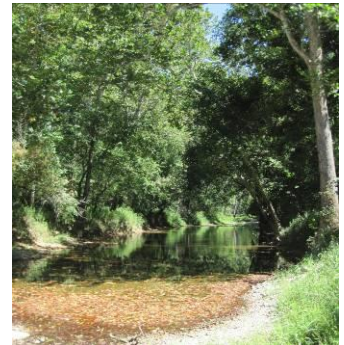


**Final**

# **Integrated Natural Resources Management Plan for the Jefferson Range Ripley County, Indiana**



***Completed 8 March 2013***





FINAL

INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN  
(INRMP)

FOR THE  
JEFFERSON RANGE  
RIPLEY COUNTY, INDIANA



INDIANA AIR NATIONAL GUARD

MARCH 2013

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# INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

## JEFFERSON RANGE

### RIPLEY COUNTY, INDIANA

#### SIGNATURE PAGE

This Integrated Natural Resources Management Plan (INRMP) is a new INRMP for Jefferson Range and has been developed due to the presence of significant natural resources on Jefferson Range. These resources include the assumed presence of a federally listed endangered species (i.e., Indiana bat) and an active wildland fire management program. It meets the requirements for INRMPs per National Guard Bureau and Air Force policy, meets the intent of the Sikes Act, as amended (16 United States Code [USC] §670a *et seq.*), and contributes to the management of natural resources on military installations.

To the extent that resources permit, the US Fish and Wildlife Service, Indiana Department of Natural Resources, and the Indiana Air National Guard by signature of their agency representative, do hereby enter into a cooperative agreement for the conservation, protection, and management of natural resources present on Jefferson Range, Indiana. The intention of this agreement is to maintain sustainable ecological communities on Jefferson Range that integrate the interests and mission of the agencies charged with conservation, protection, and management of natural resources in the public interest. This agreement may be modified and amended by mutual agreement of the authorized representatives of the three agencies. This agreement will become effective upon the date of the last signatory and shall continue in full force until terminated by written notice to the other parties, in whole or in part, by any of the parties signing this agreement.

By their signatures below, or an enclosed letter of concurrence, all parties grant their concurrence with and acceptance of the following document.

#### Approving Officials:

  
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Indiana Air National Guard  
Range Commander

  
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US Fish and Wildlife Service  
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Indiana Department of Natural Resources  
Director

8 Mar 13  
Date

02-15-13  
Date

3-7-13  
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## **ANNUAL REVIEW AND COORDINATION PAGE**

This page is used to certify the annual review and coordination of the Integrated Natural Resources Management Plan (INRMP) for Jefferson Range in Ripley County, Indiana.

With the signature below, the certifying official acknowledges that the annual review and coordination of the INRMP has occurred for the specified year.

**Approving Official:**

**Year:** \_\_\_\_\_

---

**Lt Col Kenith Stone**  
Indiana Air National Guard  
Range Commander

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Date

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## EXECUTIVE SUMMARY

The Integrated Natural Resources Management Plan (INRMP) is the primary guidance document and tool for managing natural resources at Jefferson Range by the Indiana Air National Guard (INANG). The Jefferson Range includes approximately 1,038 acres of federally owned land under the command of the INANG in Ripley County near Madison, Indiana, and surrounded by Big Oaks National Wildlife Refuge (NWR). The Jefferson Range's primary purpose is to support military training, but it contains diverse habitats and species. The natural resources management of Jefferson Range must be conducted in a way that provides for sustainable land use, complies with applicable environmental laws and regulations, and provides for no net loss in the capability to support the military mission. The INRMP provides a structure and plan to manage natural resources more effectively and ensure that Jefferson Range remains available to support the installation's military mission into the future.

This INRMP is a new INRMP and is required as a result of the assumed presence of a federally listed endangered species, Indiana bat (*Myotis sodalis*), and active wildland fire and vegetation management programs. The development of this INRMP was done in cooperation with the US Fish and Wildlife Service (USFWS) and the Indiana Department of Natural Resources (IDNR). The details of this development process and the future review process are described in **Section 1.4** of the INRMP.

The Sikes Act Improvement Act (SAIA) of 1997, 16 United States Code (USC) §670a et seq., as amended, requires federal military installations with significant natural resources to develop a long-range INRMP and implement cooperative agreements with other agencies. An INRMP is required by Department of Defense (DoD) and US Air Force (USAF) Policy for the Jefferson Range because the INANG conducts military training that requires conservation measures to minimize impacts (e.g., wildland fire management, vegetation management, invasive species control), is assumed to have listed species, and sustains natural resources. The INRMP is intended to be consistent with the SAIA. Specific goals identified by the INRMP are:

GOAL PM: Manage natural resources in a manner that is compatible with and supports the military mission while complying with applicable federal and state laws and USAF regulations and policies.

GOAL SO: Manage soils to minimize sediment loss and erosion, while protecting water quality.

GOAL WA: Maintain water resources so they remain resilient and with no net loss of acreage or functions and values.

GOAL VE: Manage vegetation to maintain grasslands, forests and other habitats using cost effective and sustainable methods.

GOAL FW: Maintain fish and wildlife populations while minimizing potential impacts to the military mission.

GOAL TE: Manage rare species using an ecosystem approach, while maintaining the military mission at Jefferson Range.

GOAL FI: Minimize risk and maximize ecological benefits by continuing the wildland fire program.

GOAL IN: Minimize impacts of invasive and pest species, while minimizing the use of chemicals to manage those species, utilizing an integrated pest management approach.

These goals are supported in the INRMP by objectives and projects, as well as management strategies and specific actions to achieve these goals. Goals and objectives are listed in **Section 4.0** of the INRMP, and activities and projects are summarized in **Tables 8 and 9** of **Section 5.0**. These goals will ensure the success of the military mission and conservation of natural resources. The general philosophies and methodologies used throughout the Jefferson Range natural resources management program are focused on conducting doctrinally required military training while maintaining ecosystem viability and sustainability.

This INRMP provides a description of the installation and the military mission, information regarding the environment on Jefferson Range, and specific natural resource management programs designed for successful and sustainable military training. The implementation of this INRMP at the Jefferson Range will ensure the successful accomplishment of the INANG's military missions while promoting adaptive management that sustains ecosystem and biological integrity and provides for multiple uses of natural resources. It will also ensure that efforts at Big Oaks NWR and Jefferson Range are integrated, as much as possible, given the differences in ownership, mission and natural resources present.

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## 1.0 INRMP OVERVIEW

### 1.1 Purpose & Scope

The Integrated Natural Resources Management Plan (INRMP) is the primary guidance document and tool for managing natural resources at Indiana Air National Guard's (INANG's) Jefferson Range. Jefferson Range includes approximately 1,038 acres of federally owned land under the command of the INANG in Ripley County near Madison, Indiana. The Jefferson Range must provide a variety of environmental conditions and habitats in which to train airmen. The management of Jefferson Range must be conducted in a way that provides for sustainable, healthy ecosystems, complies with applicable environmental laws and regulations, and provides for no net loss in the capability of military installation lands to support the military mission of the installation. Installation commanders can use INRMPs to manage natural resources more effectively to ensure that installation lands remain available and in good condition to support the installation's military mission over the long term.

This INRMP is intended to be consistent with the Sikes Act Improvement Act (SAIA) of 1997, 16 United States Code (USC) §670a et seq., as amended and Air Force Instruction (AFI) 32-7064, *Integrated Natural Resources Management* as required by the Department of Defense (DoD) and National Guard Bureau (NGB) (see **Section 1.2** for more information). This INRMP integrates all aspects of natural resources management with the rest of the Jefferson Range's mission, and therefore becomes the primary tool for managing the Jefferson Range's ecosystem and habitat while ensuring the successful accomplishment of the military mission at the highest possible levels of efficiency. The INRMP is the guide for the management and stewardship of all natural resources present on the Jefferson Range. A multiple-use approach will be implemented to allow for the presence of mission-oriented activities, as well as protecting environmental quality through the efficient management of natural resources. This is the first INRMP developed for the Jefferson Range.

There are significant natural resources present at Jefferson Range and some unique management limitations. Jefferson Range is part of the former Jefferson Proving Ground (JPG), a training and testing facility managed by the United States (US) Army that was decommissioned in the mid-1990s (US Army 1995). As a result, there is a large amount of unexploded ordinance (UXO) throughout the former JPG which severely limits certain land management activities, such as biological surveys, wetland delineations and vegetation management. The biodiversity and habitat quality on former JPG land is very high as a result of the wildland fire history and land use since JPG's creation. In 1996 the US Fish & Wildlife Service (USFWS) began managing the natural resources within the former JPG land, and in 2000 the land was designated as the Big Oaks National Wildlife Refuge (NWR). Jefferson Range is surrounded by the Big Oaks NWR

(see **Map 1**). A Memorandum of Agreement (MOA) was signed in 2000 by US Army, US Air Force (USAF) and USFWS that identifies the responsibilities of each party (see Appendix H). A portion of the natural resources management on Jefferson Range is conducted by USFWS personnel from Big Oaks NWR, while the INANG is responsible for the management around the former JPG installation fence and a number of roads (see **Section 2.1** for more information). The primary drivers for developing an INRMP for Jefferson Range are the presumed presence of Indiana bat (*Myotis sodalis*; federally listed endangered species) and the need for a proactive wildland fire management program. Indiana bats have been documented on Big Oaks NWR and similar habitat occurs on Jefferson Range. This same situation is also true for a number of state-listed species (see **Section 4.7** and **Appendix E** for more details). Furthermore, the nature of military training (see **Section 2.5** for details) on Jefferson Range results in high wildfire risk and requires an active wildland fire management program (see **Section 4.8** for details). There is also an active vegetation management program to maintain open grasslands to support the military training (see **Section 4.5** for details).

## 1.2 Authority & Regulatory Compliance

### 1.2.1 Natural Resources Laws, Regulations & Policy

The **SAIA** requires federal military installations with adequate wildlife habitat to develop a long-range INRMP and implement cooperative agreements with other agencies. The SAIA requirements are described above and in **Section 1.4**.

The **DoD Instruction (DoDI) 4715.03, *Natural Resources Conservation Program***, dated 18 March 2011, identifies the DoD policies and procedures concerning natural resources management and INRMP reviews, public comment, and endangered species consultation. INRMPs are required to be jointly reviewed by the USFWS, state conservation agency, and military proponent for operation and effect on a regular basis, but not less often than every five years. Minor updates and continued implementation of an existing INRMP do not require an opportunity for public comment. Major revisions to an INRMP do require an opportunity for public review. The degree of endangered species consultation when updating or revising an INRMP depends upon the management strategies identified in the INRMP and the amount of past consultation. Most updates and revisions will not require formal consultation. Endangered Species Act (ESA) Section 7 consultation is required for INRMPs that contain management strategies that may affect federally listed species or critical habitat. The need for such consultation should become apparent during the review for operation and effect and implemented if necessary as part of a revision.

**AFI 32-7064, *Integrated Natural Resources Management***, dated 17 September 2004, provides guidance on how the USAF implements the SAIA. This guidance addresses what an INRMP is, its purpose, who prepares it, the criteria for

determining which installations require an INRMP, coordination requirements, reporting requirements, review requirements, ESA consultation requirements, public access policies, the requirement for no net loss of capability to support military training, and a few other topics. This is a general guidance document on the purpose, development, implementation, and update/ revision of INRMPs. It requires INRMPs to be developed jointly with the USFWS and state conservation agency. It requires INRMPs to support the military mission and details the review process with emphasis on joint annual reviews and review for operation and effect no less than every five years. The guidance also indicates that the review for operation and effect will determine if a revision is required. A revision is not required if the cooperating agencies agree that an INRMP is meeting the intent of the Sikes Act. Instead, the INRMP can be updated as necessary and implementation continued.

In addition to these three fundamental INRMP regulations and guidance, this INRMP has been prepared pursuant to applicable federal, state, local, and USAF laws, regulations and policies that pertain to natural resources management on military land, which are summarized in **Appendix K**.

### 1.2.2 NEPA Compliance

The Environmental Impact Analysis Process (EIAP) is the process by which federal agencies facilitate compliance with environmental regulations. The primary legislation affecting these agencies' decision-making process is the National Environmental Policy Act of 1969 ([NEPA]; 42 USC 4321 *et seq.*). NEPA requires that federal agencies consider potential environmental consequences of proposed actions. The law's intent is to protect, restore, or enhance the environment through well-informed federal decisions. The Council on Environmental Quality (CEQ) was established under NEPA for the purpose of implementing and overseeing federal policies as they relate to this process.

The adoption of an INRMP can be considered a major federal action as defined by Section 1508.18 of the CEQ regulations. USAF policy requires an analysis of potential environmental impacts for the implementation of an INRMP, although a complete Environmental Assessment (EA) is not necessarily required, as individual actions and projects undergo their own NEPA analysis (See **Section 3.3**). The environmental impact analysis is presented in **Section 6** in this INRMP and can be used to develop project-specific analyses in the future.

CEQ regulations require intergovernmental notifications prior to making any detailed statement of environmental impacts. Through the Interagency and Intergovernmental Coordination for Environmental Planning (IICEP) process, the INANG notifies relevant federal, state, and local agencies and allows them sufficient time to make known their environmental concerns specific to a Proposed Action. Comments and concerns submitted by these agencies during the IICEP process are subsequently incorporated into the analysis of potential

environmental. This coordination fulfills requirements under Executive Order (EO) 12372, *Intergovernmental Review of Federal Programs*, and AFI 32-7060, *IICEP*. Furthermore, public participation in decision making on new proposals is required. Consideration of the views and information of all interested persons promotes open communication and enables better decision-making. Agencies, organizations, and members of the public with a potential interest in the Proposed Action, including minority, low-income, disadvantaged, and Native American groups, are urged to participate. A record of public involvement, agency coordination, and Native American consultation associated with this NEPA analysis is provided in **Appendix L**.

The EIAP for the implementation of the Jefferson Range INRMP was conducted in accordance with NEPA, CEQ *Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act* (40 Code of Federal Regulations [CFR] §1500-1508), and 32 CFR 989. The EIAP and decision-making process for the Proposed Action (implementation of the Jefferson Range INRMP) involves a thorough examination of all environmental issues pertinent to the action proposed. Impact evaluations contained in **Section 6** of this INRMP determined that no significant environmental impacts would result from implementation of the Proposed Action or any identified alternative. This determination is based on thorough review and analysis of existing resource information, and coordination with knowledgeable, responsible personnel from the Jefferson Range, Big Oaks NWR, and other relevant local, state, and federal agencies.

The EIAP for the implementation of the Jefferson Range INRMP does not include an analysis of effects for individual actions or projects described in **Section 5** of the INRMP. Individual actions or projects that have the potential to impact the environment will be analyzed separately in accordance with the NEPA process described in **Section 3.3**.

### 1.3 Responsibilities

The INRMP has been organized to ensure the implementation of year-round, cost-effective management activities and projects that meet the requirements of Jefferson Range. Various organizations on Jefferson Range are responsible for the implementation of the INRMP and are described in the following subsections. Due to the nature of Jefferson Range, the responsibilities are spread across multiple organizations within the INANG as well as the Big Oaks NWR and the US Army. **Section 2.1** provides more detail on the organization structure and relationship amongst all the parties. The Joint Forces Air Component Headquarters Detachment 2, Indiana Air Guard (JFAC-IN-DET2) is the organization with the primary responsibility for operation of Jefferson Range. The 181<sup>st</sup> Intelligence Wing (181 IW) is the organization with the INANG that generally has responsibility for environmental management.



### **1.3.1 INRMP Working Group**

The INRMP Working Group will be responsible for the overall implementation of the INRMP. The INRMP Working Group will be made up of the key Jefferson Range personnel from the host unit (i.e., JFAC-IN-DET2), 181 IW, National Guard Bureau, Asset Management Division, Environmental Branch (NGB/A7AN), and Big Oaks NWR and will assume an oversight role to ensure the effective implementation of this INRMP. Top and mid-level management representation, as well as representation from several individuals with day-to-day on-Range field experience, will provide the INRMP Working Group with the leadership and structure necessary for the successful implementation of this INRMP. The INRMP Working Group is also essential for internal environmental awareness (see **Section 3.1**).

### **1.3.2 Range Command—JFAC-IN-DET2/CC**

The Range Command at Jefferson Range (JFAC-IN-DET2/CC) includes three primary officers in charge: Range Commander, Range Operations Officer and Range Non-Commissioned Officer-In-Charge (NCOIC). All three have responsibility for the management and daily operations of Jefferson Range, including natural resources management and coordination with Big Oaks NWR. Range Command has responsibility for minimizing Bird/Wildlife Aircraft Strike Hazard (BASH) risk, ensuring the military users are aware of BASH conditions and coordinating with 122<sup>nd</sup> Fighter Wing (122 FW) Safety Officer. JFAC-IN-DET2/CC will ensure the implementation of the INRMP to the fullest extent practicable based on funding and manpower availability and in compliance with the MOA and in coordination with Big Oaks NWR.

### **1.3.3 NGB/A7AN Natural Resources Manager**

The NGB Environmental Conservation (NGB/A7AN) Natural Resources Manager tracks DoD and USAF policies and approves funding for projects or studies identified as a priority in this INRMP. Deviation from the projects proposed in this Plan will be independently reviewed by the NGB/A7AN Natural Resources Manager. The NGB/A7AN Natural Resources Manager acts as a technical point-of-contact on all natural resource-related activities. Projects proposed in this INRMP are reviewed by the Jefferson Range Command staff and the NGB/A7AN Natural Resources Manager.

### **1.3.4 Environmental Manager—181 IW/EM**

The 181 IW/EM currently provides support to Jefferson Range for environmental issues, such as pest management, cultural resources management and other environmental requirements. The role of the 181 IW Environmental Manager (EM) in implementing the INRMP is limited to ensuring that activities associated with the implementation of this INRMP adhere to applicable federal, state, local, and USAF environmental regulations and policies.

### **1.3.5 Safety Officer—122 FW/SE**

The 122 FW/SE, in conjunction with the Safety Representative at Jefferson Range, is responsible for implementing all activities presented in this Plan that pertain to the BASH Reduction Program. The 122 FW/SE also ensures that bird/wildlife strikes resulting from aircraft training at Jefferson Range are accurately documented and reported to the USAF BASH Team, Kirtland Air Force Base (AFB), New Mexico. The primary safety concern at Jefferson Range is the abundant UXO present throughout the former JPG, including Jefferson Range. Managing UXO risk is paramount for all on-the-ground activities.

### **1.3.6 Legal—INANG LG**

The Legal office is responsible for ensuring that the implementation of the management objectives contained within this INRMP meet all of the INANG's and the INANG's regulatory and statutory requirements that pertain to natural resources management. The legal office will review any future natural resources management proposals and alert the JFAC-IN-DET2/CC and 181 IW/EM should there be any regulatory conflicts or shortfalls. In addition, the legal office will keep the JFAC-IN-DET2/CC and 181 IW/EM informed of any new statutes or regulations that might affect natural resources management on the Jefferson Range.

### **1.3.7 Civil Engineer—181 IW/CE**

The 181 IW/CE is responsible for infrastructure maintenance and new construction on the Jefferson Range. The Jefferson Range receives support assistance from 181 IW/CE for new construction and major maintenance. Day-to-day operations and maintenance is performed by JFAC-IN-DET2 Range personnel. Jefferson Range has its own Operations and Maintenance Budget that is provided by the INANG.

### **1.3.8 US Fish & Wildlife Service**

In addition to the usual role of the USFWS Field Office and Ecological Services during INRMP development, review and implementation, the USFWS also plays a significant role in the natural resources management at Jefferson Range due to the nature of the relationship between Big Oaks NWR, Jefferson Range and the US Army (refer to MOA in **Appendix H**). Jefferson Range does not have any natural resources staff on site or available remotely, so the availability of expertise from Big Oaks NWR is essential to natural resources management on Jefferson Range. The Big Oaks NWR Refuge Manager provides natural resources management expertise, particularly wildland fire and vegetation management, to Jefferson Range. The Refuge Manager occasionally provides additional USFWS staff to assist Jefferson Range. Staffing requirements for the management of natural resources when it is not practicable to use DoD personnel is set forth in Section 2.10 of AFI 132-7064.

SAIA (16 USC 670c-1) provides the DoD and its entities the authority to enter into cooperative agreements with any appropriate entity in support of developing and/or implementing an INRMP for a specific facility. In 2006, DoD entered into a tripartite Memorandum of Understanding (MOU) with USFWS and the International Association of Fish and Wildlife Agencies that includes INRMP-specific cooperation as well as encouraging DoD entities to enter into cooperative agreements with the USFWS and state agencies to assist with INRMP implementation. In addition, the Economy Act (31 USC 1535 and 1536) allows a federal agency to enter into an agreement with another federal agency, when the services can be rendered in a more convenient and cost effective manner by another federal agency.

### **1.3.9 Indiana Department of Natural Resources**

The IDNR also provides technical assistance to Jefferson Range and is a partner in the development and review of this INRMP, along with the USFWS. IDNR has a district wildlife biologist that is familiar with the species and ecology on Jefferson Range and Big Oaks NWR. The district biologist can provide technical assistance when needed.

## **1.4 Review & Revision Process**

### **1.4.1 Review for Operation and Effect**

Not less than every five years, the INRMP will be reviewed for operation and effect to determine if the INRMP is being implemented as required by the SAIA and contributing to the management of natural resources at the Jefferson Range. The review will be conducted by the three cooperating parties to include the commander responsible for the INRMP, the Regional Director of the USFWS, and Director of the IDNR. While these are the responsible parties, technical representatives generally are the personnel who actually conduct the review.

The review for operation and effect will either conclude that the INRMP is meeting the intent of the SAIA and it can be updated and implementation can continue; or that it is not effective in meeting the intent of the SAIA to conserve natural resources while providing for no net loss in training capability and it must be revised. The conclusion of the review will be documented in a jointly executed memorandum, meeting minutes, or in some other way that reflects mutual agreement.

If only updates are needed, they will be done in a manner agreed to by all parties. The updated INRMP will be reviewed by the local USFWS office, USFWS Regional Director, and IDNR Director. Once concurrence letters or signatures are received from USFWS Regional Director and the IDNR Director, the update of the INRMP will be complete and implementation will continue. Generally, the EA and associated analysis will continue to be applicable to updated INRMPs and a new NEPA analysis will not be required.

If a review of operation and effect concludes that an INRMP must be revised, there is no set time to complete the revision. The existing INRMP remains in effect until the revision is complete and USFWS and IDNR concurrence on the revised INRMP is received. The INANG will endeavor to complete such revisions within 18 months depending upon funding availability. Revisions to the INRMP will go through a more detailed review process similar to development of the initial INRMP to ensure INANG military mission, USFWS, and IDNR concerns are adequately addressed and the plan meets the intent of the SAIA.

#### **1.4.2 Annual Reviews and Coordination**

Per DoD policy, the INANG will review the INRMP annually in cooperation with the USFWS and IDNR. On an annual basis, the INANG will invite the USFWS Regional Office, the USFWS local field office, the IDNR, and NGB/A7AN to attend a meeting or participate in a conference call to review previous year INRMP implementation and discuss implementation of upcoming programs and projects. Invitations will be either by letter or email. Attendance is at the option of those invited, but at minimum the USFWS local field office and one representative of IDNR are expected to attend. The meeting will be documented with an agenda, meeting minutes and sign in roster of attendees.

At this annual meeting the need for updates or revisions will be discussed. If updates are needed, the INANG will initiate the updates and after agreement of all three parties they will be added to the INRMP. If it is determined that major changes are needed, all three parties will provide input and an INRMP revision will be initiated with the INANG acting as the lead coordinating agency. The annual meeting will be used to help expedite the more formal review for operation and effect and if all parties agree and document their mutual agreement, it can fulfill the requirement to review the INRMP for operation and effect.

If not already determined in previous annual meetings, by the fourth year annual review a determination will be made jointly to continue implementation of the existing INRMP with updates or to proceed with a revision. If the parties feel that the annual reviews have not been sufficient to evaluate operation and effect and they cannot determine if the INRMP implementation should continue or be revised, a formal review for operation and effect will be initiated. The determination on how to proceed with INRMP implementation or revision will be made after the parties have had time to complete this review.

As part of the annual review, the INANG will specifically:

- Invite feedback from the USFWS and IDNR on the effectiveness of the INRMP
- Inform the USFWS and IDNR which INRMP projects and activities are required to meet current natural resources compliance needs

- Document specific INRMP action accomplishments from the previous year

Information for the annual reviews comes from the INANG environmental staff, the Jefferson Range military leadership, cooperating agencies, project files, and NGB as applicable. Cooperating agencies may request a site visit through the JFAC-IN-DET2/CC.

### 1.5 Management Strategy & Stewardship

The INRMP was developed using an interdisciplinary approach and information gathered from a variety of organizations. Information and guidance was also solicited from a variety of federal, state, and local agencies and groups. A Task Force was formed, which included key Jefferson Range personnel, Big Oaks NWR personnel, individuals from various agencies, and groups that have an interest in Jefferson Range and the management of its resources. Representatives from the following federal and state agencies comprised the Task Force: USFWS (Ecological Services and Big Oaks NWR) and IDNR (Headquarters and District Biologists). INRMP Task Force meeting minutes and correspondence with the agencies is provided in **Appendix L**.

The INRMP Task Force ensures that information concerning the natural resources on or in the vicinity of the Jefferson Range is accurate and presented in accordance with local and regional management strategies, where feasible. This approach allows for insight into possible operational alternatives, which could result in reduced impacts on the natural resources on the Jefferson Range and in surrounding areas.

Participation on the INRMP Task Force by representatives from the USFWS and the IDNR satisfies the provisions of the SAIA (16 USC §670a et seq.) as described in **Section 1.2**. The INRMP Task Force is also the venue for achieving mutual agreement of the parties concerning conservation, protection, and management of fish and wildlife resources, as well as for completing the annual reviews and 5-year reviews for operation and effect as described in **Section 1.4**.

The INRMP presents practicable alternatives and recommendations that allow for the protection and enhancement of natural resources and conservation of existing ecosystems, while minimizing impacts on the military mission at the Jefferson Range. Consequently, the implementation of some of these recommendations may sacrifice improvement of the Jefferson Range natural resources in deference to the safety and efficiency of the military mission.

Enabling long-term use of Jefferson Range for military training is the primary purpose of natural resources management at the Jefferson Range. The Jefferson Range INRMP is a military mission-driven plan, created with the paired goals:

- To allow for and support the conduct of military training at levels necessary to maintain a full readiness posture for national defense and civil missions; and
- To provide for sustainable management of natural resources with an ecosystem focus, consistent with federal, state, and local regulations.

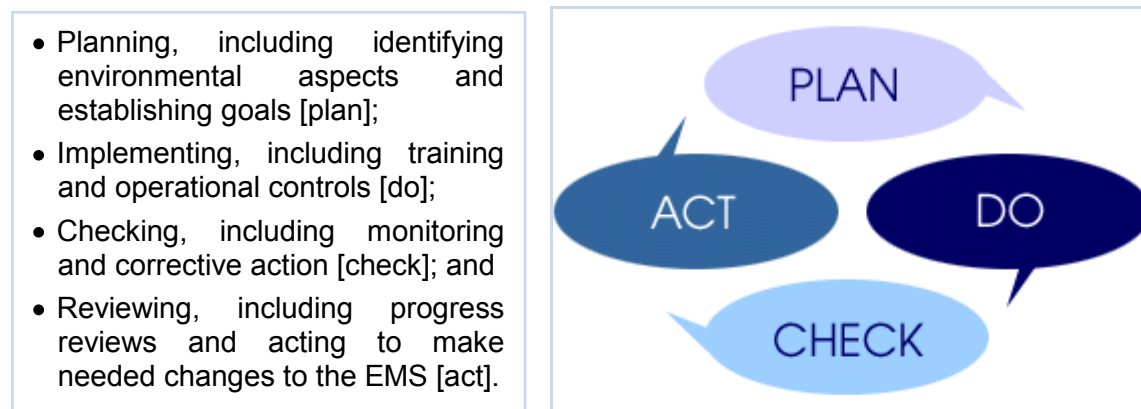
The INANG embraces the concept of integrating holistic natural resources management with mission activities. The INANG recognizes that on-going military training and associated mission activities can consume and potentially damage the natural resources on mission land, and that successful execution of their mission in perpetuity is dependent upon sustainable land use and the conservation of these natural resources. The INANG is committed to the planned, deliberate management of natural resources, supporting the installation operational mission, meeting or exceeding stewardship requirements, partnering in local and regional conservation initiatives, and enhancing the quality of life for its personnel and guests.

The INANG recognizes that it is a steward of publicly-owned natural resources and, as compatible with the military mission and Jefferson Range safety and security requirements, that it has a responsibility to provide access for the use and enjoyment of these resources in a manner consistent with the resources' ability to support such use. The INANG also recognizes the responsibility to ensure that the natural resources entrusted to their care are sustained in a healthy condition.

### **1.5.1 Environmental Management System**

The NGB/A7AN and INANG consider the Jefferson Range to be part of the combined INANG operations in Indiana. The Environmental Management System (EMS) is part of the overall INANG management system, and includes organizational structure, planning, responsibilities, practices, procedures and processes, and resource allocation for developing, implementing, achieving, reviewing, and maintaining environmental commitments. The International Standards Organization (ISO) 14001 EMS model used by the INANG leads to continual improvement based upon a cycle of —plando, check, act”:

The EMS is continually updated through this cycle, fine-tuning its management of operations that may harm the environment. This continual improvement cycle is a fundamental attribute of the EMS that allows the system to adapt to the dynamic nature of the organization's operations. The INRMP process is this process: develop an INRMP and identify specific actions, implement the plan and do the actions, conduct annual and 5-year review to monitor implementation, and modify plan accordingly.



**Figure 1. EMS Process from US Environmental Protection Agency (USEPA)**

This INRMP directly supports the INANG's and the NGB/A7AN's EMS. Annual review of the INRMP in conjunction with the USFWS, IDNR, and other state agencies will be conducted in order to support the concept of EMS. Annual reviews are discussed in **Section 1.4** and monitoring of implementation is discussed in **Section 5**.

### 1.5.2 Ecosystem Management

Natural resources at Jefferson Range will be managed with an ecosystem management approach as directed by AFI 32-7064 and Department of Defense Instruction (DoDI) 4715.03 (Natural Resources Conservation Program). Ecosystem management may be defined as management to restore and maintain the health, sustainability, and biological diversity of ecosystems while supporting sustainable economies and communities. The goal of ecosystem management on military lands is to ensure that military lands support present and future training and testing requirements while preserving, improving, and enhancing ecosystem integrity. As described in DoDI 4715.03, ecosystem management will incorporate the following elements as described in **Table 1**.

| <b>Table 1. Elements and Principles of Ecosystem Management</b> |   |
|---|---|
| <b>DoDI 4715.03 Elements</b>                                    |   |
| <b>1</b>  | Avoid single-species management and implement an ecosystem-based multiple species management approach, insofar as that is consistent with the requirements of the ESA |
| <b>2</b>  | Use an adaptive management approach to manage natural resources such as climate change  |
| <b>3</b>  | Evaluate and engage in the formation of local or regional partnerships that benefit the goals and objectives of the INRMP   |
| <b>4</b>  | Use the best available scientific information in decision-making and  |

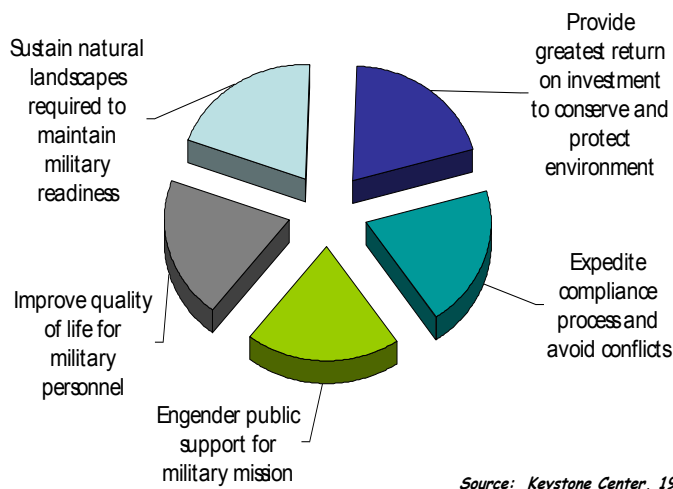
|                               |   |
|-------------------------------|---|
|                               | adaptive management techniques in natural resource management   |
| <b>5</b>                      | Foster long-term sustainability of ecosystem services   |
| <b>AFI 32-7064 Principles</b> |   |
| <b>1</b>                      | Maintain or restore native ecosystem types across their natural range where practical and consistent with the military mission  |
| <b>2</b>                      | Maintain or restore ecological processes such as wildland fire and other disturbance regimes where practical and consistent with the military mission   |
| <b>3</b>                      | Maintain or restore the hydrological processes in streams, floodplains, and wetlands when feasible  |
| <b>4</b>                      | Use regional approaches to implement ecosystem management on an installation by collaboration with other DoD components as well as other federal, state and local agencies, and adjoining property owners   |
| <b>5</b>                      | Provide for outdoor recreation, agricultural production, harvesting of forest products, and other practical utilization of the land and its resources, provided that such use does not inflict long-term ecosystem damage or negatively impact the USAF mission |

Biodiversity is the degree of variation of life forms within a given ecosystem, biome, or an entire planet. The DoD's challenge is to manage for biodiversity in a way that supports the military mission. The INRMP is identified by DoD as the primary vehicle for conserving biodiversity on military installations. Specific management practices identified in this INRMP have been developed to enhance and maintain biological diversity within the ecosystem at the Jefferson Range. The outcome of biodiversity conversation on DoD land includes the items listed in **Table 2**.

| <b>Table 2. Outcomes of Biodiversity Conservation</b> |  |
|---|--|
| <b>Outcomes</b>                                       |  |
| <b>1</b>  | Maintain or restore remaining native ecosystem types across their natural range of variation   |
| <b>2</b>  | Maintain or reestablish viable populations of native species on an installation, when practical  |
| <b>3</b>  | Maintain ecological processes, such as disturbance regimes, hydrological processes, and nutrient cycles, to the extent practicable   |
| <b>4</b>  | Manage and monitor resources over sufficiently long time periods to allow for adaptive management and assessment of changing ecosystem dynamics (i.e., incorporate a monitoring component to management plans) |



## Why Conserve Biodiversity on Military Lands?



**Figure 2. Why Conserve Biodiversity on Military Lands?**

Ecosystem management includes biodiversity conservation and invasive species control as integral parts of ecosystem management. USAF installations should maintain or reestablish viable populations of all native species when practical and consistent with the military mission. USAF installations should also identify the presence of exotic and invasive species, and implement programs to

control and/or eradicate those species. When feasible, USAF installations should develop joint control strategies with other federal, state, and local cooperating agencies and adjacent landowners to increase the effectiveness of control measures.

### 1.5.3 Goals & Objectives

Goals and objectives provide the framework for the natural resources management programs. Goals provide a general guiding direction for each technical area and logical objectives that facilitate achieving those goals are described for any priority issues within each technical area. The objectives then drive the development of activities and projects to achieve those objectives. Goals and objectives are described in **Section 4.0** under each technical area. Activities and projects, and the objectives they support, are described in **Tables 8 and 9** in **Section 5.0**. Due to the nature and size of Jefferson Range, the INANG supports Big Oaks NWR in its efforts at landscape management. The activities and projects undertaken at Jefferson Range are often at a much smaller scale. Below are the goals identified in **Section 4.0**:

**GOAL PM:** Manage natural resources in a manner that is compatible with and supports the military mission while complying with applicable federal and state laws and USAF regulations and policies.

**GOAL SO:** Manage soils to minimize sediment loss and erosion, while protecting water quality.

**GOAL WA:** Maintain water resources so they remain resilient and with no net loss of acreage or functions and values.

**GOAL VE:** Manage vegetation to maintain grasslands, forests, and other habitats using cost effective and sustainable methods.

GOAL FW: Maintain fish and wildlife populations while minimizing potential impacts to the military mission.

GOAL TE: Manage rare species using an ecosystem approach, while maintaining the military mission at Jefferson Range.

GOAL FI: Minimize risk and maximize ecological benefits by continuing the wildland fire program.

GOAL IN: Minimize impacts of invasive and pest species, while minimizing use of chemicals to manage those species, utilizing an integrated pest management approach.

## 1.6 Integration with Other Plans

By its nature, an INRMP is multidisciplinary and provides the summary for natural resources at a specific installation. As a result, information from an INRMP is incorporated into other plans and other plans help identify management priorities and potential impacts to natural resources. The INRMP is integrated with a number of INANG plans including:

- Comprehensive Range Plan – long-term plan for the military mission at Jefferson Range (INANG 2010).
- Wildland Fire Management Plan (from Big Oaks NWR, included in **Appendix J**) – provides summary of the wildland fire program, including training, techniques, processes, responsibilities, and cooperators (Winters and Robb 2006).
- Integrated Cultural Resources Management Plan (ICRMP) – plan for management of cultural resources, including consultation and other legal requirements, known cultural resources, processes and responsibilities (INANG 2011b).
- Integrated Pest Management Plan (IPMP) – plan for management of pest species, including nuisance wildlife and invasive species, to minimize impact to mission, natural resources and the environment (INANG 2011a).

In addition, due the relationship with Big Oaks NWR, this INRMP will also be integrated with the Comprehensive Conservation Plan for Big Oaks NWR, as well as the Wildland Fire Management Plan listed above (See **Section 3.9**).

## 2.0 INSTALLATION INFORMATION

### 2.1 General Description

Jefferson Range is located in Ripley County in southern Indiana, immediately north of Madison, IN, approximately 30 miles northeast of Louisville, KY and 60 miles southeast of Indianapolis, IN. Jefferson Range is surrounded by the Big Oaks NWR, both of which are on a portion of the former JPG. The land is still owned by the US Army and a MOA was signed in 2000 by US Army, US Air Force and USFWS that identifies the responsibilities of each party (see **Appendix H**). While Jefferson Range and Big Oaks NWR are operated by different agencies and have different missions, there is significant overlap in their daily operations and management responsibilities on the combined properties. The presence of over 1.5 million rounds of live UXO has influenced the real estate agreements and land management activities on former JPG land and is the reason US Army retains ownership of the land.



**Figure 3. Location of Jefferson Range within Indiana.**

**Figure 3** and **Map 1** show Jefferson Range in relation to southern Indiana, and the surrounding region. Jefferson Range comprises approximately 1,038 acres and encompasses three parcels. The primary range is 983 acres and includes all the headquarters buildings and range tower. The second range is 50 acres located 6 miles south of the primary range and is a precision guided missile range for inert munitions. Jefferson Range also includes the Old Timbers Lodge and the 5 acres associated with its driveway and grounds. The INANG is also responsible for the maintenance of four historic stone arch bridges, one historic

schoolhouse, and the boundary fence as well as several roads including the perimeter and those that lead to the primary range and secondary range.. An overview of Jefferson Range and its facilities is provided in **Map 2**. An aerial image of Jefferson Range is provided in **Map 5**. All maps are provided in **Appendix C** and only the map number is referenced in this INRMP.

The primary access to the range is through Big Oaks NWR off US Highway 421, which runs along the southeastern border of Big Oaks NWR. There are a limited number of access points through locked gates from Old Michigan Road on the east side of Big Oaks NWR (see **Map 4**). Access directly into the primary range and headquarters of Jefferson Range is through an additional set of locked gates.

Big Oaks NWR is surrounded by a chain-link fence that is 55 miles long, which is maintained by Jefferson Range to provide controlled access to the ranges. There are significant risks for trespassers in the form of UXO and depleted uranium (DU) and active range use. As a result, all interior road barricades to the primary and secondary ranges are closed and all access is tightly controlled. In addition there is extensive and regular coordination with the Big Oaks NWR to ensure there are no users at risk. During training events, interior road barricades are closed and locked to prevent inadvertent access. All Big Oaks NWR visitors are given a briefing on safety concerns and access policies.

There is an extensive system of internal roads on Big Oaks NWR and Jefferson Range, primarily remnants of the road network on the former JPG. Jefferson Range is responsible for 20 miles of paved road and 37 miles of gravel road within the fenceline, which includes roads on Big Oaks NWR that are essential for range use. These roads also provide firebreaks during wildland fire activities (See **Section 4.8**).

## 2.2 Regional Land Use

The immediate area surrounding Jefferson Range is the Big Oaks NWR. Jefferson Range and Big Oaks NWR are generally comprised of forest and native prairie habitats. Big Oaks NWR extends into Jefferson and Jennings Counties as well as Ripley County. The area outside Big Oaks NWR is mainly farmland mixed with woodlands and riparian corridors (see **Map 5**). The nearest city is Madison, which is located approximately 6 miles south of the main entrance to Big Oaks NWR and near the southern boundary. A few small towns occur along the eastern perimeter of Big Oaks NWR, including Belleview, Bryantsburg, and New Marion. New Marion is the closest town to the Jefferson Range headquarters (i.e., primary parcel). Versailles is located about 6 miles to the northeast, while North Vernon is located about 6 miles to the northwest of the northern boundary of Big Oaks NWR. There are a handful of other small towns around the northern and western boundary of Big Oaks NWR, but they are at least one mile from the boundary. According to the US Census Bureau (2011), the population of Ripley County was 28,818. Current population levels represent

an 8.7 percent increase from 2000. In general, populations have remained fairly stable in the area and land use has not changed greatly. While the local population has grown over the past decade, land use has changed very little in the immediate vicinity of the Jefferson Range and Big Oaks NWR.

There are a number of other public lands in the area surrounding Big Oaks NWR, including, Crosley State Fish and Wildlife Area, Selmier State Forest, Clifty Falls State Park and Versailles State Park. There are also a number of county parks scattered throughout the three counties. Crosley State Fish and Wildlife Area includes 4,228 acres to the west of Jefferson Range, and is primarily wooded and includes about 7 miles of the Muscatatuck River. Selmier State Forest includes 355 acres to the northwest of Jefferson Range, and is wooded with access to the Muscatatuck River. Fishing, hunting, and other outdoor recreational uses are permitted on State Fish and Wildlife Areas and State Forests, but there are few park amenities. Clifty Falls State Park includes 1,416 acres to the south of Jefferson Range near Madison, and has waterfalls, caves and sinkholes. Versailles State Park includes 5,988 acres to the northeast of Jefferson Range. Both state parks have typical park amenities, such as campgrounds, pool and trails, limited hunting or fishing and a number of organized events.

### 2.3 Installation History

Prior to World War II, this area was used for farming and grazing similar to what is found today outside the Big Oaks NWR boundary. On 8 October 1940 the War Department established a 55,264-acre tract of land in southeast Indiana known as the JPG. Assigned to the Ordnance Department, Army Services Forces, the installation's principal mission was the production, acceptance, and specification testing of all types of ammunition, projectiles, propellants, cartridge cases, primers, fuses, boosters, bombs, and grenades. The JPG operations began in May 1941. Peak periods of activity occurred during World War II, the Korean War, and the Vietnam War. Maximum production testing of 175,000 rounds per month and the highest employment at 1,774 personnel were reached in support of the Korean War in 1953.

Following each period of conflict, activities at the JPG significantly decreased. After World War II, the JPG became a sub-installation to the Indiana Arsenal and was briefly placed on standby status. From 1958-1961 it was again placed on standby status and partially deactivated, with some facilities leased to the private sector. In the early 1980s, increased emphasis on national defense, readiness capability, and conventional warfare brought about modest increases and diversification in production acceptance testing. Just prior to notification of closure in 1988, the JPG was in the process of increasing its productivity by 25 percent and planning to modernize its facilities.

In 1976, Jefferson Range was established within JPG for use by the USAF and INANG as overflow from Camp Atterbury. In December 1988, the JPG was included on the *Base Realignments and Closure (BRAC), Report of the Defense Secretary's Commission* and was identified for closure. Upon notification of

closure in 1989, the JPG employed approximately 450 personnel. The Army mission was terminated in September 1995. For more information on the closure of the former JPG, refer to the *Final Environmental Impact Statement (EIS) for the Disposal and Reuse of the JPG* (US Army 1995).

Between 1995 and 2000, Jefferson Range operated under their existing agreement with the US Army from 1982 and the USFWS began managing natural resources on former JPG land. After decommissioning, the firing range portion of the former JPG (51,000 acres) was included in a MOA between the US Army, USAF, and USFWS in 2000 (**Appendix H**). The MOA allowed for the continuation of Jefferson Range and the creation of Big Oaks NWR, while the US Army continued to own the property due to UXO, DU, and other contamination. The cantonment area of the former JPG was disposed of through a separate process. The continued use of the Jefferson Range includes not only the acreage described earlier for the range itself, but also monitoring for the safety fan areas as well as maintenance activities by Jefferson Range on Big Oaks NWR in support of military training (see **Section 2.5**).

For the history of Jefferson Range prior to World War II, see the ICRMP (INANG 2011b) that provides details of historic and pre-historic use and cultural resources present on Jefferson Range. Old Timbers Lodge, a significant cultural resource, and the 5 acres of land associated with the facility are maintained by the INANG through an agreement with the non-profit Big Oaks Conservation Society.

## 2.4 Military Mission

The JFAC-IN-DET2 of the INANG is responsible for the operation of and activities conducted on Jefferson Range. The INANG's federal mission is to provide combat ready personnel, aircraft, and equipment for worldwide deployment in support of USAF objectives. The INANG's state mission is to protect life and property, provide disaster relief, and ensure public safety when called upon by the Governor. The current mission of Jefferson Range is to support air-to-ground training by the Air National Guard and USAF and helicopter training by the US Army and Army National Guard.

According to the Comprehensive Range Plan (INANG 2010), the vision for Jefferson Range is to offer realistic training to aircrew with a broadening emphasis on joint exercises that includes Muscatatuck Urban Training Center (MUTC), urban warfare, and homeland defense. This will ensure supporting the core competencies of Developing Airmen, Technology to Warfare, and Integrating Operations. This vision encompasses Combat Support, Close Air Support (CAS), unmanned aerial vehicles (UAV), small arms and Conventional as well as Tactical air-to-ground training.

Jefferson Range's mission is to provide a facility for aircrews to practice the delivery of air-to-ground ordnance in the safest, most realistic environment

possible. The operations at Jefferson Range have transformed to accommodate the DoD need for joint training in an urban setting, particularly in support of joint training efforts at MUTC.

The restricted airspace associated with the former JPG has been transferred to the Military Department of Indiana for use by the INANG. The restricted airspace includes Military Operations Areas (MOAs) to the south and southwest, and Air Traffic Control Association Areas (ATCAAs) to the north and northwest. This airspace includes R3403A/B and the Ripley ATCAA. R3403A is the primary airspace that overlies the actual real estate of the former JPG, with operating limits from surface to 43,000 feet. Daily flying operations normally block airspace from surface to 24,000 feet, which allows the necessary airspace for High Altitude Release Bomb (HARB). Higher altitudes are granted via request. R3403B is limited from 1,200 feet above ground level to 18,000 feet and is used for maneuvering airspace. This airspace is located north and west of 3403A and extends the usable airspace an additional 2 miles on the west and 4 miles on the north.

The Ripley ATCAA was obtained as maneuvering airspace for high altitude deliveries and is located above 3403B with limits from 18,000 to 24,000 feet. Jefferson Range also uses several MOAs. JPG A, B, C and the -G" ATCAA lay adjacent and west of the restricted airspace while JPG —D lies to the north. These MOAs provide for tactical maneuvering and multiple re-attacks. These MOAs also provide crucial airspace for -standoff tactics".

Normal operating hours are Monday through Friday, with one or two weekends per month depending on requests. Monday is designated as a primary maintenance window. Flying periods are either AM, PM or Night operations. Operating hours can be any time of day and any day of the week, depending on the training requirements. Jefferson Range typically receives requests to fly morning, afternoon, and nights for a 16-hour day. However, manpower resources force the schedule to satisfy only two of the requested periods. Jefferson Range currently supports eight Air National Guard (ANG) units and some regular users from the Army National Guard (ARNG), USAF, and US Marine Corps (USMC). Approximately 900 sorties occur per year at Jefferson Range, with increasing ground operations (ANG 2001). **Table 3** lists the primary users of the Jefferson Range.

| Table 3. Primary Users of Jefferson Range |         |         |          |                 |
|---|---------|---------|----------|-----------------|
| Unit                                      | Type    | Service | Aircraft | Location        |
| 122 FW                                    | Regular | ANG     | A-10C    | Fort Wayne, IN  |
| 180 FW                                    | Regular | ANG     | F-16C/D  | Toledo, OH      |
| 113 ASOS                                  | Regular | ANG     | JTAC     | Terre Haute, IN |
| 123 STS                                   | Regular | ANG     | JTAC     | Louisville, KY  |

| Table 3. Primary Users of Jefferson Range |            |         |             |                       |
|---|------------|---------|-------------|-----------------------|
| Unit                                      | Type       | Service | Aircraft    | Location              |
| 160 SOAR                                  | Regular    | Army    | MH-6/MH-60  | Fort Campbell, KY     |
| 1/137 AHB                                 | Periodic   | Army    | UH-60       | Shelbyville, IN       |
| 1/137 AV RGT                              | Periodic   | Army    | UH-60/CH-47 | Rickenbacker ANGB, OH |
| 1/230 ACS                                 | Periodic   | Army    | HH-60/OH-58 | Louisville, TN        |
| 127 FW                                    | Occasional | ANG     | A-10C       | Selfridge ANGB, MI    |
| 169 ASOS                                  | Occasional | ANG     | JTAC        | Peoria, IL            |
| 19 ASOS                                   | Occasional | USAF    | JTAC        | Fort Campbell, KY     |
| HSC-26                                    | Occasional | Navy    | MH-60       | NAS Norfolk, VA       |
| 5 SFG                                     | Occasional | Army    | Helos       | Fort Campbell, KY     |
| 8/229 AV RGT                              | Occasional | Army    | AH-64       | Fort Knox, KY         |
| Source: ANG 2012                          |            |         |             |                       |

## 2.5 Operations & Infrastructure

### 2.5.1 Military Training Facilities and Activities

Jefferson Range consists of approximately 1,038 acres with approximately 1,033 acres designated for air-to-ground training. The remaining 5 acres consist of Old Timbers Lodge property. The safety buffer is primarily located on Big Oaks NWR. There are no croplands or grazing permits on Jefferson Range. As a result of the UXO and DU limitations, there is no foot or vehicle training outside the cantonment area or away from established roads.

Jefferson Range facilities include the headquarters building, range tower, storage concrete bunker, equipment maintenance and storage facility, heavy equipment barn, flank tower, office building, overflow housing building, helipad, four storage sheds and one hazardous waste storage building (see **Map 3**). The range tower and headquarters building and potable waterline are all recently built to support range operations (INANG 2010).

The primary training facilities consist of an air-to-ground range located in the northern parcel with the headquarters buildings, range towers, and laser scoring system. The primary bombing range offers a variety of tactical targets in support of aircrew training. Targets are designed and constructed in an attempt to create scenarios that may be encountered in combat situations. In addition to tactical targets, one conventional bomb circle and conventional strafe pits are maintained. Target scenarios include strafe pits, bunkers, communications stations, a mock convoy of various sized tanks, and mock aircraft. The mock



runway is not certified nor maintained for landing any aircraft; it only exists for visual recognition and delineation of the impact area.

Air-to-ground ranges are controlled areas where military aircraft are able to train in air-to-ground weapons delivery operations. Aircraft approach a designated range, "acquire" (i.e., locate) a practice target on the ground surface, and then fire or release their weapons at the target. Aircraft can engage in bombing runs, missile launches, or strafing runs (air-to-ground gunnery) at targets located within range boundaries. To aid in effective weapons delivery, aircraft are equipped with a variety of targeting systems, including the Low Altitude Navigation and Targeting Infrared for Night (LANTIRN) and LITENING II Pod. Air-to-ground range training operations are monitored, and results are reviewed with the participants to further enhance targeting proficiency (ANG 2001).

Ordnance is delivered onto targets within the Jefferson Range target impact areas by F-16s, A/OA-10s, and transient aircraft from other installations (e.g., F-15s and F-18s). The only explosives used on the range are spotting charges within the various bomb dummy units (BDUs) delivered on the range (ANG 2001). Spotting charges contain approximately the same amount of powder as a shotgun shell. Fires can result from the heat generated by spotting charges; however most burn themselves out before any response is necessary.

Ordnance authorized for use at the Jefferson Range includes BDU-33 (25 lb), MK-82/84 (500/2,000 lb) inert practice bombs, 2.75-inch rockets, and 20- and 30-mm cannon rounds. On an annual basis, approximately 14,500 BDUs and inert bombs are delivered and approximately 100,000 rounds of 20- and 30-mm shells are fired on JPG Range. In addition, 300 electronically-scored events occur per year using the Laser Scoring System located in the Primary Training Range (ANG 2001).

A precision guided munitions (PGM) target is also located in the 50-acre southern parcel, approximately 6 miles south of Jefferson Range's primary air-to-ground range. The PGM target and laser scoring system are used for laser weapons delivery training in support of ANG and USAF units assigned to the PGM mission. All approaches to the PGM target are from north to south between 5,000 feet above ground level and 20,000 feet mean surface level. Up to approximately 170 PGM (inert) deliveries occur per year within this southern parcel (ANG 2001).

When UXO from JPG is encountered, UXO removal crews are employed to safely remove and dispose of UXO. The remnants of current munitions are collected annually from each area.

## **2.5.2 Training Lands**

Training lands can be defined into the following land use categories: improved, semi-improved and unimproved grounds. Improved grounds are developed areas

that have either an impervious surface (e.g., sidewalks and buildings, excluding runway and apron areas) or landscape plantings that require intensive maintenance and upkeep. Semi-improved grounds are where periodic grading or maintenance is performed for operational reasons. Unimproved grounds receive little to no grounds maintenance. They can include streams, wetlands, forests, shrublands and grasslands.

Jefferson Range consists of three non-contiguous parcels totaling approximately 1,038 acres. Improved grounds at Jefferson Range include the 5-acre Old Timber Lodge parcel and approximately 5 acres of the primary range parcel, which includes the command and support area (i.e. operational headquarters, main tower and eastern support tower).

The vast majority of the remaining 1,028 acres of land, which includes the impact areas for both the primary range and southern range parcels, consists of unimproved grounds. Both of these areas are dominated by open grasslands, as a result of regular wildfires and prescribed fires, as well as forests, shrublands, streams and wetlands.

Although some semi-improved grounds occur within Jefferson Range, they are difficult to quantify because they are interspersed with unimproved grounds. Semi-improved grounds include the areas around targets and the dirt access roads. An overview of Jefferson Range and its facilities is provided in **Map 3**. An aerial image of Jefferson Range is provided in **Map 5**.

In addition to this land, the INANG is responsible, per the MOA, for maintaining the 55 miles of chain-link fence surrounding Big Oaks NWR and 20 miles of paved roads, 37 miles of gravel roads and firebreaks within the refuge. These lands require periodic maintenance, and therefore, would be characterized as semi-improved grounds.

## 2.6 Constraints & Opportunities

The most significant constraints on Jefferson Range are related to UXO contamination. All DU contamination is located south of the southern range and does not overlap Jefferson Range (see **Map 4**). There are no major topographic or vegetative features that limit the military mission on Jefferson Range. Although there are currently no constraints associated with threatened and endangered species and/or water resources, listed species and water resources should be reevaluated for potential constraints if new activities or development are planned. For more discussion of threatened and endangered species see **Section 4.7** and **Appendix E**. Constraints are presented graphically in **Map 6**. There are currently no plans for new development or significant military mission changes, so no opportunity map is provided.

## 2.7 Natural Environment

A brief summary of all aspects of the natural environment is provided below. A complete, detailed summary of the natural environment and listed and rare species is provided in **Appendix D** and **Appendix E**, respectively.

### 2.7.1 Climate

The climate of Ripley County is characterized by a humid, mid-latitude, predominately continental climate. The warmest month has been July with an average maximum temperature of 86 degrees Fahrenheit (°F), while the month of January has been the coldest with an average minimum temperature of 22°F. The annual precipitation is approximately 44.5 inches, ranging from 2.7 to 4.7 inches per month, and is distributed fairly evenly throughout the year, which includes approximately 17 inches of snow per year (November through March) (Indiana State Climatology Office [ISCO] 2011).

### 2.7.2 Topography

Jefferson Range lies within the Southern Hills and Lowlands Region of Indiana and the Muscatatuck Plateau Physiographic Division (Gray 2001). In general, the area around the range is a gentle rolling plain and exhibits limited topographic relief and features. Jefferson Range is fairly flat with a few exceptions associated with drainages; elevations range from approximately 240 to 270 meters above mean sea level (**Map 8**).

### 2.7.3 Geology and Soils

Jefferson Range lies on the western limb of the Cincinnati Arch, a plunging anticline, and is underlain by deposits of wind-blown non-stratified silts and clays and glacial till of Illinoian and Wisconsin Age (US Army 1995). In Ripley County, rock types exposed at the bedrock surface are typically poorly producing limestones and dolomites with varying amounts of interbedded shales to poorly producing shales with limestone interbeds. Big Oaks NWR and Jefferson Range are located within one of the two known karst areas in Indiana. Approximately 87 percent of Jefferson Range soils are characterized as Avonburg and Cobbersfork silt loams. Cobbersfork silt loams are identified as hydric soils in Ripley County (National Resource Conservation Service [NRCS] 2011b). The remaining 13 percent of Jefferson Range soils are comprised of Cincinnati, Grayford, Holton, Rossmoy, Ryker and Wakeland silt loams and Eden-rock outcrop complex. Soils types are illustrated on **Map 9** and described in **Table D-2**.

### 2.7.4 Water Resources

Jefferson Range is in the Muscatatuck watershed within the Patoka-White River Basin in the Wabash River Subregion of the Ohio River Region. In general, surface water flows northeast to southwest on Jefferson Range with Otter,

Graham and Big Creeks all merging into the Muscatatuck River west of Big Oaks NWR. There are a limited number of defined channel drainages on any of the Jefferson Range parcels, although Old Timbers Lodge does border Graham Creek. The drainages present on Jefferson Range parcels include five headwater streams (see **Maps 10 and 11**). The primary range parcel drains into Otter Creek and Graham Creek. Old Timbers Lodge is located on and also drains into Graham Creek. The southern range parcel drains into Marble Creek and then into Big Creek (see **Maps 10 and 11**).

There appears to be one pond on the main parcel but there are no known ponds or other open water on any of the range parcels. There are limited unconsolidated or bedrock aquifers underneath Jefferson Range. There are no 100 or 500-year floodplains identified on Jefferson Range. There have been no surveys to characterize wetlands at Jefferson Range due to the presence of UXO and resulting lack of ground disturbance. Based on National Wetland Inventory (NWI) data, there are four wetlands on the primary range parcel and none on the southern range parcel or near Old Timbers Lodge (USFWS 2003). A summary of wetlands identified in the NWI data on Jefferson Range is presented in **Table D-3** and in **Maps 10 and 11**.

### 2.7.5 Ecosystem

Jefferson Range is in Pre-Wisconsinian Drift Plains ecoregion within the Eastern Corn Belt Plains within the Central US Plains in the Eastern Temperate Forest ecoregion (Woods et al. 1999). Based on the ecoregions defined specifically for Indiana, Jefferson Range is located within the Muscatatuck Flats and Canyons Section of the Bluegrass Natural Region (Homoya et al. 1985, Hedge et al. 1993). This area is primarily a rolling till plain with local end moraines with diverse hard forests. Originally, natural tree cover was significant with beech forests common on upland, drier soils, while beech forests and elm-ash swamp forests dominated the lowland, wetter soils.

The forests and savannas that dominant this ecoregion generally benefit from the presence of wildland fire. The maintenance of savannas and prairie mosaics requires the regular presence of wildfires or prescribed fire. Therefore, a prescribed fire program is essential at Jefferson Range to maintain ecosystem health and prairie mosaics (see **Section 4.8**).

### 2.7.6 Flora & Vegetation Communities

Due to the restricted access resulting UXO, there have been no flora surveys or ground-truthed vegetation community delineations. Due to the restricted access, limited ground disturbance, and regular wildland fire on Jefferson Range, large tracts of native vegetation and open grassland are present and provide habitat for both common and rare plant species. Jefferson Range is comprised of approximately 53 percent grassland, 19 percent forest, 13 percent early successional habitat, 4 percent wetland, and 4 percent woodland (Mallarach and

Schools 1998). Open grassland habitat is more prevalent on Jefferson Range in comparison to Big Oaks NWR due a greater frequency of wildfire. Vegetation communities found on Jefferson Range are summarized in **Table D-4** and illustrated on **Map 13**. For full details of threatened and endangered species, including plants, on Jefferson Range, see **Appendix E**.

### 2.7.7 Fauna

Big Oaks NWR and Jefferson Range provide large areas of unfragmented habitat, including wet woodlands, dry-upland forests, successional shrublands, and grasslands. The diverse habitat types support a high level of biodiversity. Although numerous studies have occurred over the years in the former JPG property and subsequently Big Oaks NWR (see **Appendix G**), comprehensive surveys have not been conducted for all fauna and none specifically for Jefferson Range. Based on previous survey data and observations over the years, Big Oaks NWR habitat is known to support a wide variety of wildlife species. To date, approximately 220 species of birds, 37 species of mammals, 40 species of fish, 20 species of reptiles, 25 species of amphibians, 9 species of mussels and 60 species of butterflies have been documented. A list of potential species, including those documented on Big Oaks NWR, is included in **Appendix F**.

### 2.7.8 Threatened and Endangered Species

Federally listed species with known occurrence in Ripley County include the endangered Indiana bat (*Myotis sodalis*) and endangered running buffalo clover (*Trifolium stoloniferum*). The Indiana bat has been documented on Big Oaks NWR and is assumed to occur on Jefferson Range. The running buffalo clover has not been documented on Big Oaks NWR or Jefferson Range to date. No critical habitat exists on Jefferson Range. Ten bird species occurring within Big Oaks NWR have also been designated by Region 3 of the USFWS as federal Species of Concern: American woodcock (*Scolopax minor*), bobolink (*Dolichonyx oryzivorus*), dickcissel (*Spiza americana*), Eastern meadowlark (*Sturnella magna*), grasshopper sparrow (*Ammodramus savannarum*), loggerhead shrike (*Lanius ludovicianus*), red-shouldered hawk (*Buteo lineatus*), sedge wren (*Cistothorus platensis*), cerulean warbler (*Dendroica cerulean*), and Henslow's sparrow (*Ammodramus henslowii*).

Approximately 162 rare state species are known to occur within Jefferson, Jennings and Ripley counties. Of these species, 74 species are known to occur within the Big Oaks NWR and 64 species have the potential to occur on the Jefferson Range (IDNR 2011, USFWS 2011b). **Table E-2** presents a list of rare state listed species with the potential to occur on Big Oaks NWR and Jefferson Range. A detailed summary of federally and state-listed species and other special status species is provided in **Appendix E**.

Priority species were identified based on their regulatory status, known occurrence on or near Jefferson Range, or highly likely occurrence on Jefferson

Range. Seven of the rare species are considered priority species at Jefferson Range. These species include one mammal, one plant, one frog and four birds:

- federally and state endangered Indiana bat
- federally and state endangered running buffalo clover
- federal species of concern dickcissel
- federal species of concern grasshopper sparrow
- federal species of concern and state endangered Henslow's sparrow (*Ammodramus henslowii*)
- federal species of concern and state endangered cerulean warbler (*Dendroica cerulea*)
- state endangered northern crawfish frog (*Rana areolata circulosa*)

These rare wildlife and plant species are discussed in greater detail in **Section 4.7.**

### 3.0 MISSION SUSTAINABILITY

#### 3.1 Integrating Natural Resources Management & Military Mission

This INRMP integrates aspects of natural resources management into the military mission. As such, it becomes the primary tool for ecosystem management at the Jefferson Range while ensuring the successful, efficient accomplishment of the military mission. A multiple-use ecosystem management approach will be implemented to accommodate mission-oriented activities and provide for good stewardship, thereby maintaining and improving the quality, aesthetic values and ecological relationships of the environment.

The purpose of the Jefferson Range is to ***maintain sustainable natural resources as a critical training asset*** upon which to accomplish the INANG mission. To accomplish this goal, natural resource managers need to:

Ensure ***no net loss*** in capability to support existing and projected military training.

Maintain ***quality training lands*** through monitoring, minimizing damage, mitigation, and rehabilitation.

Specific military missions and training requirements are fluid and change from time to time with realignments, transformations, and changes in equipment and tactics. This requires the establishment of basic underlying natural resource management principles and practices that have broad application and can be adapted for multiple situations, such as is the case with surface water and soil management practices. Implementation of this INRMP at the Jefferson Range will successfully promote adaptive stewardship practices that protect and enhance natural resources for multiple use, sustainable yield and biological integrity, while supporting the military mission.

##### 3.1.1 Operations Planning & Review

Projects, activities, new development and mission changes are typically reviewed by multiple entities within the INANG, including the 181 IW/EM. New construction projects are reviewed by the INANG Facility Board. If there is the potential for environmental impacts, the NEPA process is started, as described in **Section 3.3**. If there are additional environmental compliance requirements, the 181 IW/EM facilitates any required consultation or permit applications, as described in **Section 3.4**.

##### 3.1.2 Natural Resources Management Actions

The ignition of wildfires is the primary potential impact to natural resources from the military mission at the Jefferson Range. While wildfires have an impact on the natural resources, they can also result in beneficial impacts to grassland systems. Maintenance activities conducted for operational reasons (e.g., fence, roads, firebreaks) also have the potential to impact natural resources. However, because maintenance activities are restricted to a very limited area, overall impacts to natural resources are minor.

The ultimate goal of this INRMP, as well as its subsequent updates or revisions, is to ensure continuous military training capability for the INANG, while managing for sustainable natural resources at the Jefferson Range. An active natural resources management program will accommodate the INANG's training mission, while emphasizing integrated, adaptive management that focuses on maintaining ecosystem function and stability. Future development of the Jefferson Range to meet the training needs of the INANG is addressed in the Jefferson Range Comprehensive Range Plan (INANG 2010).

The INANG requires open areas in the vicinity of the targets for both ranges. The INANG also requires a safety buffer around these primary training areas. Ideally, the safety buffer is comprised of healthy habitat that can withstand or even benefit from wildfires that will occur occasionally with military training and which does not require extensive management or intervention. Degradation of natural resources can result in unintended impacts to the military mission, impaired readiness, and funds spent on natural resources crisis management and interventions rather than training. Healthy ecosystems are resilient and can support long term training needs. The INANG needs the land and its natural resources to function together in a healthy ecosystem to support training.

All habitats at Jefferson Range are important in supporting training activities. Due to the arrangement with Big Oaks NWR, the habitat on the refuge is also essential in supporting training activities by serving as the majority of the safety buffer and wildland fire buffer for Jefferson Range. Military training is done in conjunction with the existing landscape and when necessary the landscape is modified to better support the training mission needs, such as maintaining open grasslands within the primary target areas. Management activities in this INRMP are designed to support the desired habitats and ecosystem functions.

### **3.1.3 Environmental Awareness**

The primary means of environmental awareness at Jefferson Range is through safety briefings. Jefferson Range and Big Oaks NWR conduct safety briefings for all users of Jefferson Range and Big Oaks NWR. Safety briefings are extensive and standardized due to the presence of various restricted areas and UXO and DU contamination.

### **3.1.4 Sustainability Challenges**

The primary sustainability challenge on Jefferson Range, as it is currently used and projected to be used in the near future, is the ability to manage vegetation. Maintaining open grassland areas suitable for military training takes active vegetation and wildland fire management, which is primarily provided by Big Oaks NWR. Military training does cause wildfires; therefore, the INANG must be able to manage fuel loads to reduce the likelihood of uncontrollable wildfires.

Another challenge is that there are a number of natural resources surveys and assessments that are typical on military installations, but simply not feasible on



Jefferson Range due to safety concerns from UXO contamination. Because groundtruthing is limited, it is difficult to obtain detailed information on site-specific natural resources and their condition for management purposes.

If the mission changes significantly in the future, the sustainability challenges could increase. However, the likelihood of an extensive expansion of on-the-ground activities or infrastructure is low because ground disturbance is limited greatly by the presence of UXO.

### **3.2 Encroachment Management**

Due to the location of Jefferson Range within the Big Oaks NWR, there is inherently a larger buffer between Jefferson Range and surrounding land uses. Since Jefferson Range also manages a large amount of restricted airspace, they have few encroachment issues, either on the ground or in the air.

### **3.3 National Environmental Policy Act (NEPA)**

The initial step by the INANG to comply with NEPA for any activity that might impact the environment is to complete USAF Form 813: Request for Environmental Impact Analysis. The form is prepared to aid in the development of the assessment, providing information on the proposed action and its alternatives, purpose, and potential environmental effects. This allows the proponent to identify potential environmental impacts early and facilitates making a determination about whether an Environmental Assessment or Environmental Impact Statement might be required for a specific action. Some sections are prepared by the proponent and other sections are prepared by Environmental personnel.

If the action is not covered by a categorical exclusion, then an EA is prepared to determine if there are potential significant impacts. If potential significant impacts are identified, either while completing AF Form 813 or during the EA, then an EIS is prepared. The majority of natural resources management actions are covered by categorical exclusions.

### **3.4 Consultation Requirements**

The INANG has multiple natural resources consultation requirements in addition to the INRMP development and review requirements as identified in the Sikes Act (see **Section 1**). Federally listed threatened and endangered species management requires Endangered Species Act Section 7 consultation with the USFWS. State listed threatened and endangered species management and game species management requires consultation with IDNR. Actions that fall under the jurisdiction of Section 404 or 401 of the Clean Water Act (CWA) necessitate permitting from the US Army Corps of Engineers (USACE) and Indiana Department of Environmental Management (IDEM). For projects requiring occurring in a floodway or state designated navigable water, the IDNR

has authority to issue waterways permits under the Flood Control Act, Navigable Waterways Act, and several other state acts.

In addition to natural resources consultation requirements, there are National Historic Preservation Act (NHPA) and tribal consultation requirements, which are presented in full in the Integrated Cultural Resources Management Plan (INANG 2011b).

### **3.5 Beneficial Partnerships & Collaborative Resource Planning**

As described throughout the INRMP, the relationship with Big Oaks NWR is essential to natural resources management on Jefferson Range. In addition, the non-profit Big Oaks Conservation Society has an agreement with Jefferson Range for the maintenance and management of the Old Timbers Lodge and its grounds. Big Oaks Conservation Society is the friends group for Big Oaks NWR, and as a result is involved with numerous projects on Big Oaks NWR.

### **3.6 Public Access & Outreach**

Public access is limited at Jefferson Range. However, a number of groups are invited onto Jefferson Range at various times throughout the year. There is currently no unsupervised public access or individual public access programs for outdoor recreation or otherwise at Jefferson Range. Big Oaks Conservation Society hosts an annual event at the Old Timbers Lodge in which Jefferson Range and INANG personnel participate. Big Oaks Conservation Society also coordinates other public access and outreach activities in coordination with Big Oaks NWR that typically involve Old Timbers Lodge and other activities on Big Oaks NWR.

### **3.7 Climate Change Assessment**

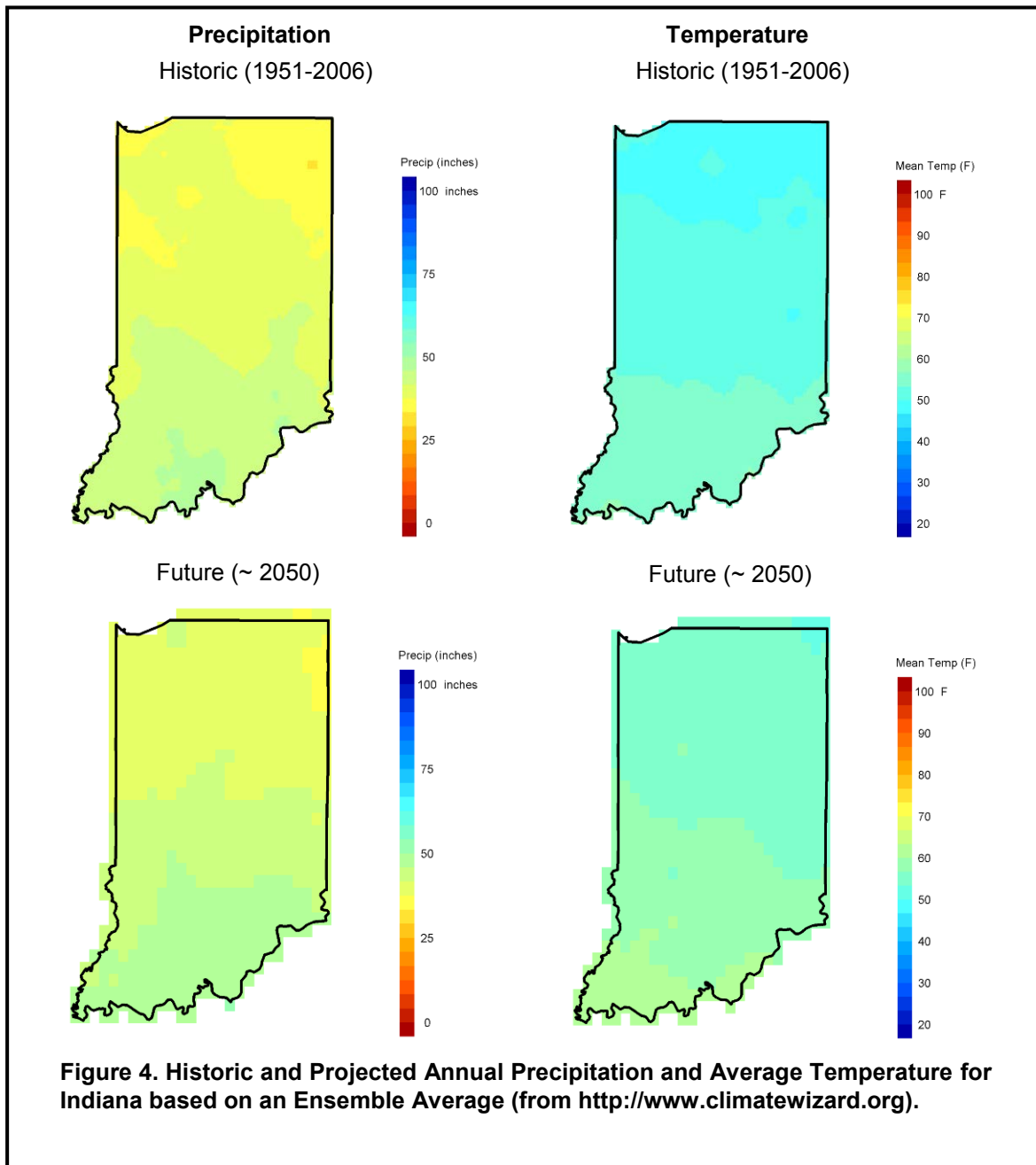
In order to assess the potential impacts from climate change on the natural resources at a given facility, the first step is to identify what the projected range of change might be in the future both mid- and long-term. The second step is to identify which species or systems are mostly likely to be affected by the projected range of changes. Climate change vulnerability assessments are part of this process. Finally, the third step is to identify management activities and projects now and in the future that can respond to these challenges. Species or systems likely to be affected at these ANGSS and appropriate management priorities, activities and projects for them are identified in the respective management sections in **Section 4**.

Due to the lack of readily available regionally-specific model outputs, the Nature Conservancy's ClimateWizard was used to determine likely future climate regimes under different emissions scenarios. ClimateWizard enables technical and non-technical audiences alike to access leading climate change information and visualize the regional impacts to both temperature and precipitation that are likely to occur in areas within the US. In general, Indiana's climate will grow considerably warmer and probably wetter during this century. The ensemble

average of 16 models predict an average 5°F (range: 3 to 7°F) increase in average temperature and a 3 inch (range: -11 to 14 inches) increase in annual precipitation by 2050 under a moderate emissions scenario as summarized on The Nature Conservancy's Climate Wizard site (<http://www.climatewizard.org>).

**Table 4** presents a summary of the predictions for each model.

| Table 4. Summary of Results from Climate Change Models<br>Predicted Values for Southern Indiana by Mid-Century<br>Under Different Emissions Scenarios |                               |        |        |                          |      |      |
|---|-------------------------------|--------|--------|--------------------------|------|------|
| Climate Model   | Annual Precipitation (inches) |        |        | Average Temperature (°F) |      |      |
|   | B1                            | A1B    | A2     | B1                       | A1B  | A2   |
| bccr_bcm2_0.1   | 9.19                          | 8.05   | 11.20  | 4.05                     | 5.30 | 5.04 |
| cccma_cgcm3_1.1   | 7.84                          | 8.59   | 8.74   | 3.69                     | 4.96 | 4.66 |
| cnrm_cm3.1  | 8.28                          | 7.18   | 9.23   | 3.47                     | 4.49 | 4.31 |
| csiro_mk3_0.1   | 2.53                          | 5.41   | 8.80   | 2.26                     | 3.15 | 3.62 |
| gfdl_cm2_0.1  | -4.58                         | -7.41  | -0.41  | 3.99                     | 6.41 | 5.94 |
| gfdl_cm2_1.1  | -0.44                         | 2.90   | 9.43   | 4.19                     | 5.65 | 4.85 |
| giss_model_e_r.1  | 9.09                          | 13.61  | 16.10  | 2.24                     | 2.61 | 3.34 |
| inmcm3_0.1  | -7.04                         | -4.35  | -5.23  | 4.44                     | 5.48 | 5.36 |
| ipsl_cm4.1  | -1.22                         | 2.98   | 0.37   | 5.16                     | 7.31 | 6.26 |
| miroc3_2_medres.1   | -2.50                         | -10.50 | -10.35 | 4.46                     | 6.15 | 5.98 |
| miub_echo_g.1   | -2.74                         | 8.65   | 0.12   | 4.77                     | 5.49 | 6.08 |
| mpi_echam5.1  | 9.27                          | 13.61  | 11.77  | 3.68                     | 4.93 | 3.97 |
| mri_cgcm2_3_2a.1  | 5.14                          | 7.39   | 5.54   | 3.17                     | 4.28 | 3.46 |
| ncar_ccsm3_0.1  | 5.43                          | 9.27   | 7.41   | 4.29                     | 5.21 | 5.68 |
| ncar_pcm1.1   | 16.31                         | 10.81  | 14.21  | 2.07                     | 3.02 | 2.61 |
| ukmo_hadcm3.1   | 12.26                         | 12.16  | 2.53   | 4.98                     | 6.30 | 5.05 |
| Ensemble Average  | 2.98                          |        |        | 4.66                     |      |      |
| From <a href="http://www.climatewizard.org">http://www.climatewizard.org</a>  |                               |        |        |                          |      |      |
| Emissions Scenarios: B1 = low, A1B = medium, A2 = high  |                               |        |        |                          |      |      |



For Jefferson Range, the models all indicate some shift in growing season over the next century with the climate of Indiana becoming more like its neighboring states to the south. Some of the models indicate increases in precipitation especially in the winter. Overall with the likely increase in rainfall and temperature, the resources most likely to be impacted by climate change are special status species, invasive species, vegetation and water resources. For more detailed analysis associated with those resources, see **Section 4**.

### 3.8 Indiana Comprehensive Wildlife Strategy

During the INRMP update process, the INANG consulted state wildlife action plan for Indiana - *Indiana Comprehensive Wildlife Strategy* (IN CWS; IDNR 2006) - to ensure INRMP goals, objectives and strategies are consistent with Indiana's overall statewide, regional and habitat specific plans. The IN CWS was developed to manage public and private lands in the best way possible to benefit all Indiana's wildlife, and especially those with declining populations. The IN CWS identifies habitat areas that demonstrate the greatest conservation need and potential, and establishes specific conservation goals for the enhancement and protection of these sites. The IN CWS is available at [http://www.in.gov/dnr/fishwild/files/CWS MANUSCRIPT.pdf](http://www.in.gov/dnr/fishwild/files/CWS_MANUSCRIPT.pdf).

A list of all the priority state-level conservation goals, as presented in the IN CWS, is provided in **Table 5**. While all INRMP goals, objectives, and strategies were found to be consistent with the IN CWS, not all of them contribute specifically to one of the IN CWS goals. The IN CWS is organized by habitat types with high priority conservation actions for the habitat and for Species of Greatest Conservation Need (SGCN). Refer to **Table 5** for a summary of how this INRMP contributes to IN CWS goals.

### 3.9 Big Oaks NWR Comprehensive Conservation Plan

Although the CCP for Big Oaks NWR is not yet complete, the two plans should share some overlapping goals and objectives and even projects, as Jefferson Range is imbedded within Big Oaks NWR and NWR Staff provide support to Jefferson Range when needed. After the CCP is finalized, an analysis should be provided here that indicates the areas where this INRMP and the CCP complement and differ from each other.

### 3.10 INRMP Implementation Analysis

The primary measure of INRMP effectiveness is whether it helps prevent net loss in the capability of military lands to support the military mission. The INANG is preserving Jefferson Range's capability to support training through its natural resource management practices outlined in this INRMP.

Long-term management effectiveness is also evaluated through periodic inventories of species populations, habitat quantity and quality, and habitat values through the recurring planning level survey (PLS). Trends can be used to indicate the degree of success. The INANG will evaluate these recurring data as they become available.

A practical evaluation of INRMP implementation includes reviewing whether planned projects and activities have been accomplished. In future updates, a table providing an analysis of previous fiscal year (FY) projects and their implementation status will be included in this section.

Table 5. State-wide High Priority Conservation Actions By Habitat Type from the IN CWS

| Habitat              | INRMP<br>Contributes<br>to IN CWS | Conservation Action   |
|----------------------|-----------------------------------|---|
| <b>All Habitats*</b> | ✓                                 | Adaptive Management to modify survey and monitoring, research and other conservation actions and activities in response to new information to improve habitat conservation efficiency for SGCN.   |
| <b>Aquatic</b>       |                                   | Habitat restoration incentives (financial) to promote the retention and development of sloughs, oxbows, and backwater habitats to benefit the banded pygmy sunfish, bantam sunfish and cypress darter in the lower Wabash River drainage.   |
|                      | ✓                                 | Protection of adjacent buffer zone by 1) promoting the establishment and maintenance of buffers on all aquatic systems to control sedimentation and to benefit aquatic SGCN; and 2) providing grassy, shrubby, and/or woody riparian cover along rivers and streams for resting, denning, and loafing sites for otters.   |
|                      |                                   | Habitat restoration on public lands to 1) create nesting islands for least terns in appropriate areas and 2) restore wetland habitats in floodplain areas to provide alternative habitats for aquatic species. Target wetlands in close proximity to rivers & streams.  |
|                      |                                   | Cooperative land management agreements (conservation easements) to promote the protection of aquatic systems for SGCN by encouraging public and private entities to enter into cooperative land management agreements and conservation easements. Provide technical assistance on the species that benefit from such protection and potential enhancement measures. |
|                      | ✓                                 | Habitat protection on public lands to 1) protect nesting and foraging areas from human disturbance in order to ensure successful nesting and foraging by bald eagles, osprey, peregrine falcons, least terns, black terns, and piping plovers (potential); and 2) conserve existing riparian cover along rivers and streams to provide habitat for otters.          |
|                      |                                   | Habitat protection incentives (financial) to provide technical assistance and support the use of state, federal and private incentive programs to protect aquatic habitat for the benefit of SGCN.  |

**Table 5. State-wide High Priority Conservation Actions By Habitat Type from the IN CWS**

| <b>Habitat</b>               | <b>INRMP<br/>Contributes<br/>to IN CWS</b> | <b>Conservation Action</b>  |
|------------------------------|--|---|
| <b>Aquatic<br/>Continued</b> |  | Managing water regimes to ensure appropriate water regime targets are selected in manipulated headwater streams, especially headwater streams occupied by redbreasted dace.   |
|                              | ✓  | Pollution reduction to 1) work with state, federal and private partners to reduce point and non-point source pollution in aquatic systems to maintain and increase the distribution of the fat pocketbook, western sand darter, northern madtom and channel darter populations in the lower Wabash, White and Ohio Rivers where they are now confined; 2) maintain healthy fish and aquatic invertebrate populations with low contaminant loads in order to provide food for bald eagles, osprey, least terns, black terns, piping plovers, trumpeter swans, and other aquatic birds and species that prey on aquatic systems dependent birds; and 3) develop/support programs that reduce input of heavy metals, PCBs, and related contaminants into aquatic systems to benefit river otters and other SGCN. |
|                              | ✓  | Restrict public access and disturbance to 1) develop and distribute BMPs relative to avoiding and minimizing disturbance to reptile hibernating areas (backwaters, small pools and shallow inlets to lakes and rivers) to promote the conservation of SGCN found in aquatic systems; and 2) protect nesting and foraging areas from human disturbance in order to ensure successful nesting and foraging by bald eagles, osprey, peregrine falcons, least terns, black terns, and piping plovers.   |
|                              | ✓  | Corridor development/protection to promote the development and adoption of BMPs to protect aquatic systems shorelines and riparian corridors to minimize eutrophication to benefit pointed campeloma populations and other SGCN.  |
|                              |  | Reintroduction (restoration) to 1) support the development and implementation of practical mussel restoration and evaluation techniques for use in appropriate situations for the restoration of extirpated or nearly extirpated mussel species and 2) monitor the abundance and distribution of newly restored aquatic system dependent species such as the river otter and osprey.  |
|                              |  | Population management to 1) determine factors affecting the distribution and relative abundance of rare aquatic-based wildlife such as the river otter, 2) refine and improve survey and monitoring programs for aquatic wildlife species such as river otters, mussels species and osprey, 3) implement  |

**Table 5. State-wide High Priority Conservation Actions By Habitat Type from the IN CWS**

| Habitat                      | INRMP<br>Contributes<br>to IN CWS | Conservation Action  |
|------------------------------|-----------------------------------|--|
|                              |                                   | harvest strategies to maximize take of targeted species and minimize unintentional take of otters and 4) determine age-specific reproductive parameters for river otters and mussel species.   |
| <b>Aquatic<br/>Continued</b> |                                   | Translocation to new geographic range to 1) support the development of technical assistance materials to heighten public awareness of the dangers of releasing aquatic species in new geographical areas (even SGCN) and 2) track shifts in species geographic range for correlation to global warming trends and new ecological relationships.  |
|                              |                                   | Protection of migration routes to 1) protect shoreline areas from high human use along Lake Michigan for migrating piping plovers and 2) secure and appropriately manage sufficient aquatic areas to provide for the needs of self-sustaining populations of migrating birds.  |
|                              | ✓                                 | Habitat protection to 1) support programs that promote clean water and maintenance of a diverse aquatic ecosystem for the benefit of reptile and amphibian SGCN, 2) identify and secure critical spawning grounds for greater redhorse, lake sturgeon, northern brook lamprey and Tippecanoe darter to ensure maintenance of self-sustaining populations and 3) develop and/or support programs that restore/maintain riparian cover along rivers and streams for the benefit of mussels and other aquatic SGCN. |
|                              |                                   | Culling/selective removal to monitor the health of hellbenders and other aquatic SGCN and evaluate the use of selective removal of infected individuals to control the spread of contagious disease.   |
|                              |                                   | Threats reduction to cooperate with other programs to evaluate threats (contamination, gravel mining, dams, etc) to aquatic systems and provide information on impacts to SGCN.  |
|                              |                                   | Native predator control to evaluate the use of muskrat and raccoon control in sensitive areas (where populations of SGCN are known to occur) to promote the survival and reproduction of SGCN, especially nesting turtles and mussels and to employ effective and appropriate predator deterrents in near least tern nesting colonies and similar vulnerable concentrations of SGCN.   |



**Table 5. State-wide High Priority Conservation Actions By Habitat Type from the IN CWS**

| Habitat        | INRMP<br>Contributes<br>to IN CWS | Conservation Action  |
|----------------|-----------------------------------|--|
| <b>Forests</b> | ✓                                 | Land use planning to 1) maintain or create landscapes dominated by forest in order to provide for needs of area sensitive species; 2) work with local units of government for protection and management of forested habitats; and 3) encourage the retention of forested corridors to connect forest blocks for SGCN, especially Indiana bat and timber rattlesnake.   |
|                |                                   | Habitat protection on public lands to provide technical assistance to management plan development and implementation for state and federal forest properties.  |
|                |                                   | Habitat restoration on public lands to encourage sustainable timber management practices to provide a variety of forest stages for the wide variety of forest-dependent birds.   |
|                | ✓                                 | Succession control (fire, mowing) to encourage sustainable timber management practices to provide a variety of forest stages for the wide variety of forest-dependent birds.   |
|                | ✓                                 | Corridor development/protection to 1) investigate features of functional dispersal corridors in forests that benefit SGCN and 2) promote development and retention of functional dispersal corridors in forest to benefit SGCN.  |
|                |                                   | Habitat protection incentives (financial) to 1) encourage sustainable timber management practices to provide a variety of forest stages for the wide variety of forest-dependent birds; 2) support enrollment into state-sponsored forest management programs such as Classified Forest and Classified Wildlife Habitat programs; and 3) provide technical assistance to forest habitat protection incentive programs, such as Farm Bill programs and Forest Legacy. |
|                |                                   | Habitat restoration through regulation to promote forest restoration practices that use native trees, protection natural drainage and protection of other landscape features to benefit SGCN in forest restoration projects conducted under state permit or receiving public funds.  |
|                |                                   | Habitat protection through regulation to provide technical assistance to regulatory agencies protecting forest habitat to benefit SGCN.  |

Table 5. State-wide High Priority Conservation Actions By Habitat Type from the IN CWS

| Habitat                      | INRMP<br>Contributes<br>to IN CWS | Conservation Action  |
|------------------------------|-----------------------------------|--|
| <b>Forests<br/>Continued</b> | ✓                                 | Habitat protection to 1) protect forest habitat especially forest in close proximity to wetlands, rocky glades or connecting corridors between forest blocks for copperbelly watersnakes, rough green snakes, scarlet snakes, southeastern crowned snakes and timber rattlesnakes; 2) determine what constitutes high quality foraging and roosting habitat for forest dwelling bats; and 3) implement silvicultural strategies that provide for a continuous supply of large, dead and/or dying deciduous trees to provide roost sites for crevice-dwelling bats such as the Indiana bat. |
|                              | ✓                                 | Protection of migration routes to investigate forest distribution in Indiana and provide adequate forestlands for migrating birds and bats.  |
|                              |                                   | Population management to 1) determine distribution and relative abundance of rare forest-dependent wildlife such as the Indiana bat, Northern myotis, and Allegheny woodrat; 2) develop survey and monitoring programs for forest-dwelling bats; and 3) develop survey and monitoring programs for Allegheny woodrats and other forest-dwelling rodents.   |
|                              |                                   | Food plots to provide for adequate regeneration of native tree species to provide adequate food for forest dwelling SGCN.  |
|                              |                                   | Regulation of collecting to develop technical assistance materials that promote leaving SGCN in the natural environment.   |
|                              |                                   | Threats reduction to 1) determine threats to forest-dwelling bats, 2) determine impacts of different forest management regimes on habitat quality (foraging and roosting) for forest-dwelling bats, and 3) investigate the impact of forest management practices on the blue-spotted salamander, four-toed salamander, green salamander, red salamander, Allegheny woodrat and other SGCN.   |
|                              |                                   | Native predator control to investigate the impact of human persecution on timber rattlesnakes and other rare snakes and determine preventative measures.   |
|                              |                                   | Disease/parasite management to reduce raccoon populations in proximity to woodrat colonies   |

Table 5. State-wide High Priority Conservation Actions By Habitat Type from the IN CWS

| Habitat                      | INRMP<br>Contributes<br>to IN CWS | Conservation Action   |
|------------------------------|-----------------------------------|---|
| <b>Forests<br/>Continued</b> |                                   | Limiting contact with pollutants/contaminants to monitor the impacts of forest-pest management measures on forest SGCN.   |
|                              |                                   | Public education to reduce human disturbance to 1) post signs at important cave sites used by forest bats to reduce/ eliminate unauthorized human visitation and 2) provide technical assistance to land managers and landowners to reduce adverse impacts to timber rattlesnakes that encounter humans.  |
| <b>Grasslands</b>            |                                   | Habitat restoration incentives (financial) to 1) support farm programs that convert row-crop areas to grasslands to benefit a variety of birds including American bittern, barn owl, Henslow's sparrow, loggerhead shrike, northern harrier, sedge wren, short-eared owl, upland sandpiper, western meadowlark; and 2) develop large-scale grassland restoration projects on reclaimed strip mined lands and assess their effectiveness for providing habitat for area-sensitive bird (SGCN) species. |
|                              |                                   | Cooperative land management agreements (conservation easements) to develop cooperative agreements with transportation agencies for management and restoration of habitats on railroad right of ways (ROWs) to benefit Franklin's ground squirrels, badgers, and other grassland dependent species.  |
|                              |                                   | Habitat restoration on public lands to incorporate management for rare grassland-dependent SGCN, such as the Franklin's ground squirrel and badger, on public lands.  |
|                              |                                   | Corridor development/protection to identify and promote the retention of natural habitat corridors to connect patches of grassland habitat for the benefit of SGCN.   |
|                              |                                   | Land use planning to provide technical assistance to land use planning entities to promote development and retention of landscape features and management practices that benefit SGCN.  |
|                              | ✓                                 | Restrict public access and disturbance to develop and promote implementation of BMPs that limit disturbance to nesting grassland birds (SGCN), especially on public conservation lands.   |

Table 5. State-wide High Priority Conservation Actions By Habitat Type from the IN CWS

| Habitat                         | INRMP<br>Contributes<br>to IN CWS | Conservation Action  |
|---------------------------------|-----------------------------------|--|
| <b>Grasslands<br/>Continued</b> | ✓                                 | Habitat protection on public lands to 1) restore native grasslands on public land to benefit blue-spotted salamander, crawfish frog, eastern spadefoot toad, northern leopard frog, plains leopard frog, Blanding's turtle, Butler's garter snake, Kirtland's snake, ornate box turtle, smooth green snake, spotted turtle, western ribbon snake, American bittern, barn owl, Henslow's sparrow, loggerhead shrike, northern harrier, sedge wren, shorteared owl, upland sandpiper, western meadowlark, badger, bobcat, Franklin's ground squirrel, least weasel plains pocket gopher; 2) restore moist soil units or grassy wetlands for the benefit of blue-spotted salamander, crawfish frog, eastern spadefoot toad, northern leopard frog, plains leopard frog, Blanding's turtle, Butler's garter snake, Kirtland's snake, smooth green snake, spotted turtle, western ribbon snake, and American bittern, northern harrier, sedge wren, short-eared owl, upland sandpiper, least weasel; 3) convert row-crop areas to grasslands to benefit a variety of SGCN; and 4) incorporate management for rare grassland-dependent SGCN on public lands. |
|                                 |                                   | Habitat restoration to benefit SGCN through regulation to 1) promote the use of native grass and forb vegetation on projects conducted under state permits or receiving public funds and 2) provide technical assistance for grassland restoration to state agencies involved in habitat mitigation.   |
|                                 |                                   | Technical assistance to provide information to landowners and public land managers on methods to manage grassland areas for the benefit of SGCN.   |
|                                 |                                   | Population management to 1) determine distribution and relative abundance of grassland-dependent SGCN such as badger and Franklin's ground squirrel and 2) develop survey and monitoring programs for grassland-dependent SGCN such as badgers and Franklin's ground squirrels.  |
|                                 | ✓                                 | Public education to reduce human disturbance to develop and promote implementation of best management practices (BMPs) that limit disturbance to nesting grassland birds (SGCN), especially on public conservation lands.  |
|                                 | ✓                                 | Exotic/invasive species control to control shrub encroachment and invasive species in grassland areas in order to benefit a variety of SGCN.   |

Table 5. State-wide High Priority Conservation Actions By Habitat Type from the IN CWS

| Habitat                         | INRMP<br>Contributes<br>to IN CWS | Conservation Action  |
|---------------------------------|-----------------------------------|--|
| <b>Grasslands<br/>Continued</b> |                                   | Protection of migration routes to identify and protect potential dispersal corridors for grassland species occupying isolated blocks of habitats   |
|                                 |                                   | Food plots to promote the use of native grass and forb species in the restoration of suitable disturbed areas, such as surfaced mined areas, for the benefit of grassland SGCN.  |
|                                 |                                   | Threats reduction to determine threats to grassland-dependent SGCN, such as the Franklin's ground squirrel.  |
|                                 | ✓                                 | Habitat protection to promote the protection and proper management of grassland habitat, including wet prairies, for the benefit of grassland SGCN.  |
|                                 |                                   | Regulation of collecting to encourage public support for collection prohibitions to protect vulnerable populations of grassland SGCN, especially reptiles and amphibians.  |
|                                 |                                   | Native predator control to investigate the impact of predation, especially raccoon predation, on vulnerable populations of grassland SGCN, especially turtles (eggs).  |
|                                 |                                   | Limiting contact with pollutants to 1) work with the State Chemist Office and other to develop herbicide and pesticide label directions that are protective of SGCN and 2) support compliance with all state and federal environmental regulations relative to grasslands lands. |
| <b>Wetlands</b>                 | ✓                                 | Habitat protection on public lands to conserve and manage diverse wetlands on public lands for the benefit of SGCN including mammals, birds, amphibians and reptiles.  |
|                                 |                                   | Succession control (i.e., fire, mowing) to manage plant succession using water level manipulation, fire, and other methods to conserve diverse wetlands for the benefit of SGCN including mammals, birds, amphibians and reptiles.   |
|                                 |                                   | Cooperative land management agreements (conservation easements) to support the use of cooperative land management agreements to conserve and protect privately owned wetlands for the conservation of wetland SGCN.  |

**Table 5. State-wide High Priority Conservation Actions By Habitat Type from the IN CWS**

| Habitat                       | INRMP<br>Contributes<br>to IN CWS | Conservation Action   |
|-------------------------------|-----------------------------------|---|
| <b>Wetlands<br/>Continued</b> |                                   | Habitat restoration on public lands to 1) restore wetlands on public lands for the benefit of SGCN including mammals, birds, amphibians and reptiles, 2) create wetland areas for black terns and 3) support the planting of appropriate native plant stocks to accelerate and enhance wetland restorations and to use for demonstration purposes.  |
|                               |                                   | Corridor development/protection to promote the development and protection of wetland complexes including connecting wetland habitats for the benefit of copperbelly water snakes and other SGCN.  |
|                               |                                   | Land use planning to provide technical assistance that promotes the values and benefits of wetlands.  |
|                               |                                   | Protection of buffer zone around wetlands to protect wetlands and ameliorate benefits to SGCN.  |
|                               |                                   | Habitat protection incentives (financial) to cooperate with programs (Wetland Reserve Program) and organizations (Ducks Unlimited) that provide financial incentives to private landowners to develop and /or protect wetlands.   |
|                               |                                   | Artificial habitat creation (artificial reefs, nesting platforms) to provide nesting platforms in appropriate wetlands for black terns.   |
|                               |                                   | Habitat restoration through regulation to provide technical assistance to regulatory programs regarding wetlands beneficial to SGCN for evaluation of projects conducted under state permit or receiving public funds, especially in regarding minimizing adverse impacts or mitigation.  |
|                               |                                   | Reintroduction (restoration) to determine feasibility of restoring wetland-dependent SGCN such as the swamp rabbit and star-nosed mole.   |
|                               |                                   | Population management to 1) determine distribution and relative abundance of rare wetland-dependent wildlife such as the swamp rabbit and star-nosed mole; 2) develop survey and monitoring programs for rare species associated with wetland habitats such as swamp rabbits and star-nosed moles; and 3) investigate the impact of regulated species (e.g. raccoons and coyotes) on populations of Blanding's turtle, spotted turtle, and other wetland dependent SGCN |

**Table 5. State-wide High Priority Conservation Actions By Habitat Type from the IN CWS**

| <b>Habitat</b>   | <b>INRMP<br/>Contributes<br/>to IN CWS</b> | <b>Conservation Action</b>  |
|--|--|---|
| <b>Wetlands<br/>Continued</b>  |  | Protection of migration routes to target the restoration, protection and acquisition of wetlands to provide for the needs of migrating SGCN.  |
|  |  | Disease/parasite management to investigate suspicious mortality or disease in wetland species to determine risk to wetland dependent SGCN and appropriate protective measures.  |
|  |  | Habitat protection to conserve and manage a variety of wetland types for the benefit of SGCN including mammals, birds, amphibians, and reptiles.  |
|  |  | Regulation of collecting to investigate the role or intentional and/or un-intentional take on the viability of reptile and amphibian SGCN populations.  |
|  |  | Exotic/invasive species control to reduce invasive plants in wetlands using water level manipulation, fire, herbicides, and other methods for the benefit of SGCN including mammals, birds, amphibians, and reptiles. |
|  |  | Threats reduction to investigate threats (e.g. exotic species competition, loss of wetland diversity, dependence on other species such as burrowing crayfish) to wetland dependent SGCN.                              |
| *All Habitats are compiled from Conservation Actions present under all the habitat types present on Jefferson Range. |  |   |

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## 4.0 NATURAL RESOURCES PROGRAM MANAGEMENT

### 4.1 Natural Resources Program Development

The guiding philosophy of this INRMP is to take an ecosystems approach to managing the natural resources present on Jefferson Range (see **Section 1.5**). Ecosystem management provides a framework to link the military mission to local, regional, and global ecological integrity. Sustaining ecosystem integrity is the best way to protect and enhance biodiversity, ensure sustainable use, and minimize the effort and cost of management.

Ecosystem management is based on clearly stated goals and objectives, and associated activities and projects. This INRMP identifies goals and objectives, and presents the means to accomplish them, as well as the methodologies to monitor results. Activities generally refer to in-house, no cost actions under taken by the National Guard Bureau (NGB), INANG, or Jefferson Range personnel. Projects generally refer to actions that are performed by others, usually under contract to INANG or NGB. In addition, projects can be performed using non-DoD funds or by volunteers. See **Section 5.3** for more details about funding.

This chapter summarizes each technical area of natural resources management. In a given section, relevant management strategies, practices, guidelines, best management practices, and priorities will be presented, as applicable to the technical topic. Goals and objectives are presented below by section. Activities and projects associated with those goals and objectives are presented in **Tables 9 and 10**, respectively, in **Section 5.0**. Laws and regulations are not summarized in each sub-section, although primary legal drivers are identified. A complete summary of all relevant laws, regulations, executive orders and policies is provided in **Appendix K**.

The following sections are not included in this INRMP because they do not apply to Jefferson Range or are included within other sections:

- Forestry Management – There is no income-generating forestry program at Jefferson Range. Forest management, as part of vegetation management, is presented in **Section 4.5**.
- Migratory Birds Management – Migratory birds are managed as part of fish and wildlife management. Refer to **Section 4.6** for details about migratory bird management.
- Bird Aircraft Strike Hazard – BASH related objectives are presented as part of fish and wildlife management in **Section 4.6**.
- Floodplain Management – Floodplain management is presented with water resources in **Section 4.4**.
- Outdoor Recreation – There is no outdoor recreation program at Jefferson Range, although there is outdoor recreation at Big Oaks NWR.

- Coastal/Marine Management – There is no coastal or marine habitat at Jefferson Range.
- Agricultural Outleasing and Other Leases – There are no leases at Jefferson Range.
- Natural Resources Law Enforcement – There is no natural resources law enforcement program at Jefferson Range, although there are natural resources law enforcement personnel that patrol Big Oaks NWR.

### **Integration with Big Oaks NWR**

As a result of the management responsibilities set for the in the MOA between the US Army, USAF and USFWS (see **Appendix H**), Jefferson Range and Big Oaks NWR have a very unique management situation. INANG is responsible for some infrastructure maintenance on Big Oaks NWR per the MOA (e.g., perimeter fence, some roads, and historic structures). While the INANG is responsible for natural resources management on Jefferson Range, a significant portion of the natural resources management on Jefferson Range is implemented and overseen by USFWS personnel from Big Oaks NWR. Shared management occurs because Jefferson Range is surrounded by Big Oaks NWR (see **Map 2**) and its safety buffers overly the refuge. As a result the goals of the Big Oaks NWR have direct bearing on the natural resources management on Jefferson Range. More information on Big Oaks NWR is available at <http://www.fws.gov/midwest/bigoaks/>.

National Wildlife Refuges develop Comprehensive Conservation Plans (CCPs), which are very similar to INRMPs developed by DoD facilities. As described in the Interim Comprehensive Conservation Plan (CCP) for Big Oaks NWR, the goals of the Big Oaks NWR are:

1. To preserve, conserve, and restore fish, wildlife, and plants listed as endangered and threatened and those species of management concern whose populations are declining;
2. To preserve, conserve, and restore a natural diversity and abundance of fish, wildlife, and plants by protecting, restoring, and managing large blocks of forest, grassland, shrubland habitats;
3. To provide interpretive, educational and research opportunities with the emphasis on resource conservation, restoration, and enhancement, and on biodiversity and biological integrity; and
4. To provide the public with opportunities for high quality wildlife-oriented recreation to the extent these activities are compatible with the mission of the refuge, public safety and the terms of the Army's real estate permit for use of the property.

In addition, Big Oaks NWR has been identified as a Globally Important Bird Area by the American Bird Conservancy due to the large population of Henslow's sparrows within the site's grassland areas. This is indicative of healthy native grasslands, which are relatively uncommon in the region and require an active and extensive prescribed fire and brush management program to maintain. These grasslands are also the preferred habitat for the INANG since they are more suitable for the flying mission than forested areas. The priority of maintaining open grasslands for both rare species and the military mission creates a clear direction for the natural resources management on Jefferson Range.

## 4.2 Programmatic Management

**GOAL PM:** Manage natural resources in a manner that is compatible with and supports the military mission while complying with applicable federal and state laws and USAF regulations and policies.

OBJECTIVE PM1: Initiate and/or continue programs and projects that enhance training land and opportunities and result in no net loss of training land availability.

OBJECTIVE PM2: Utilize adaptive, ecosystem management as the primary natural resources management paradigm.

OBJECTIVE PM3: Continue safety briefings to include relevant environmental awareness to minimize impacts to natural resources.

OBJECTIVE PM4: Conduct environmental awareness training with the support of other agencies as appropriate.

OBJECTIVE PM5: Continue to cooperate with Big Oaks NWR and other agencies on public outreach and regional land and natural resources management efforts.

OBJECTIVE PM6: Maintain and improve Geographic Information System (GIS) data for Jefferson Range and access to that GIS data by INANG personnel.

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Programmatic management includes environmental awareness, public outreach, outdoor recreation, GIS data management, INRMP annual reviews, adaptive management and other objectives relating to implementing a natural resources management program. Much of the natural resources management by Jefferson Range contributes to ecosystem management, but they are only a small piece of larger efforts by Big Oaks NWR.

### ***Primary Regulatory Drivers***

- Sikes Act
- DoDI 4715.03
- AFI 32-7064

### 4.2.1 Outdoor Recreation

The INANG is a trustee of public land and has a responsibility to protect and enhance environmental quality, conserve natural resources, and provide opportunities for outdoor recreation. Outdoor recreation is defined as a recreational program, activity, or opportunity that is dependent on the natural environment. Due to the presence of UXO, there are no outdoor recreation opportunities on Jefferson Range. There are opportunities on Big Oaks NWR but every outdoor recreation user must have a regular safety briefing and can only use a limited number of areas due to the presence of UXO and DU. Availability for outdoor recreation is also limited by the military mission at Jefferson Range. During active military training, the internal portions of Big Oaks NWR are blocked to prevent inadvertent entry into the safety buffers.

### 4.2.2 Public Outreach

Public outreach is an essential management tool at Jefferson Range – both for natural resources management and in general. Due to the limitations for public access resulting from safety considerations, the INANG does not have a regular public outreach program on site. They do participate with Big Oaks Conservation Society in some of the public activities hosted at Old Timbers Lodge. In addition, the majority of land use around INANG is associated with other public lands, so coordinating regional efforts with other agencies is an essential component of public outreach at Jefferson Range.

### 4.2.3 GIS Data Management

There is a very limited amount of natural resources data that have been groundtruthed on Jefferson Range. However, there are a number of surveys and related GIS data that were developed for either the former JPG or Big Oaks NWR, which have applicability to Jefferson Range. There is no GIS capability at Jefferson Range, although Big Oaks NWR does have GIS capability and maintains its own GIS data. There is general data available for the facility through the Common Installation Picture (CIP), which maintains a master dataset for every DoD installation with an emphasis on boundaries and infrastructure. **Table 6** provides a summary of GIS data currently available for Jefferson Range.

| Table 6. Summary of GIS data available for Jefferson Range   |                             |                          |
|--|-----------------------------|--------------------------|
| GIS Data   | Source                      | Needs updating?          |
| Boundary   | Created                     | Yes                      |
| Building Infrastructure  | CIP                         | Yes                      |
| Fences & Gates   | CIP                         | Yes                      |
| Roads  | CIP                         | Yes                      |
| Training Infrastructure  | CIP                         | Yes                      |
| Elevations   | CIP                         | Yes                      |
| Restricted Areas   | Big Oaks NWR                | No*                      |
| Streams  | National Hydrology Dataset  | No                       |
| Open Water   | National Hydrology Dataset  | No                       |
| Wetlands   | National Wetlands Inventory | No                       |
| Floodplains  | FEMA                        | No                       |
| Watersheds   | National Hydrology Dataset  | No                       |
| Burn Units   | Big Oaks NWR                | No*                      |
| Fire History   | Big Oaks NWR                | Annually                 |
| Soils  | NRCS                        | No                       |
| Land Cover   | Big Oaks NWR                | Yes                      |
| Aerial Imagery   | Multiple Sources            | Multiple years available |
| <p>CIP=Common Installation Picture (°Virtually all of the CIP data was missing all or part of the relevant data for one or more parcels. Some of the data is available from other sources as indicated here. There has also been some recent construction that will need to be captured in GIS.</p> <p>NRCS = Natural Resources Conservation Service</p> <p>FEMA = Federal Emergency Management Agency</p> <p>* indicates that the data does not currently have Federal Geographic Data Committee (FGDC) compliant metadata.</p> |                             |                          |

### 4.3 Soil Conservation & Sediment Management

**GOAL SO:** Manage soils to minimize sediment loss and erosion, while protecting water quality.

OBJECTIVE SO1: Manage the maintenance of roads and firebreaks to minimize the potential for erosion and sedimentation and the establishment of invasive species.

OBJECTIVE SO2: Minimize nonpoint source pollution by implementing BMPs and following existing spill prevention and hazardous materials management protocols.

OBJECTIVE SO3: Minimize nutrient and sediment inputs in surface waters to protect water quality.

OBJECTIVE SO4: Maintain vegetation buffers around water resources.

Surface water and groundwater quality is directly related to land management practices that affect stormwater runoff. Stormwater runoff is produced when rainfall during a storm exceeds the infiltration capacity of the soil or encounters an impervious surface. Stormwater runoff can be a significant source of pollutants and sediment into surface waters, especially in areas where groundcover has been disturbed or with impervious surface cover. Water quality may also be negatively impacted by disturbances causing increased sedimentation to wetlands and stream channels. Sources of stormwater runoff and pollution could originate from the headquarters area or areas designated for fueling and maintenance activities. Stormwater runoff from impervious surfaces has a high potential to carry pollutants into wetlands, surface waters, and groundwater. Impervious surfaces at Jefferson Range include paved areas and buildings. For a complete summary of soils and geology on Jefferson Range, see **Appendix D.1.3**.

#### **Primary Regulatory Drivers**

- Clean Water Act
- Indiana Water Pollution Control Act

Sediment resulting from erosion affects surface water quality and aquatic organisms. Two main types of soil erosion exist: wind erosion and water erosion. Several factors affect water erosion. These factors include rainfall, slope steepness and length, soil texture or erodibility, cover protecting the soil, and special practices such as terracing or planting on the contour.

Erosion control and soil conservation are not widespread natural resource issues at the Jefferson Range because there is very limited ground disturbance due to the presence of UXO and relatively low relief. However, some erosion concerns do arise during road, trail, firebreak, and fenceline maintenance. Erosion has the potential to be severe at Jefferson Range due to the generally low infiltration rate for water, which can result in substantial runoff and increased erosion potential.

The opportunities for exposed soil are very limited, thus areas affected by erosion are minimal.

#### 4.3.1 Best Management Practices and Regulatory Authority

Stormwater BMPs for Indiana are discussed in the *Indiana Storm Water Quality Manual* available at <http://www.in.gov/idem/4899.htm>. The City of Madison, Indiana has also published a regional manual, *Best Management Practices Stormwater Management Manual for Southern Indiana*, at <http://www.madison-in.gov/pdf/best-management-practices-manual.pdf>. Additionally, the USEPA published *Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices*, October 1992, EPA 833-R-92-001 can be used for construction activities. BMPs extracted from various manuals relevant to the needs of Jefferson Range are included in **Appendix I**. In particular, BMPs for water bar installation and maintenance, culvert installation and maintenance and other types of stream crossings are included.

In Indiana, when construction or other land-disturbing activities result in 1 acre or more of soil disturbance, a Rule 5 Permit for *Storm Water discharge Associated with Construction Activities* must be obtained from IDEM per 327 Indiana Administrative Code 15-5 (National Pollutant Discharge Elimination System Permit [NPDES] Rule Program). When applying for a Rule 5 permit, an Erosion Sediment Control Plan (ESCP) and Storm Water Pollution Prevention Plan (SWPPP) must be submitted to the county and IDEM for approval; these plans should outline the proposed erosion prevention and sediment control BMPs to be implemented during and after land disturbing activities.

#### 4.3.2 Management Strategies

In general, erosion and sedimentation are limited because overall ground disturbance is minimal due to extensive UXO contamination on former JPG land. However, it is recommended that the INANG implement the following strategies, when applicable, to protect water quality and minimize erosion:

- Use BMPs for construction and maintenance activities;
- Minimize the amount of impervious surfaces in newly developed areas;
- Limit the use of pesticides to the extent possible to in and around buildings and other developed areas;
- Minimize the use of overall herbicide use during vegetation maintenance activities and avoid the use of herbicides in and around surface waters;
- Restrict vehicles from within 30 feet of stream banks or lakes except where established stream crossings exist;

- Improve or develop new stream crossings in areas that are frequently clogged by debris, causing water within the stream channel to back up or flood;
- Revegetate barren ground and reforest areas around water resources;
- Prevent surface water pollution by ensuring environmental plans (e.g., SWPPP) are followed; Monitor roads adjacent to wetlands and streams to ensure erosion and sedimentation are not occurring.

Opportunities for erosion and sediment control training are available throughout the state of Indiana. The local Soil and Water Conservation Districts (SWCD) and watershed groups host workshops annually, typically during the winter months, for those interested in learning more about appropriate BMPs for construction and maintenance activities. One of the largest workshops is hosted by the White River Watershed in Noblesville, Indiana.



## 4.4 Water Resources Management

**GOAL WA:** Maintain water resources so they remain resilient and with no net loss of acreage or functions and values.

OBJECTIVE WA1: Minimize impacts to water resources and comply with all laws and regulations pertaining to wetlands, streams, floodplains and regulated water bodies.

OBJECTIVE WA2: Maintain or enhance riparian corridors.

OBJECTIVE WA3: Maintain or enhance crawfish frog ponds.

Wetlands and aquatic habitats are some of the most productive habitats, and often provide migration corridors for a variety of species. Floodplains are low areas adjacent to streams, rivers, or lakes prone to flooding, while riparian zones are vegetated communities along water bodies that may include both uplands and wetlands. Floodplains and riparian zones provide the following benefits:

### **Primary Regulatory Drivers**

- Clean Water Act
- Indiana Isolated Wetlands Law
- Indiana Flood Control Act
- AFI 32-7064
- EO 11990
- EO 11988

- Store excess water during flood events;
- Provide shade for fish and other aquatic species;
- Improve water quality by reducing sedimentation and removing pollutants;
- Stabilize stream banks; and
- Provide quality habitat and wildlife corridors.

In addition to the goal, objectives and management strategies presented here, those presented in **Section 4.3** also contribute to the management of water resources. For a complete summary of water resources on Jefferson Range, including streams, rivers, ponds, wetlands and floodplains, see **Appendix D.1.4**.

### 4.4.1 Regulatory Authority

Jurisdictional waters of the US are areas regulated under the CWA and may also include coastal and inland waters, lakes, rivers, ponds, streams, intermittent streams, vernal pools, and other waters, that if degraded or destroyed could affect interstate commerce. The term —waters of the United States” has broad meaning under the CWA and incorporates deep water aquatic habitats and special aquatic habitats (including wetlands). Section 404 of the CWA authorizes

the USACE to issue permits for the discharge of dredged or fill into the ~~waters~~ of the United States,” including wetlands. Section 401 of the CWA gives the state of Indiana the authority to regulate, through the state water quality certification program, proposed federally-permitted activities that may result in a discharge to water bodies, including wetlands. The state may issue certification, with or without conditions, or deny certification for activities that may result in a discharge to water bodies. In Indiana, the IDEM is responsible for issuing Section 401 Water Quality Certification (WQC).

Although the US Supreme Court Decision in the case of Solid Waste Agency of Northern Cook County (SWANCC) v. USACE 531 US 159 (9 January 2001) determined that the presence of migratory birds only was not sufficient cause for declaring jurisdiction over isolated wetlands, Indiana passed the Isolated Wetlands Law (Indiana Code [IC] 13-18-22). This law is implemented in accordance with 327 Indiana Administrative Code (IAC) 17. It gives the IDEM the authority to issue isolated wetlands permits, which include the Isolated Wetland General Permit and the Isolated Wetland Individual Permit.

For projects requiring construction in a floodway or state designated navigable water, the IDNR has authority to issue waterways permits under the Flood Control Act, Navigable Waterways Act, and several other state acts. The INANG should contact the IDNR prior to initiating work within a Federal Emergency Management Agency (FEMA) floodplain to identify the appropriate permit(s).

Furthermore, wetlands are protected under EO 11990 - *Protection of Wetlands* and floodplains are protected under EO 11988 – *Floodplain Management*. The purpose of EO 11990 is to reduce the adverse impacts associated with the destruction or modification of wetlands through federal actions. The purpose of EO 11988 is for federal agencies to provide leadership and take action to reduce the risk of flood loss, minimize the impacts of flooding, and restore and preserve the natural and beneficial values of floodplains when acquiring, managing or disposing of federal lands.

As a result of the federal and state regulations, as well as DoD and Air Force (AF) policy, the INANG is responsible for identifying and locating jurisdictional ~~waters of the United States~~, isolated wetlands, and regulated floodplains, where these resources have the potential to be impacted by activities at the Jefferson Range. Activities could include construction of roads, buildings, runways, and other appurtenant structures or activities as simple as culvert crossings of small intermittent streams, rip-rap placement in stream channels to curb accelerated erosion, and incidental fill and grading of wet depressions.

#### **4.4.2 Permitting**

As discussed above, the USACE, IDEM and IDNR have regulatory authority over jurisdictional waters of the United States, isolated wetlands and floodplains in the

state of Indiana. In Indiana, the USACE issues individual permits, nationwide permits (NWP), and a Regional General Permit (RGP) that covers many routine or minor projects. The IDEM has issued general 401 WQCs to cover many of the NWP and RGP activities, as well as Individual 401 WQCs, Isolated Wetland General Permits and Isolated Wetland Individual Permits. The IDNR issues various waterways permits for work in floodplains in Indiana.

In general, individual permits are required for disturbances that exceed thresholds for disturbances covered by general permits. Permitting requirements vary depending on type, location, and extent of disturbance. Prior to initiating projects or activities (e.g., dredging, filling, work in/around a stream) occurring within or with the potential to affect a floodplain, wetland or other water body, the appropriate agencies should be consulted to determine permitting requirements.

As a result of new USEPA ruling, IDEM has issued a new permit through its NPDES Program. The new NPDES Pesticide General Permit pertains to pesticide applications on waters of the state of Indiana and land areas adjacent to waters of the state, and is consistent with the USEPA pesticide general permit requirements published under 40 CFR 122. This NPDES general permit is applicable to all persons who discharge pesticides to waters of the state from the application of biological pesticides or chemical pesticides, which leave a residue of the pesticide or its degradates. The following categories of pesticide discharges are covered under this general permit: (1) mosquitoes and other flying insect pest management, (2) aquatic weed and algae control, (3) aquatic nuisance animal control, (4) forest canopy pest control, (5) ditch bank or conveyance weed control, (6) control of aquatic vegetation under a IDNR Permit, and (7) aquatic weed and algae control in private ponds.

Specifically, the NPDES Pesticide General Permit issued by IDEM covers the control of invasive or other nuisance weeds in a right-of-way or easement where to target the pests effectively a portion of the pesticide unavoidably will be applied over and deposited to water. The submission of a notice of intent (NOI) and development of a Pesticide Discharge Management Plan under this general permit will only be required for certain persons who have pesticide applications that would exceed a threshold(s) listed in the general permit. The INANG should consult the general permit thresholds and/or contact IDEM when using pesticides or herbicides for vegetation management along roads, firebreaks and the fence to determine if a NOI or Pesticide Discharge Management Plan is required.

#### **4.4.3 Management Strategies**

In general, water resources will be managed through conservation and impact avoidance. The following guidelines will be implemented to ensure compliance and to protect and enhance water resources at the Jefferson Range.

- Consult with 181 IW/EM or NGB/A7AN Natural Resources Manager prior to initiating projects with the potential to disturb water resources. If necessary, projects should be referred to the USACE and IDEM to determine if jurisdictional waters of the US and/or state, respectively, would be impacted and the appropriate permits. To ensure compliance with Section 401 of the CWA, any requirements and conditions under NPDES permits must be met for IDEM certification.
- Plan development and training to avoid wetland and floodplain impacts to the maximum extent possible and mitigate unavoidable impacts on wetland and floodplain functions.
- Do not allow vehicles within any known and/or potential wetland areas.
- Restrict vehicles from within 30 feet of water resources except where established crossings exist.
- Maintain 300-foot buffers around wetlands. Activities within buffer zones are limited to those that cause little or no impact or disturbance to the wetlands. In cases where established activities already occur within buffers and cannot be reasonably changed, those wetlands should be subject to increased monitoring.
- Avoid disturbance of wetlands and aquatic habitats where practicable, especially during restrictions for spawning activity.
- Protect the riparian zone and stream banks through good forest, land, and wetland management.
- Manage invasive species to promote the establishment of desirable native wetland species.
- Minimize use of pesticides and avoid the use of pesticides in and around wetlands and other surface waters (see **Section 4.9**);
- Evaluate potential adverse effects of proposed training to floodplains; alternatives must be considered to avoid adverse effects and incompatible development of the floodplain (EO 11988). If unavoidable, consult with IDNR to obtain the appropriate permits.
- Provide training units with written guidance for natural resources protection.
- Review operations and maintenance that potentially affect water resources, and develop procedures to avoid the loss of function.

While these are sound management strategies generally, they have limited applicability at Jefferson Range due to the limited water resources present and the limited ground disturbance that occurs on former JPG land due to extensive UXO contamination. When necessary, wetland delineations should be conducted with the least invasive means possible.

## 4.5 Vegetation Management

**GOAL VE:** Manage vegetation to maintain grasslands, forests and other habitats using cost effective and sustainable methods.

OBJECTIVE VE1: Maintain intact, healthy habitat (e.g. forests and riparian corridors) and enhance or restore degraded habitat, without increasing BASH risk.

OBJECTIVE VE2: Manage for open grasslands by continuing to implement the wildland fire program and minimize woody encroachment, in conjunction with Big Oaks NWR.

OBJECTIVE VE3: Maximize native plants and avoid invasive non-native plants in landscaping, in particular around Old Timbers Lodge.

OBJECTIVE VE4: Coordinate with Big Oaks NWR to maintain existing large contiguous blocks of habitat between the two facilities and increase connectivity among the smaller blocks of habitat.

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Vegetation management includes management of forests, fish and wildlife habitat, rare species habitat and invasive plant species. There is a significant overlap in the objectives, activities and projects within this section and all other sections within the INRMP, which is indicative of the essential role vegetation plays in ecosystems and natural resources management.

### **Primary Regulatory Drivers**

- Sikes Act
- AFI 32-7064

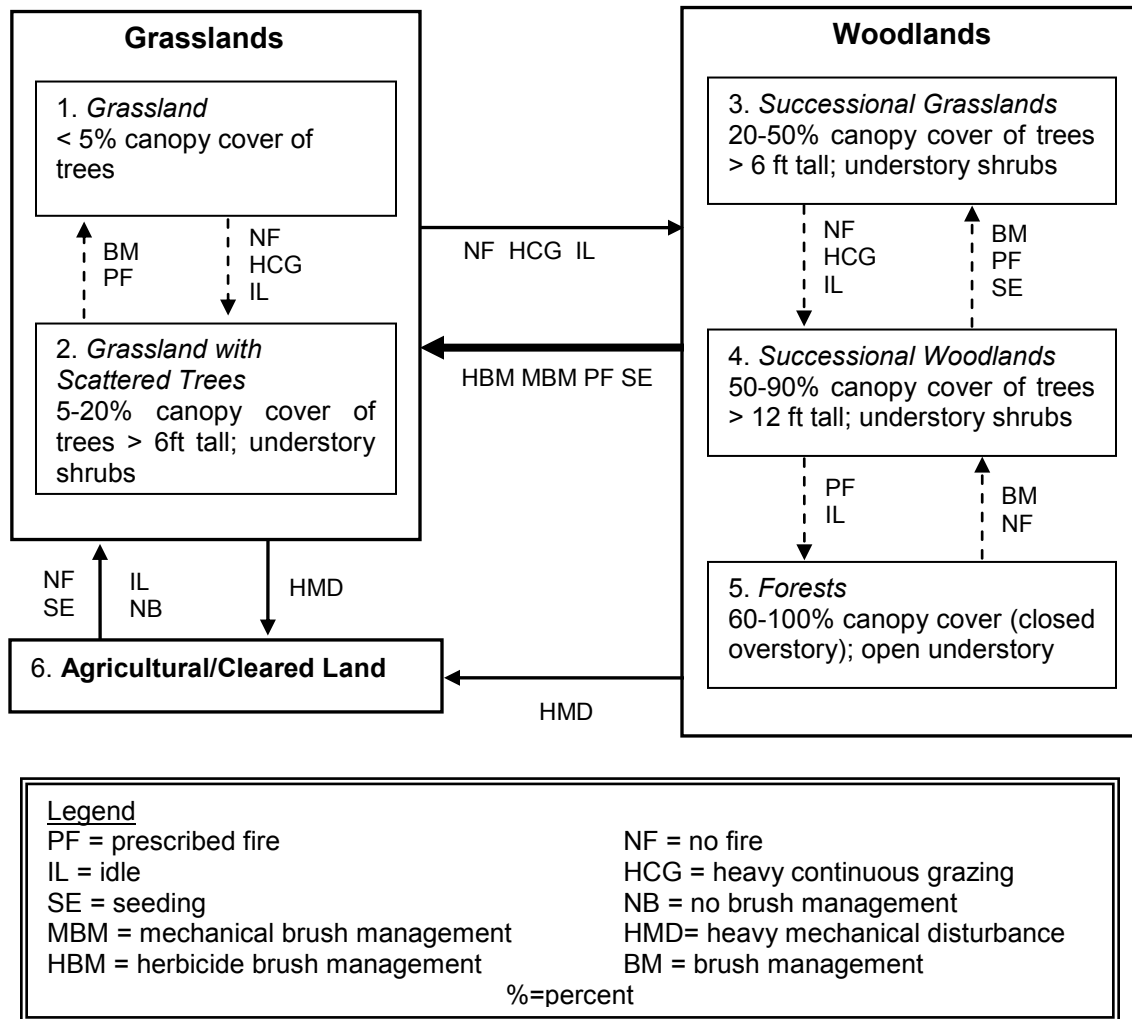
A major management focus of Big Oaks NWR and Jefferson Range is vegetation management and is the single most time-consuming aspect of the natural resources management program. Existing habitats are managed to provide large contiguous blocks of forest, grassland, and shrub habitat. Big Oaks NWR promotes habitat continuity and diversity to support healthy populations of wildlife, especially the declining species dependent on forests and grasslands.

Adaptive, ecosystem management takes into account that Big Oaks NWR and Jefferson Range are part of a larger landscape, and provides the framework for forming management decisions and strategies, while using the most current, scientifically validated, management techniques. Population and habitat monitoring are used to periodically by Big Oaks NWR to evaluate and improve management techniques. Cooperative research and monitoring studies are being developed with specialists to increase and improve the knowledge and ability to manage the resources found in the area.

Forests are managed for large contiguous blocks, a habitat rare in the present landscape of Indiana and required by "forest-interior" species. Examples of these

species include Indiana bat, cerulean warbler, wood thrush (*Hylocichla mustelina*), worm-eating warbler (*Helmitheros vermivorum*), and wild turkey (*Meleagris gallopavo*).

Grasslands are also managed for large contiguous blocks, and are interspersed with the large forest blocks occurring within Big Oaks NWR. Grasslands are maintained by carrying out an extensive prescribed fire program. On Jefferson Range, in particular, there are large blocks of grasslands as a result of regular wildfires from military training, which are some of the largest blocks of grasslands within the Big Oaks NWR boundary.



**Figure 5. State and Transition Model of Upland Vegetation Communities in Ripley County**

In order to illustrate the relationship between the different vegetation communities and management tools, a state and transition model has been developed (see **Figure 5**). This model illustrates the management requirements

necessary to maintain a specific habitat type. For example, to transition an area from successional woodlands to grasslands with scattered trees requires first using brush management and/or prescribed fire to shift the vegetation to successional grasslands, followed by intensive multi-modal brush management and intensive prescribed fire to shift the vegetation to grasslands with scattered trees.

Vegetation management at Jefferson Range will be coordinated and implemented with Big Oaks NWR. The following sections provide specific management recommendations and strategies for forest, grassland and riparian habitat within Jefferson Range.

#### 4.5.1 Forest Management

Large forested tracts are rare in Indiana. However, the area north of K road on Big Oaks NWR contains one of the largest contiguous blocks (approximately 14,000 acres) of forest in Indiana and provides breeding habitat for a variety of declining populations of neotropical migrant birds (IDNR 2011, USFWS 2011b).

However, there are limited forests on Jefferson Range compared to Big Oaks NWR, and they do not generally require management actions. The primary management concern with forests on Jefferson Range is to minimize impacts to potential roosting habitat for Indiana bats. Recommended strategies to manage forests at Jefferson Range include:

- Use prescribed fire to manage fuel loads within forests and woodlands and reduce risk of uncontrollable wildfires from military activities (see **Section 4.8**).
- Do not remove large trees and snags suitable for Indiana bat roosting habitat (refer to **Section 4.7** for more information).

In addition to the management recommendations above, the impact of the emerald ash borer (*Agrilus planipennis*) will need to be addressed once it reaches Ripley County (see **Section 4.9** for more details on this invasive species).

#### 4.5.2 Grassland Management

Native grasslands of any size are rare in southern Indiana and there are a large number of rare species dependent upon healthy native grasslands (see **Section 4.7**). Big Oaks NWR has some open, grassland areas, but they are scattered and generally impacted by woody encroachment. A key management goal for Big Oaks NWR is to maintain and enhance open, grasslands for rare grassland dependent species through the reduction and prevention of woody encroachment.

In contrast, the majority of Jefferson Range is grasslands, largely as a result of regular military training and associated wildfire starts. Open grasslands are the preferred habitat to support the military mission at Jefferson Range. The key for long-term management of open grasslands is to prevent woody species (e.g., sweet gum, black locust, sumac, etc.) from resprouting and getting established. If these species resprout and it becomes significant enough, then intensive brush management, including herbicides, becomes essential to reduce and prevent further resprouting of these woody species. Furthermore, the brush management needs to be coordinated with an active and intensive prescribed fire regime until the resprouting species are reduced. Recommended strategies to manage grasslands at Jefferson Range include:

- Maintain open grasslands by preventing any woody encroachment into those areas.
- Transition successional grasslands to open grasslands using a combination of brush management and prescribed fire, and limit the use of herbicide to the extent possible. (Herbicides will have to be used every 5 to 10 years in conjunction with prescribed fire to maintain open fields.)

#### **4.5.3 Riparian Enhancement along Water Resources**

Riparian habitat is essential for many species and performs critical water quality functions as well. The management priority for existing, undisturbed riparian areas is to protect and enhance existing habitat quality. Recommended strategies include:

- Allow undisturbed riparian forests to flourish naturally. Intermittent flooding disturbances will naturally enhance these areas.
- Avoid unnecessary removal of trees along the riparian corridor to prevent adverse effects on stream water quality and aquatic organisms from runoff and sedimentation.
- Leave several hollow trees and dead trees per acre to provide habitat for cavity-nesting birds and Indiana bats. Trees with hollows in the trunk or upper limbs provide homes for several species.



## 4.6 Fish and Wildlife Management

**GOAL FW:** Maintain fish and wildlife populations while minimizing potential impacts to the military mission.

OBJECTIVE FW1: Minimize BASH risk by deterring birds, and other wildlife, from areas of low-altitude flight activity

OBJECTIVE FW2: Maintain populations of wildlife by minimizing impacts and by providing healthy, diverse habitat types and corridors for movement between those habitats.

Fish and wildlife management at the Jefferson Range focuses on maintaining and restoring natural habitat favorable for indigenous fish and wildlife in a manner consistent with the military mission and all applicable laws and regulations. Information pertaining to fish and wildlife species known to occur at the Jefferson Range are included in **Appendix D**.

In addition to general fish and wildlife management, there are additional management needs associated with minimizing BASH-related risk and impact to migratory bird species since Jefferson Range's primary military mission is based on flying missions.

### **Primary Regulatory Drivers**

- Sikes Act
- Migratory Bird Treaty Act
- AFI 32-7064
- Indiana Fish and Wildlife Regulations

With Jefferson Range surrounded by Big Oaks NWR, there is sufficient habitat to support a healthy diversity of wildlife. Jefferson Range supports numerous native species and habitats, as well as federally and state listed threatened and endangered species (see **Section 4.7** and **Appendix E**). There are no noticeable negative impacts from mission activities on wildlife populations on Jefferson Range. The majority of fish and wildlife management is conducted on Big Oaks NWR by USFWS personnel. The fish and wildlife on Jefferson Range benefit from the management on Big Oaks NWR.

Due to safety restrictions from the military mission and the presence of UXO, there are no consumptive or non-consumptive fish and wildlife management opportunities on Jefferson Range. In the past there has been a very limited hunting program on Jefferson Range, which is currently suspended and undergoing review. A hunting program may be re-established in the future if a program can be implemented that minimizes the hazards from UXO and other safety concerns. The current opportunities that do exist all occur on Big Oaks NWR. Based on data from Big Oaks NWR, the game species likely present on Jefferson Range are squirrels, white-tailed deer (*Odocoileus virginianus*), and wild turkey.

In addition, beavers and river otters are present on Big Oaks NWR, but are unlikely on Jefferson Range due to the lack of large, perennial streams. Beavers, in particular, are important to manage for since they are ecosystem engineers and influence hydrology, wetlands and vegetation across large areas. They also have the ability to negatively impact roads and stream crossings. Big Oaks NWR actively manages to minimize infrastructure impacts, but otherwise allows beavers to create new impoundments and this is increasing the area of permanent water and wetland diversity on Big Oaks NWR.

The focus on maintaining open grasslands on Jefferson Range will benefit many wildlife species that are dependent on early successional habitat, such as white-tailed deer, bobwhite quail (*Colinus virginianus*) and numerous non-game species.

#### **4.6.1 Migratory Bird Treaty Act**

The Migratory Bird Treaty Act (MTBA) prohibits, unless permitted by regulations, the pursuit, hunting, take, capture, killing or attempting to take, capture, kill, or possess any migratory bird included in the Migratory Bird Treaty, including any part, nest, or egg of any such bird (16 USC § 703). The DoD has a MOU with the USFWS pursuant to EO 13186 (Responsibilities of federal agencies to Protect Migratory Birds), which outlines a collaborative approach to promote the conservation of migratory bird populations. This MOU specifically pertains to natural resource management activities, including, but not limited to, habitat management, erosion control, forestry activities, invasive weed management, and prescribed burning. It also pertains to installation support functions, operation of industrial activities, construction and demolition activities, and hazardous waste cleanup. In February 2007, the USFWS finalized regulations for issuing incidental taking permits to the DoD. If any of the Armed Forces determine that a proposed or an ongoing military readiness activity may result in a significant adverse effect on a population of migratory bird species, then they must confer and cooperate with the USFWS to develop appropriate and reasonable conservation measures to minimize or mitigate identified significant adverse effects (50 CFR Part 21).

#### **4.6.2 BASH-Related Management**

The INANG does not currently have a BASH Plan for Jefferson Range. However, they actively implement measures to minimize the risk and potential for bird strikes to occur at the Jefferson Range.

Birds can be encountered up to altitudes of 30,000 feet and higher. However, most birds fly close to the ground level, and more than 95 percent of all reported incidents in which an USAF aircraft has struck a bird have been below 3,000 feet above ground level. Approximately half of these bird strikes occur in an airfield environment, and approximately one quarter occur during low-altitude training.

Strike rates rise significantly as altitude decreases, partly due to the greater number of low-altitude missions, but mostly because birds are commonly active close to the ground. Any gain in altitude represents a substantially reduced threat of a bird-aircraft strike. The potential exists for future bird strikes if current procedures to minimize risk are not continued.

At the Jefferson Range, there are several common birds that might be present and pose a hazard: gulls, hawks, owls, falcons, blackbirds, starlings, rufous-sided towhee, pigeons, doves, ducks, geese, woodpeckers, crows, wild turkey, sparrows/house sparrows, chickadee, meadowlark, killdeer, tufted titmice, and common grackle. Migratory waterfowl (ducks, geese, and swans) pose a threat to low-flying aircraft. Waterfowl vary considerably in size, from 1 to 2 pounds for ducks, 5 to 8 pounds for geese, and up to 20 pounds for most swans. There are two normal migratory seasons, spring and fall. Waterfowl are usually only a hazard during the migratory season. Waterfowl typically migrate at night and generally fly between 1,500 and 3,000 feet above ground level during the fall migration and 1,000 to 3,000 feet above ground level during spring migration. In addition, other large avian species, such as turkey vultures and gulls, pose a threat to military aircraft.

In order to minimize the BASH-related risk, wildlife management on Jefferson Range will attempt to deter animals from foraging or roosting in areas near or adjacent to the low-level flying routes and attract wildlife to areas away from those routes. This approach has been chosen due to the relative abundance and diversity of wildlife species present on Jefferson Range, and the low likelihood of excluding all wildlife species that pose a significant threat to the safety of the flying mission.

BASH is not a significant issue at Jefferson Range because planes do not land and take off at Jefferson Range and generally perform few low approaches. More than one half of all USAF bird-aircraft strikes occur at or below 600 feet above ground level during low-level flights. As part of BASH procedures, aircraft are provided with a report from the Avian Hazard Advisory System (AHAS), conditions and recent bird observations when they check in with the tower. If risk is considered high, Jefferson Range will occasionally impose adjustments to training to reduce risk. Planes descend occasionally to 500 feet for some training and down to 75 feet for the strafing pit. Helicopters do occasionally land at Jefferson Range.

#### **4.6.3 Management Strategies**

Wildlife management involves manipulating various aspects of an ecosystem to benefit chosen wildlife species. Management of these habitats generally is focused to benefit indigenous species, particularly threatened and endangered species and game species. The INANG will manage the wildlife and its habitat at Jefferson Range by implementing the strategies listed below.

- Preserve snags and large trees for cavity-nesting species in the safety buffer unless required for safety or mission considerations.
- Protect riparian forest and wetlands as many indigenous and rare species are dependent on them at Big Oaks NWR (e.g. northern river otter [*Lutra canadensis*], crawfish frog, etc).
- Perform prescribed burns to enhance native prairie grassland habitat.
- Minimize the amount of herbicides used for invasive species control, particularly in or around surface waters and wetlands, by using mechanical methods to the extent possible to avoid impacts to fish and wildlife habitat.
- Mow and burn open fields between 15 September and 15 April to avoid impacting nesting and migratory birds when possible.
- Maintain grass heights between 20-30 cm in the impact area during the growing season to discourage assembly of small, flocking birds.
- Maintain corridors between wetlands to provide for wildlife movement between areas.
- Minimize habitat fragmentation by minimizing land clearing, new road construction, and expansion of firebreaks and plow lines.

Due to the nature of the relationship between Big Oaks NWR and Jefferson Range, the majority of these strategies are implemented by USFWS personnel. Jefferson Range is managed for open grassland to facilitate the flying mission and that limits the species and density of wildlife species present on Jefferson Range.

#### **4.6.4 Nuisance Wildlife and Wildlife Diseases**

Other than minimizing BASH risk, there are few nuisance wildlife species at Jefferson Range. Nuisance wildlife problems will be evaluated in conjunction with USFWS and IDNR personnel, if appropriate. Any solutions to nuisance wildlife problems will follow the Integrated Pest Management Plan (IPMP, See **Section 4.9**).

Diseases affecting fish and wildlife may occur on the installation. Any large-scale fish and wildlife deaths and unnatural behavior occurring on the installation will be reported, recorded and investigated, in conjunction with USFWS and IDNR personnel, if appropriate.

## 4.7 Threatened and Endangered Species Management

**GOAL TE:** Manage rare species using an ecosystem approach, while maintaining the military mission at Jefferson Range.

OBJECTIVE TE1: Maintain populations of Indiana bat, cerulean warbler and other forest dependent rare species by maintaining existing tracts of forest.

OBJECTIVE TE2: Maintain populations of dickcissel, grasshopper sparrow, Henslow's sparrow and crawfish frog by maintaining existing tracts of grassland.

OBJECTIVE TE3: Maintain diversity of vegetation communities to provide a variety of disturbance regimes and habitat types to support a variety of rare species, in conjunction with Big Oaks NWR.

This section presents information about the management of sensitive species that are located or may be located on Jefferson Range, and the requirements and strategies for their management. While there have been no site-specific surveys due to the presence of UXO on Jefferson Range, there are likely federally and state listed species present on Jefferson Range based on former JPG and Big Oaks NWR surveys. For a complete summary of federal and state listed species, as well as other rare species, see **Appendix E**. In general, if a species is documented to occur on Big Oaks NWR, it is assumed to occur on Jefferson Range with the exception of karst species and perennial stream species.

### **Primary Regulatory Drivers**

- Endangered Species Act
- Bald and Golden Eagle Protection Act
- Indiana Nongame and Endangered Species Conservation

Based on previous surveys, the endangered Indiana bat is the only federally listed species protected by the ESA known to occur within Big Oaks NWR and likely to occur on Jefferson Range. Thirteen state-listed endangered animals, including 2 amphibians, 10 birds and 1 reptile, are known to occur within Big Oaks NWR and are protected under state law. In addition to those species protected by law, Big Oaks NWR has documented 8 federal species of concern and 61 state listed rare species.

Seven rare species are considered priority species at Jefferson Range. Of these species, five are afforded protection under the ESA and/or Indiana law. These species include one mammal, one plant, one frog and four birds:

- federally and state endangered Indiana bat
- federally and state endangered running buffalo clover
- federal species of concern dickcissel
- federal species of concern grasshopper sparrow
- federal species of concern and state endangered Henslow's sparrow

- federal species of concern and state endangered cerulean warbler
- state endangered northern crawfish frog

Of these seven species, Indiana bat and cerulean warbler are forest dwelling species, while the other five are grassland dependent species. It is possible other species may be documented or identified as priority species in the future as additional surveys and natural resources management are conducted at Jefferson Range.

#### 4.7.1 Federally Listed Species

The INANG is required to manage federally listed threatened and endangered species. Failure to protect federally listed species could lead to an ESA violation, which could negatively impact training land availability.

Federally listed species with known occurrence in Ripley County, Indiana include Indiana bat and running buffalo clover (USFWS 2011a). Only Indiana bat has been documented on Big Oaks NWR; it is assumed that it occurs on Jefferson Range as well. Eight bird species occurring within Big Oaks NWR have also been designated as federal Species of Concern by Region 3 of the USFWS because they may be in need of concentrated conservation actions. Eight of those species are documented on Big Oaks NWR and are likely to occur on Jefferson Range as well. No critical habitat as designated by USFWS exists on Jefferson Range. **Appendix E.1** provides a detailed summary of federally listed species in Ripley County and whether they have been documented on Big Oaks NWR. The federally listed species receiving management priority at Jefferson Range are the endangered Indiana bat, endangered running buffalo clover, and two federal species of concern, dickcissel and grasshopper sparrow.

**Indiana bat:** Jefferson Range is likely to contain potential roosting habitat for Indiana bats within the forested portions of the primary range (INRMP Task Force Meeting, **Appendix L**). Indiana bat maternity colonies typically occupy multiple roost trees in riparian, bottomland, and upland forests during the summer. Roost trees generally have exfoliating bark and have a southeast or south-southwest solar exposure and an open canopy. Since most of Jefferson Range is open grassland, potential habitat is primarily limited to the forested corners of the primary range parcel. For more discussion on forest management at Jefferson Range, refer to **Section 4.5.2**.

Forest Management Guidelines for informal ESA Section 7 consultations in the state of Indiana for the Indiana bat have been developed by the USFWS Bloomington Field Office (BFO) and are included at the end of **Appendix E** (USFWS 2008). To maintain suitable habitat for the Indiana bat, the following management strategies are recommended in these guidelines:

- Do not remove trees >3-inch diameter at breast height (dbh) while Indiana bats may be present from 1 April through 30 September (i.e., trees may be felled from 1 October through 31 March).
- No tree removal shall occur within 100 feet of a perennial stream or within 50 feet of an intermittent stream.
- Standing snags shall not be removed, except where they pose a serious human safety hazard (a tree with <10 percent live canopy should be considered a snag). Snags that have no remaining bark and no visible cracks, splits, or hollows may be removed as well as any snags leaning more than 45° from vertical.
- Prescribed burns shall not be conducted from 15 April through 15 September in burn areas containing potential bat roost trees/snags >3" dbh as specified by the current USFWS Guidelines (unless dates change in future guidelines or agreements).
- Temporary fire breaks shall be created and/or maintained around any known Indiana bat primary maternal roost trees that fall within a proposed burn area prior to the burn. While this is part of the BFO guidelines, it has limited application on Jefferson Range or Big Oak NWR due to safety issues associated with UXO and DU.

*Management Recommendations:* Prior to conducting activities within the forested portions of the Jefferson Range, the INANG will review and implement the appropriate BFO Forest Management Guidelines to ensure no incidental take or adverse affects to Indiana bats occur as a result of training or land management activities at the Jefferson Range.

The USFWS BFO guidelines state that no prescribed fire shall be conducted from 15 April to 15 September. The Big Oaks NWR is currently conducting formal consultation to modify the no prescribed fire period from 30 April to 30 August. The proposed modifications to the prescribed fire dates would provide additional opportunities to achieve refuge habitat management objectives. Big Oaks NWR undertakes vegetation and wildland fire management in conjunction with and on Jefferson Range. Any of these activities led by Big Oaks NWR will be done in compliance with their intra-agency consultation requirements.

**Dickcissel:** The dickcissel is known to breed on the Big Oaks NWR (USFWS 2011b) and further is known to breed in the grassland areas on Jefferson Range (USFWS 2011b).

*Management Recommendations:* The primary strategies for managing the dickcissel include maintaining suitable grassland habitat and minimizing woody encroachment (Dechant et al. 2002). In order to maintain suitable habitat, the following management actions are recommended:

- Minimize disturbance in suitable grassland areas during the breeding season (ranges from late April to late August).
- Conduct mowing after peak breeding season (after mid-August), when possible, but mow early enough to ensure vegetation can recover before the winter or following spring.
- Use prescribed fire on a rotational basis in these areas (3 to 5 year cycle).
- Refer to **Section 4.5.2** of the INRMP for more information on grassland habitat management recommendations.

**Grasshopper sparrow:** The grasshopper sparrow is known to breed on the Big Oaks NWR (USFWS 2011b) and furthermore is known to nest within the grassland areas on Jefferson Range (USFWS 2011b).

*Management Recommendations:* The primary strategy for managing the grasshopper sparrow is maintaining large areas of contiguous suitable grassland habitat with low shrub density (Dechant et al. 2002). Habitat management for the grasshopper sparrow is similar to the dickcissel and primarily consists of discouraging woody vegetation encroachment in grassland areas through mowing and burning (Dechant et al. 2002). Refer **Section 4.5.2** of the INRMP for more information on grassland habitat management recommendations.

**Running buffalo clover:** All of the extant populations in Indiana occur in the southeastern corner. To date, this species has not been observed on the Big Oaks NWR or Jefferson Range, so no management strategies are recommended, but should be revisited if this species is found in the future. Surveys for this species are recommended in conjunction with other spring floristic and vegetation community surveys.

#### **4.7.2 State Listed Species**

Nongame and endangered animals in the state of Indiana are regulated under Indiana Code 14-22-34-1 *et seq.* Plants have no legal protection in Indiana unless they are listed under the ESA. In addition to the federally endangered species and species of special concern, approximately 74 species are known to occur within the Big Oaks NWR and 64 species have the potential to occur on the Jefferson Range (IDNR 2011, USFWS 2011b). **Appendix E.2** presents a detailed summary of state-listed species on Big Oaks NWR and potentially on Jefferson Range. The state listed species receiving priority at Jefferson Range are the endangered Henslow's sparrow, cerulean warbler and northern crawfish frog.

**Henslow's sparrow:** Henslow's sparrows are known to breed on Big Oaks NWR and are likely to occur within the grassland areas on Jefferson Range (USFWS 2011b).



*Management Recommendations:* Woody invasion and grassland habitat area are limiting factors for the Henslow's sparrow. The primary strategies to managing this species include maintaining large areas of suitable grassland habitat, avoiding habitat disturbances during the breeding season, and controlling woody encroachment. Habitat management for Henslow's sparrow is similar to the other grassland birds discussed in **Section 4.7.1**. Refer to dickcissel and grasshopper sparrow management recommendations and **Section 4.5.2** of the INRMP for more information on grassland habitat management recommendations.

**Cerulean warbler:** The cerulean warbler is known to breed on the Big Oaks NWR with the area north of K road is likely important habitat (USFWS 2011b). Due to the close proximity of the Jefferson Range to K Road, it is likely cerulean warblers are present within the forested areas on Jefferson Range.

*Management Recommendations:* Loss of habitat quantity and degradation of existing habitat quality are thought to be the primary reasons for the decline in cerulean warbler populations. The key factors threatening suitable habitat include loss of forest to other land uses, forest fragmentation, and loss of necessary vegetation structure within mature deciduous forests (USFWS 2007). Protection and enhancement of large forested areas is the primary management strategy for this species. Refer to **Section 4.5.1** for additional information on forest management on Jefferson Range.

**Northern crawfish frog:** An isolated population occurs in southeastern Indiana within the Big Oaks NWR (USFWS 2011b). Although crawfish frogs are found in a variety of habitats, the northern subspecies found in Indiana seems to prefer tallgrass prairies and other native grassland habitat (IDNR 2011, Engbrecht 2010).

*Management Recommendations:* The reasons for the decline of northern crawfish frog populations are not well understood in Indiana. A crawfish frog study within Indiana is currently being conducted by numerous entities, including Indiana University, USFWS, USACE, San Diego Zoo, Hanover College, Eastern Kentucky University, and United States Geological Survey (USGS) Earth Resources Observation and Science (EROS) Data Center, to better understand northern crawfish frog populations, distribution, and the limiting factors to this species' survival in Indiana. One of the objectives of this study is to develop management recommendations for IDNR and USFWS to better maintain and enhance crawfish frog populations in the state (IDNR 2009). Until additional information is available, it is recommended that known breeding areas and suitable habitat (moist prairies and wetland areas) within the Jefferson Range be protected, particularly during March and April.

### **4.7.3 Management Strategies**

The following general guidelines will be followed to facilitate the military mission and natural resources management objectives while minimizing negative impacts on rare species and their habitats.

- Follow the USFWS (2008) guidelines for Indiana bat.
- Continue to maintain existing tracts of forest.
- Continue to maintain existing tracts of grassland.
- Continue prescribed fire program while taking into consideration sensitive populations or time periods for priority listed species.

## 4.8 Wildland Fire Management

**GOAL FI:** Minimize risk and maximize ecological benefits by continuing the wildland fire program.

OBJECTIVE FI1: Minimize risk of escaped wildfires and prescribed fires by maintaining fire breaks, managing vegetation, planning adequately and coordinating with the USFWS.

OBJECTIVE FI2: Integrate wildland fire program with regional initiatives.

OBJECTIVE FI3: Maintain open grassland habitat using prescribed fire.

OBJECTIVE FI4: Maintain the diversity of spatial and temporal fire regimes to create a habitat mosaic that maximizes habitat diversity.

Historically, fire was an infrequent, natural ecological process within southeastern Indiana. Fire was commonly used by Native Americans around their settlements to alter habitat conditions for wildlife and for agriculture. Fire was used by the US Army on the former JPG to decrease fuel levels and reduce the chance of wildfires associated with munitions testing prior to 1995. A by-product of this management by fire has been the establishment of many large areas of early successional habitats used by many species of management concern (Winters and Robb 2006).

### **Primary Regulatory Drivers**

- Sikes Act
- AFI 32-7064
- Indiana Forest Firefighting
- Indiana Air Quality Pollution Control

Fire is a critical ecological process in the management of early successional habitats required by many species of wildlife that are of management concern within the region. The maintenance of open grasslands necessitates wildfires or prescribed fires, thereby reducing fuel loads and the risk associated with large-scale wildfires.

While wildland fires (wildfires and prescribed fires) are important ecologically, they also pose a significant threat to life and property. Management of wildland fire is important to the ecological integrity and priorities of the operational missions at Jefferson Range. The majority of resources and planning for wildland fire on Jefferson Range are provided by Big Oaks NWR, although INANG personnel also participate during wildfire response. The Wildland Fire Management Plan (WFMP) for Big Oaks NWR is included in **Appendix J** and fire management units are illustrated on **Map 14** in **Appendix C**. Ideally, in the future, Jefferson Range will be included in the WFMP for Big Oaks NWR.

Different ecological communities require unique burn intervals to maintain the vegetative composition of the ecosystem. With complete suppression of wildland

fire, all the habitats would transition to woodlands with thick understory. Many unusual grassland species and understory woodland species and communities would be lost if the habitats were to change to this structure. Currently, the USFWS uses frequent (3-year interval) low-intensity surface fires to maintain the open grasslands.

#### 4.8.1 General Wildland Fire History (from Winters and Robb 2006)

Prescribed fires and wildfires were an annual occurrence throughout much of the former JPG. Wildland fires occurred as a direct result of munitions testing and occasionally from prescribed fires. Prescribed fires were used on an almost annual basis by the US Army to reduce fuel loads and lessen the chance and/or severity of wildfires. Due to the presence of UXO, wildland fire suppression occurred from roadways (or off roadways within controlled access areas) using non-ground disturbing methods (i.e., water and backfire). The extent of wildland fires resulting from munitions testing was never documented. There are no reports of wildland fires resulting in loss of life or damage to private property during the US Army management of the former JPG.

Records documenting the extent of the US Army's prescribed fires are available from 1981 to 1997. Annual prescribed fires were primarily conducted in the spring, but occasional fall fires were recorded. Total area burned varied from a high of approximately 15,000 acres in 1981 to a low of 1,000 acres in 1988. Due to personnel constraints, no burns were conducted in 1994 and 1996. Beginning in spring 1998, the USFWS initiated its prescribed fire program with a 4,000-acre burn. The USFWS continued its prescribed fire program in 1999 with a 7,400-acre burn. Since 2001 Big Oaks NWR has burned on average 10,500 acres annually.

#### 4.8.2 Management Strategies

The definitions of all terms used in relation to wildland fire in this INRMP follow National Wildfire Coordinating Group definitions and can be found at <http://www.nwcg.gov/pms/pubs/glossary/index.htm>. The following summarizes management strategies associated with the wildland fire program at Jefferson Range and Big Oaks NWR:

- Suppress all human-caused fires commensurate with the values at risk, through the use of control, contain, and confine suppression alternatives. **In all suppression activities, the presence of UXO and DU contamination must be considered.**
- Determine specific fuel loadings in high-risk areas in relationship to natural conditions and to conditions that may be determined hazardous based on values or risks. Utilize hazard reduction prescribed burns and mechanical means as treatment methods to reduce excessive fuel hazards.

- Continue to develop and maintain inter-agency coordination to promote local, regional and national cooperation. Based on local Big Oaks NWR conditions, contribute firefighting resources to meet the needs at regional and national levels.
- Initiate a habitat improvement program through management-ignited fire for the purposes of optimizing grassland habitat for the benefit of a variety of upland wildlife species, such as Henslow's sparrow.

#### 4.8.3 Wildland Fire Constraints and Safety Measures

**In all wildland fire activities, the presence of UXO and DU contamination must be considered. All areas of Big Oaks NWR and Jefferson Range are considered contaminated with UXO; therefore, no earth-disturbing measures may be used to control wildland fires. Evidence suggests that DU is not readily transported in smoke associated with burning of natural vegetation in an environment similar to that occurring at the refuge (Williams et al. 1998).**

Constraints are primarily the result of UXO contamination, which can be encountered within any portion of Big Oaks NWR or Jefferson Range. Similarly, DU contamination is located within the DU Impact Area, which is south of Jefferson Range (see **Map 4**). Due to the dangers associated with fire and fire suppression in combination with UXO and DU, the following restrictions are in place to protect the safety of any people involved in wildland fire activities:

- Earth-disturbing fire suppression techniques may never be used within Big Oaks NWR or Jefferson Range unless done using armored equipment or within an area that has been cleared of UXO and DU.
- All suppression must occur from established roadways within closed areas, or by foot within unrestricted areas.
- The preferred and safest method for suppression of wildland fires, within both closed and unrestricted areas, will be the use of fire to make a black-line along established roadways (or along natural features) to widen existing firebreaks, as needed to prevent the spread of fire, or to monitor fires to ensure confinement within a designated area.
- An UXO hazard zone, covering all areas within 4,000 feet of open flames, will be established due to the possibility of heat induced detonation of UXO. Entry into this zone is considered hazardous and may only be permitted by the Big Oaks NWR Refuge Manager or his designee. Entry will be allowed only after wildfire —~~ze~~up,” which includes an analysis of resources threatened and risk to personnel.

- No unapproved prescribed fires will be ignited between the periods of 15 April to 15 September due to the presence of federally endangered Indiana bats within portions of many burn units.

#### 4.8.4 Wildland Fire Planning and Fuel Management

To manage fire danger and to control prescribed burns within the region, INANG and USFWS implement a series of pre-suppression programs, prevention programs, and suppression programs. Pre-suppression programs include creating access to control wildfires and implement prescribed burns, maintenance of firebreaks, and conducting prescribed burns. Preventative programs include establishing proper operational procedures to limit wildfire and collection of data to compute National Fire Danger Rating System indices. Suppression programs include fire detection and reporting, fire behavior analysis, monitoring of ignitions to ensure that they burn out, initiating attacks on small fires with the potential to spread, and initiating interagency and inter-organizational suppression strategies.

A series of prescribed fire units, or burn units, have been established on Big Oaks NWR, and some of those burn units do include Jefferson Range parcels. For a complete description of the wildland fire planning, see the Big Oaks NWR Fire Management Plan in **Appendix J. Table 7** provides descriptions of the fire management units illustrated in **Map 14**, while **Map 15** illustrates the fire history at Jefferson Range.

A system of roads is maintained throughout Big Oaks NWR and Jefferson Range, and this road network is integral to wildland fire management, especially given the limited ability to create new firebreaks due to UXO/DU limitations. The road network on Big Oaks NWR and Jefferson Range are shown on **Maps 2 and 4** respectively. Access roads are imperative in fire emergencies and provide necessary firebreaks to define blocks for prescribed burns.

| Table 7. Description of Burn Units at Jefferson Range* |                  |   |                        |
|--|------------------|---|------------------------|
| Burn Unit  | Jefferson Parcel | Fuel Model <sup>+</sup>                       | Fire Interval          |
| 1  | Primary Range    | 9-Hardwoods, 8-Hardwood/mixed<br>3-Tall Grass | 5-7 years<br>3-5 years |
| 24   | Primary Range    | 8-Hardwoods/mixed<br>3-Tall Grass             | 5-7 years<br>3-5 years |
| 30   | Primary Range    | 8-Hardwoods/mixed                             | 5-7 years              |
| 28   | 50-acre Range    | 9-Hardwoods                                   | 5-7 years              |

**Table 7. Description of Burn Units at Jefferson Range\***

| Burn Unit  | Jefferson Parcel | Fuel Model*  | Fire Interval |
|--|------------------|--------------|---------------|
| 29   | 50-acre Range    | 3-Tall Grass | 3-5 years     |
| *See <b>Map 14</b> for Burn Units on Big Oaks NWR and Jefferson Range. |                  |              |               |

Wildfire management and control is a matter of concern for military training and natural resources management at Jefferson Range. Wildfires have several potential undesirable aspects depending on their time of occurrence; they interfere with ongoing training activities, they produce smoke that contributes to the air pollution and potential complaints from neighbors, they may obscure visibility on the surrounding roadways, and when vegetative cover is sufficiently destroyed they may lead to soil erosion. Given that the preferred habitat on Jefferson Range is open grasslands, wildfires are generally positive for maintaining the grasslands and managing fuel loads. Wildfires generally burn hotter and often occur outside of the environmental conditions that are utilized for prescribed fires, so their effects can be different ecologically than prescribed fires. Prescribed fire, however, is an efficient and effective means of minimizing wildfire risk to the Wildland Urban interface, or the zone of transition between unoccupied land and human development. Prescribed fire mitigates wildfire risk through the reduction of hazardous fuels (i.e. vegetation), which also serves as a vital component of natural resources management.

In addition to conducting prescribed fires, there are specific measures taken to minimize the effects of wildfires and to provide a safe environment for conducting prescribed fires and military training. These measures include monitoring fire danger conditions, implementing fire reporting procedures, fire-related training restrictions, firebreak maintenance, establishing a prescribed fire plan, and establishing wildland fire management strategies for the entire region by coordinating with other entities engaged in wildland fire. For more details on the wildland fire program, refer to **Appendix J** which contains the Wildland Fire Management Plan for Big Oaks NWR.

## 4.9 Invasive Species & Integrated Pest Management

**GOAL IN:** Minimize impacts of invasive and pest species, while minimizing use of chemicals to manage those species, utilizing an integrated pest management approach.

OBJECTIVE IN1: Control and minimize the impact of invasive plant and animal species.

OBJECTIVE IN2: Protect infrastructure from pest species.

OBJECTIVE IN3: Control potential disease vectors.

OBJECTIVE IN4: Limit connectivity between disturbed sites to minimize spread of invasive species and pests.

Invasive and exotic species may include plants, insects, or animals. An **invasive** species is defined as —an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health.” An alien (or **non-native**) species is defined as a —species including its seeds, eggs, spores, or other biological material capable of propagating that species that is not native to that ecosystem (EO 13112).” Because of their invasive capacity, many exotic species have the ability to spread rapidly through ecosystems since their natural predators are often not present. Such species often retard natural succession and reforestation and generally cause a reduction of biological diversity in natural ecosystems.

### **Primary Regulatory Drivers**

- Federal Noxious Weed Act
- Federal Insecticide, Fungicide & Rodenticide Act
- National Aquatic Invasive Species Act
- AFI 32-1053
- AFI 32-7064
- EO 13112

**Noxious weeds** are defined as —any living stage (e.g., seeds and reproductive parts) of any parasitic or other plant of a kind, or subdivision of a kind, which is of foreign origin, is new to or not widely prevalent in the United States, and can directly or indirectly injure crops, other useful plants, livestock, or poultry or other interests of agriculture, including irrigation, or navigation or the fish and wildlife resources of the United States or the public health (Federal Noxious Weed Act of 1974).”

### 4.9.1 Integrated Pest Management

Jefferson Range has an Integrated Pest Management (IPM) Program implemented by the INANG Integrated Pest Management Plan (IPMP; INANG 2011a). IPM is the use of multiple techniques in a compatible manner to avoid



damage and minimize adverse environmental affects while obtaining control of target pests. The goal of IPM is to utilize non-chemical procedures to control pests, including both invasive and exotic plant and animal species. Typically a combination of the following IPM techniques is required to resolve a problem on a sustained basis:

- *mechanical control*, which alters environments in which pests live, traps or removes pests (e.g. glue boards and live-traps) from where they are not wanted, or excludes pests from where they are not wanted (i.e. screening);
- *cultural control*, which manipulates environmental conditions to suppress or eliminate pests (e.g. removal of food scraps or spreading manure on fields);
- *biological control*, which uses predators, parasites, or disease organisms to control pests (e.g., *Gambusia* fish to eat mosquitoes or triploid grass carp to remove aquatic weeds); and
- *chemical control*, which relies on pesticides and/or herbicides to kill pest and/or undesirable species of plants.

The IPMP includes pest identification and management requirements, outlines the resources necessary for surveillance and control, and describes the administrative, safety, and environmental requirements of the program. This plan serves as a tool to reduce pesticide use, enhance environmental protection, and maximize the use of IPM techniques. It is the policy of the INANG to minimize the use of all pesticides, including herbicides, at the installation.

#### **4.9.2 Management Strategies**

Invasive, non-native species and noxious weeds have the capability to significantly impact native vegetation and change fuel loads, flammability and outcompete native species. A key element of INRMP implementation is to ensure —no net loss” of military training capability. Management of undesirable species is necessary to maintain military training areas in usable condition. In addition, uncontrolled animal pests can become health hazards, which could threaten the military mission.

The task of controlling invasive and exotic species and noxious weeds is often expensive, lengthy, and risky because total eradication is required to prevent reestablishment. However, in accordance with laws and regulations pertaining to the management of these species, the INANG will work to prevent the introduction of these species and take measures to control them in an economically and environmentally sound manner. General management strategies are as follows:

- Implement BMPs to minimize land disturbances that favor invasion and re-vegetate disturbed areas with native species.
- Native rock material should be used instead of non-indigenous rock when practical for maintenance or construction projects.
- Utilize mulches from Jefferson Range or certified-weed free sources to facilitate the establishment of native ground cover on impoverished soils.
- Maintain biodiversity and undisturbed habitat to maximize resilience to and competition with invasive species.
- Control invasive and exotic species and noxious weeds through early detection, isolation of infested areas, and control of individual plants with physical, chemical or mechanical means, depending on the species.
- Favor basal application and spot treatment and avoid aerial or broadcast application of herbicides, to the extent possible, to prevent adverse impacts to native plants and wildlife.
- Avoid herbicide use in and around wetlands and other surface waters (see **Section 4.9**).
- Do not use invasive, non-native species in landscaping.

It is important to prevent the initial spread of invasive and exotic species and address the spread of such species as early as possible to reduce the amount of required herbicide applications. The Jefferson Range Environmental Manager should evaluate the threat of invasive species as well as the environmental impacts of herbicide usage (if required) to the environment prior to implementing any eradication and/or control program.

One of the most effective ways of preventing new invasive species is to limit all landscaping plants to only native species. There is little landscaping on Jefferson Range, with the majority associated with Old Timbers Lodge. For information about appropriate native plants to use in landscaping, refer to Indiana Native Plants and Wildlife Society at <http://www.inpaws.org/> and Indiana Wildlife Federation at <http://www.indianawildlife.org/habitatPlants.htm>.

#### **4.9.3 Invasive Species**

There have been no non-native plant surveys on Jefferson Range, but a number of non-native plants have been identified on Big Oaks NWR and some of them are likely to be present on Jefferson Range. None of these species are on the US Department of Agriculture (USDA) list for noxious weeds or the state noxious weed list (USDA 2011a, b). There was little evidence that non-native species are spreading from invaded sites into adjacent undisturbed areas.

Due to the lack of ground disturbance at Jefferson Range and Big Oaks NWR, invasive species are not common and generally found in association with roads and fences. The invasive species that are present are difficult to eradicate, so the focus is on maintaining healthy native habitats resilient to invasion by non-native species. Non-native species documented on Big Oaks NWR and likely present on Jefferson Range are presented in **Table 8** along with their management priority.

| <b>Table 8. Potential Non-Native Species at Jefferson Range</b> |                       |                        |                 |                 |
|---|-----------------------|------------------------|-----------------|-----------------|
| <b>Scientific Name</b>  | <b>Common Name</b>    | <b>Invasive Status</b> | <b>Presence</b> | <b>Priority</b> |
| <b>Plants</b>   |                       |                        |                 |                 |
| <i>Acer platanoides</i>   | Norway maple          | ICAPS                  |                 |                 |
| <i>Ailanthus altissima</i>                                      | Tree of heaven        | IDNR, ICAPS            | NWR             |                 |
| <i>Alliaria petiolata</i>                                       | Garlic mustard        | ICAPS                  | NWR             |                 |
| <i>Bromus inermis</i>   | Smooth brome          | ICAPS                  |                 |                 |
| <i>Cirsium arvense</i>  | Canada thistle        | SNW, ICAPS             | NWR             |                 |
| <i>Coronilla varia</i>  | Crown vetch           | ICAPS                  | NWR             |                 |
| <i>Dioscorea oppositifolia</i>                                  | Chinese yam           | ICAPS                  |                 |                 |
| <i>Eleagnus umbellata</i>                                       | Autumn olive          | IDNR, ICAPS            | NWR             | High            |
| <i>Euonymus fortunei</i>  | Purple winter creeper | ICAPS                  |                 |                 |
| <i>Frangula alnus</i>   | Glossy buckthorn      | ICAPS                  |                 |                 |
| <i>Glechoma hederaceae</i>                                      | Creeping charlie      | ICAPS                  |                 |                 |
| <i>Hesperis matronalis</i>                                      | Dame's rocket         | ICAPS                  |                 |                 |
| <i>Lespedeza sericea</i>  | Sericea lespedeza     | ICAPS                  | NWR             | High            |
| <i>Ligustrum vulgare</i>  | Common privet         | ICAPS                  | NWR             |                 |
| <i>Ligustrum obtusifolium</i>                                   | European privet       | ICAPS                  | NWR             |                 |
| <i>Lolium arundinaceum</i>                                      | Tall fescue           | ICAPS                  | NWR             |                 |
| <i>Lonicera japonica</i>  | Japanese honeysuckle  | ICAPS                  | NWR             | Medium          |
| <i>Lonicera maackii</i>   | Amur honeysuckle      | IDNR, ICAPS            | NWR             | High            |
| <i>Lonicera x bella</i>   | Bella honeysuckle     | IDNR,                  | NWR             | High            |

| Table 8. Potential Non-Native Species at Jefferson Range |                        |                  |          |          |
|--|------------------------|------------------|----------|----------|
| Scientific Name  | Common Name            | Invasive Status  | Presence | Priority |
| <b>Plants</b>  |                        |                  |          |          |
|  |                        | ICAPS            |          |          |
| <i>Lonicera morrowii</i>                                 | Morrow's honeysuckle   | IDNR, ICAPS      | NWR      | High     |
| <i>Lonicera tatarica</i>                                 | Tartarian honeysuckle  | IDNR, ICAPS      | NWR      | High     |
| <i>Lysimachia nummularia</i>                             | Moneywort              | ICAPS            | NWR      |          |
| <i>Lythrum salicaria</i>                                 | Purple loosestrife     | SNW, IDNR, ICAPS |          |          |
| <i>Melilotus alba</i>                                    | White sweet clover     | ICAPS            | NWR      |          |
| <i>Melilotus officinalis</i>                             | Yellow sweet clover    | ICAPS            | NWR      |          |
| <i>Microstegium vimineum</i>                             | Japanese stiltgrass    | IDNR             | NWR      | Medium   |
| <i>Morus alba</i>  | White mulberry         | ICAPS            |          |          |
| <i>Ornithogalum umbellatum</i>                           | Star-of-Bethlehem      | ICAPS            |          |          |
| <i>Phalaris arundinacea</i>                              | Reed canary grass      | IDNR, ICAPS      | NWR      |          |
| <i>Phragmites australis</i>                              | Giant reed             | ICAPS            |          |          |
| <i>Polygonum cuspidatum</i>                              | Japanese knotweed      | ICAPS            |          |          |
| <i>Potamogeton crispus</i>                               | Curly-leaf pondweed    | ICAPS            |          |          |
| <i>Pueraria montana</i>                                  | Kudzu                  | IDNR, ICAPS      |          |          |
| <i>Rhamnus cathartica</i>                                | Common buckthorn       | ICAPS            |          |          |
| <i>Rosa multiflora</i>                                   | Multiflora rose        | SNW, ICAPS       | NWR      |          |
| <i>Sicyos angulatus</i>                                  | Burcucumber            | SNW              |          |          |
| <i>Sorghum alnum</i>                                     | Columbus grass         | SNW              |          |          |
| <i>Sorghum bicolor</i>                                   | Shattercane            | SNW              |          |          |
| <i>Sorghum halepense</i>                                 | Johnson grass          | SNW              | NWR      |          |
| <i>Torilis japonica</i>                                  | Japanese hedge parsley | ICAPS            |          |          |
| <i>Ulmus pumila</i>                                      | Siberian elm           | ICAPS            |          |          |
| <i>Vinca minor</i>                                       | Periwinkle             | ICAPS            | NWR      |          |

| Table 8. Potential Non-Native Species at Jefferson Range  |                          |                 |          |          |
|---|--------------------------|-----------------|----------|----------|
| Scientific Name   | Common Name              | Invasive Status | Presence | Priority |
| <b>Plants</b>   |                          |                 |          |          |
| <b>Animals</b>  |                          |                 |          |          |
| <i>Tomicus piniperda</i>  | Common pine shoot beetle | ICAPS           |          |          |
| <i>Aphis glycines</i>   | Soybean aphid            | ICAPS           |          |          |
| <i>Agrilus planipennis</i>  | Emerald ash borer        |                 |          | High     |
| FNW = Federal Noxious Weed from APHIS (USDA 2011a)<br>SNW = State Noxious Weed from APHIS (USDA 2011b)<br>IDNR = indicates species on the IDNR list from website<br>ICAPS = non-native invasive species identified in Ripley County by the Indiana Cooperative<br>Agricultural Pest Survey at Purdue University<br>NWR = Known on Big Oaks NWR<br>JR = Known on Jefferson Range |                          |                 |          |          |

#### 4.9.4 Priority Invasive Species

There are four invasive species considered high priority for management at Big Oaks NWR and Jefferson Range: Asian bush honeysuckles, autumn olive, sericea lespedeza, and emerald ash borer. In addition, there are two medium priority species: Japanese honeysuckle and Japanese stiltgrass.

Prescribed burning may be applied as an invasive plant management tool, merging the principles of Integrated Fire Management and Integrated Pest Management. However, prescribed burning affects whole plant communities, not just the target invasive plant species. Consequently, controlling invasive plants with fire requires strategies that address invasive plant species at the population level in addition to all plant species at the community level. In general, as an invasive species management tool, prescribed fire is used to both reduce the dominance of a target invasive plant species, and to increase the dominance and diversity of desirable plant species (USFWS 2009). However, the effect of fire on an invasive plant species depends on the biological characteristics of the target species. Furthermore, the immediate and long-term response of plant communities is influenced by pre- and post- fire climate variables, activities of other taxa, management activities, natural and human-caused disturbances, as well as other environmental variables (USFWS 2009). Available information regarding prescribed burns as a means of invasive species control is provided below for both high and medium priority invasive species. Additional management for these species is outlined above in Section 4.9.2, *Management Strategies*.

## **High Priority Species**

**Asian bush honeysuckles:** The Asian bush honeysuckles are native to Eurasia (Japan, China, Korea, Manchuria, Turkey and southern Russia). In Indiana they are particularly invasive in central and northern parts of the state, but are starting to move into the southern portion. They are found at various locations around Big Oaks NWR and are assumed to be on Jefferson Range. Asian bush honeysuckles are relatively shade-intolerant and most often occur in forest edge, abandoned fields, roadsides and open wetlands. However, they will move into forest understories and dominate wherever there has been disturbance. Asian bush honeysuckles grow so densely they shade out everything on the forest floor, often leaving nothing but bare soil. This means a great reduction in the food and cover available for birds and other animals. Serious infestations can inhibit tree regeneration, essentially stopping forest succession. Some bush honeysuckle species also release chemicals into the soil to inhibit other plant growth, effectively poisoning the soil. IDNR maintains a fact sheet at [http://www.in.gov/dnr/files/Bush\\_Honeysuckle.pdf](http://www.in.gov/dnr/files/Bush_Honeysuckle.pdf).



**Figure 6. Asian Bush Honeysuckle  
(Courtesy of Indiana Cooperative  
Pest Survey Program)**

While fire is likely to kill seedlings and unhealthy bush honeysuckle plants, prescribed burns only destroy the aboveground tissue of healthy individuals (Nyboer 1992a; Hoffman and Kearns 1997; Smith 2004). Perennating tissues on roots and root crowns are often protected from fire damage by soil. Although information about asexual regeneration is relatively sparse, it is apparent that sprouting is a common response to mechanical stem damage in bush honeysuckles (Nyboer 1992a; Hoffman and Kearns 1997; Smith 2004). Similarly, bush honeysuckles can also produce sprouts in response to damage from fire; however, these respouts are often not very vigorous. As a result it appears that a single prescribed fire is usually not sufficient to eradicate invasive bush honeysuckle populations. Because post-fire sprouting is likely, subsequent prescribed burns conducted annually or biennially for several years may

**Autumn olive:** Autumn olive is native to China, Korea and Japan. It was first introduced to the US in 1830. Autumn olive is found in disturbed areas, along roadsides, in pastures, fields and sparse woodlands. Autumn olive is found at scattered locations throughout Big Oaks NWR and it is assumed to be on Jefferson Range. It is often found in poor soils due to its nitrogen-fixing root nodules that allow it to tolerate poor conditions. It can also survive the effects of salt, drought and pHs as low as 4.0. However, it does not grow well in wet habitats or in dense forests. Autumn olive is now found over the eastern half of

the United States and in all counties of Indiana. It is vigorous and competitive against native species in open communities like prairies and savannas and resprouts after cutting or burning. It also creates heavy shade, which suppresses plants that require direct sunlight. IDNR maintains a fact sheet at [http://www.in.gov/dnr/files/Autumn\\_Olive.pdf](http://www.in.gov/dnr/files/Autumn_Olive.pdf).



**Figure 7. Autumn Olive (Courtesy of National Park Service)**

It is unclear what impacts fire might have on invasive populations of autumn-olive. Research is necessary in order to determine the immediate and long term effects of fire management techniques on this species (Mehrhoff et al. 2003; Solecki 1997; Szafoni 1991). It appears that autumn-olive will sprout in response to damage from fire, indicating that a single burn is likely not sufficient to eradicate the species. However, periodic burning might control the spread and eventually reduce the presence of autumn-olive. Although it is unclear how effective multiple prescribed burns might be for controlling this species, any management activity that removes aboveground tissue, prevents seed production, and depletes energy reserves is likely to reduce autumn-olive invasiveness, especially when conducted persistently (Mehrhoff et al. 2003; Solecki 1997; Szafoni 1991).

**Sericea lespedeza:** *Sericea lespedeza* is native to Asia that was introduced into the US in the late 1800s. In general, all non-native lespedeza species are more common in the southern half of Indiana where they were planted on infertile old farm fields and coal mined lands. *Sericea lespedeza* is moving outside of planted areas, but the movement seems limited to disturbed sites and is generally not found in natural areas. This species is common throughout Big Oaks NWR and Jefferson Range, primarily along roads, but also present in grasslands. Once it gains a foothold, it can crowd out native plants and develop an extensive seed bank in the soil, ensuring its long residence at a site. Established dense stands of lespedeza suppress native flora and its high tannin content makes it unpalatable to native wildlife as well as livestock. Indiana Cooperative Agricultural Pest Survey Program maintains a fact sheet at <http://extension.entm.purdue.edu/caps/pestInfo/sericeaLlespedeza.htm>.



**Figure 8. Sericea Lespedeza (Courtesy of KDPWT)**



Fire management techniques may increase the size of invasive sericea lespedeza populations, as fire promotes seed germination (Griffith 1996; Ohlenbusch et al. 2007; Smith 1993; Stevens 2002; Even et al. 2006), and stimulates resprouting in already established plants (Stevens 2002). Griffith (1996) directly associated annual burning with the spread of sericea lespedeza. He found that burning removed residual biomass, which provided open sites for seedling establishment. Furthermore, Ohlenbusch et al. (2007) reporting similar ideas, suggesting that fire likely increased seedling establishment by scarifying seeds and increasing the light available to emerging seedlings. As a result prescribed fire alone is not likely to control sericea lespedeza (Evans et al. 2006). However, fire may be useful as part of an integrated management plan to stimulate germination from the seed bank or to increase utilization by grazing animals.

**Emerald ash borer:** Emerald ash borer is native to Asia. It was introduced into the US around 2000 in packing material made from ash wood. Emerald ash borer is not yet recorded in Ripley County, but has been documented nearby. Emerald ash borer moves about 0.5 mile per year, unless transported in firewood or other materials. It is generally assumed it will be present on Big Oaks NWR and Jefferson Range in the near future. The beetle poses a serious risk to ash trees and generally is associated with 100 percent mortality of ash trees in infected areas. Purdue



**Figure 9. Emerald Ash Borer**  
(Courtesy of Tennessee  
Department of Agriculture)

Extension maintains a summary of known distribution in Indiana, identification training, and other information at <http://extension.entm.purdue.edu/EAB/>.

### **Medium Priority Species**

**Japanese honeysuckle:** Japanese honeysuckle is native to East Asia, including Japan and Korea. The species was introduced into the US in 1806 and is found in every county in Indiana, but is much more aggressive in Southern Indiana. It is highly likely to occur at Big Oaks NWR but, if present, is not common. Japanese honeysuckle damages forest communities by out competing native vegetation for light, below-ground resources, and by changing forest structure. The vines overtop adjacent vegetation by twining about and completely covering small trees and shrubs, thereby forming a dense blanket. IDNR maintains a fact sheet at [http://www.in.gov/dnr/files/Japanese\\_Honeysuckle.pdf](http://www.in.gov/dnr/files/Japanese_Honeysuckle.pdf).

In fire-adapted communities, prescribed burning may be an effective means of controlling Japanese honeysuckle (Kush 2002; Nyboer 1992b). It is apparent, however, that single prescribed fires are



unlikely to eradicate Japanese honeysuckle from a particular site (Cain et al. 1998). It is difficult to predict the frequency of prescribed fire necessary to control Japanese honeysuckle as effective control will likely be influenced by the intensity of each burn as well as the favorability of the site for post-fire recovery of Japanese honeysuckle. It has been suggested that burning dense stands of Japanese honeysuckle at 5-year intervals may reduce the spread (Stransky 1984) and eventually reduce the presence of Japanese honeysuckle. The historic fire regime for a particular site is likely to influence the appropriateness and effectiveness of proposed burn treatments. Mesic sites with fire intolerant native flora may not respond well to fire or may not provide suitable conditions to carry an effective burn. Conversely, sites that have experienced at least some periodic fire in the past and contain more fire-tolerant native plant communities are better suited for using prescribed fire as a control method for Japanese honeysuckle. However, use of prescribed fire to control Japanese honeysuckle, while potentially effective, requires long-term commitment.

**Japanese stiltgrass:** Japanese stiltgrass is native to Asian and was first introduced into the US around 1919; it likely escaped as a result of its use as a packing material for porcelain. It occurs on stream banks, river bluffs, floodplains, emergent and forested wetlands, moist woodlands, early successional fields, uplands, thickets, roadside ditches, gas and power-line corridors, lawns and gardens. Japanese stiltgrass is found throughout Big Oaks NWR and Jefferson Range, but is limited to roadsides. Japanese stiltgrass threatens native understory vegetation in full sun to deep shade. Japanese stilt grass readily invades disturbed shaded areas, like floodplains that are prone to natural scouring, and areas subject to mowing, tilling and other soil-disturbing activities including white-tailed deer traffic. It spreads opportunistically following disturbance to form dense patches, displacing native wetland and forest vegetation as the patch expands. Japanese stilt grass appears to be associated with moist, acidic to neutral soils that are high in nitrogen. Indiana Cooperative Agricultural Pest Survey Program maintains a fact sheet at <http://extension.entm.purdue.edu/caps/pestInfo/japStiltGrass.htm>.



**Figure 10. Japanese Stiltgrass (Courtesy of National Park Service)**

Japanese stiltgrass likely relies on post-fire establishment from either on-site, soil-banked seed or off-site, transported seed. A review by (Tu 2000) suggests that following early-season fire, top-killed Japanese stiltgrass may sprout and set seed later in the year. Additionally, another review indicated that exposed mineral soils, such as those occurring after a fire, provide a favorable seedbed for Japanese stiltgrass germination and establishment (Weber 2003). In oak-hickory and sugar maple-sweetgum-yellow-poplar communities of the Vinton Furnace Experimental Forest, Ohio, both mechanical litter removal and prescribed fires increased Japanese stiltgrass seedling establishment and growth compared to control plots. Japanese stiltgrass is likely to invade burns as it favors disturbed, open sites and mineral soil for establishment; however Japanese stiltgrass was most likely to establish from the soil seed bank if present before disturbance, suggesting post-fire Japanese stiltgrass establishment can be expected where Japanese stiltgrass was present before fire.

## 5.0 PLAN IMPLEMENTATION

### 5.1 Project Development

Management goals and objectives were developed through a comprehensive evaluation of the natural resources present on Jefferson Range. In accordance with AFI 32-7064 and the principles of adaptive ecosystem management, subject areas were identified and management alternatives developed by an interdisciplinary team of ecologists, biologists, geologists, planners, and environmental scientists. **Section 4.0** presents the preferred management alternatives based on the professional opinions of the 181 IW/EM, JFAC-IN-DET2/CC, NGB/A7AN Natural Resources Manager, USFWS Big Oaks NWR Refuge Manager, USFWS Ecological Services personnel, and multiple divisions of IDNR. Through these evaluations, a set of natural resources management goals have been established based on the current theories regarding adaptive ecosystem-based planning (see **Section 4.0**).

This INRMP will be implemented through the various policies and programs described throughout the document and accomplishment of the goals and objectives as described in **Section 4.0**. The implementation schedule, activity and project lists, and how the projects relate to INRMP implementation are detailed in **Tables 8 and 9**.

This INRMP is a living document that is based on short-, medium-, and long-term planning horizons. Short-term tasks include activities and projects that are planned to occur in 0 to 5 years, while medium-term tasks include activities and projects in a 6- to 10-year period. Long-term tasks are usually scheduled beyond 10 years. A majority of the tasks discussed in this INRMP are short and medium-term natural resources management tasks. Goals, objectives and tasks should be revised over time to reflect evolving environmental condition, adaptive management and the completion of tasks as the INRMP is implemented. In addition, medium- and long-term tasks should eventually become short-term tasks over time.

#### 5.1.1 Project Implementation

In accordance with AFI 32-7064, an INRMP is considered implemented if an installation:

- Actively requests, receives, and uses funds for —mst fund” projects and activities as defined by AFI 32-7001 (Environmental Quality Programming and Budgeting);
- Executes all —mst fund” projects and activities in accordance with specific timeframes identified in the INRMP;

- Ensures that sufficient numbers of professionally trained natural resources management personnel are available to perform the tasks required by the INRMP;
- Reviews the INRMP annually and coordinates annually with cooperating agencies; and
- Documents specific INRMP action accomplishments undertaken each year.

Natural resources and land use management issues are not the only factors contributing to the development and implementation of the INRMP. Range management and other seemingly unrelated issues affect implementation. It is important to the implementation of this INRMP that Jefferson Range personnel take ownership of the INRMP by providing the necessary resources (i.e., personnel and equipment) and utilizing the appropriate funding allocated by the NGB/A7AN to enact the plan. Continued participation of the INRMP Working Group is also extremely important in the implementation of this INRMP. The INRMP Working Group is made up of Jefferson Range Command personnel and Big Oaks NWR Refuge personnel, and has an oversight role to ensure the effective implementation of this INRMP. Top- and middle-level management representation, as well as representation from several individuals with day-to-day on-site experience will provide the INRMP Working Group with the leadership and structure necessary for the successful implementation of this INRMP.

**Table 9** provides an overview of recurring natural resource management activities. These activities are generally performed by INANG Environmental Manager, Jefferson Range Command personnel and Big Oaks NWR Refuge personnel. The implementation schedule and planned projects for this updated INRMP are detailed in **Table 10**. **Table 10** will be used to develop budget requests and schedule annual project requirements. Funding requests will be submitted in accordance with current NGB procedures for conservation projects. In addition, an extended table is presented in **Appendix B** that includes man-hour estimates and budget estimates.

### 5.1.2 Priorities and Scheduling

The Office of Management and Budget considers funding for the preparation and implementation of this INRMP, as required by the Sikes Act, to be a high priority. However, the reality is that not all of the projects and programs identified in this INRMP will receive immediate funding. Projects need to be funded consistent with timely execution to meet future deadlines. Projects are generally prioritized with respect to compliance. Highest priority projects are projects related to recurring or current compliance, and these are generally scheduled earliest. As such, these projects have been placed into three priority-based categories: (1) high priority projects which are essential for maintaining compliance or for successful natural resources management, (2) medium priority projects with no

immediate compliance requirement or less impact on the natural resources, and (3) low priority projects with a natural resources benefit but no legal driver. The prioritization of the projects is based on need, legal drivers, and ability to further implementation of the INRMP.

Recurring requirements include projects and activities needed to cover the recurring administrative, personnel and other costs that are necessary to meet applicable compliance requirements (federal and state laws, regulations, Presidential EOs, and DoD policies) or which are in direct support of the military mission. Recurring costs include manpower, training, supplies; hazardous waste disposal; operating recycling activities; permits and fees; testing, monitoring and/or sampling and analysis; reporting and record keeping; maintenance of environmental conservation equipment; and compliance self-assessments.

Current compliance includes projects and activities needed because an installation is currently or will be out of compliance if projects or activities are not implemented in the current program year. Examples include:

- Environmental analyses, monitoring, and studies required to assess and mitigate potential effects of the military mission on conservation resources;
- Planning documents.
- Baseline inventories and surveys of natural and cultural resources (historical and archaeological sites);
- Biological assessments, surveys, or habitat protection for a specific listed species;
- Mitigation to meet existing regulatory permit conditions or written agreements;
- Wetland delineations in support of subsequent jurisdictional determinations and consequent permitting;
- Efforts to achieve compliance with requirements that have deadlines that have already passed;
- Initial documenting and cataloging of archaeological materials.

Maintenance requirements include those projects and activities needed that are not currently out of compliance, but shall be out of compliance if projects or activities are not implemented in time to meet an established deadline beyond the current program year. Examples include:

- Compliance with future requirements that have deadlines;
- Conservation and GIS mapping to be in compliance;

- Efforts undertaken in accordance with non-deadline specific compliance requirements of leadership initiatives;
- Wetlands enhancement, in order to achieve the executive order for “no net loss” or to achieve enhancement of existing degraded wetlands;
- Public education programs that educate the public on the importance of protecting natural resources.

Lower priority project include those that enhance conservation resources of the installation mission, or are needed to address overall environmental goals and objectives, but are not specifically required under regulation or EO and are not of an immediate nature. These projects are generally funded after those of higher priority are funded. Examples include:

- Community outreach activities, such as —Earth Day” and —Historic Preservation Week” activities;
- Educational and public awareness projects, such as interpretive displays, oral histories, nature trails, wildlife checklists, and conservation teaching materials;
- Biological assessments, surveys, or habitat protection for a non-listed species;
- Restoration or enhancement of cultural or natural resources when no specific compliance requirement dictates a course or timing of action; and
- Management and execution of volunteer and partnership programs.

## 5.2 Cooperative Agreements

Intra- and inter-agency cooperation, coordination, and communication at the federal, state and local levels (e.g., USFWS and IDNR) are requisite to the success of the INRMP. The USFWS and IDNR review the INRMP and its implementation. Specialized expertise is required to adequately manage natural resources at the Jefferson Range. Technical assistance will be sought from federal and state agencies, universities, and special interest groups.

The DoD and subcommand entities have MOUs, MOAs, and other cooperative agreements with other federal agencies, conservation and special interest groups, and various state agencies in order to provide assistance with natural resources management at installations across the US. Generally, these agreements allow installations and agencies or conservation and special interest groups to obtain mutual conservation objectives. The DoD agreements applicable to the Jefferson Range include:

- MOU between DoD and USFWS/IFWA for a Cooperative Integrated Natural Resource Program associated with the ecosystem-based

management of fish, wildlife, and plant resources on military lands (2006).

- MOU between DoD and USFWS/International Fund for Animal Welfare (IFAW) to promote the conservation of migratory birds (2011).
- MOU between the DoD and USEPA to form a working partnership to promote environmental stewardship by adopting integrated pest management strategies to reduce the potential risks to human health and the environment associated with pesticides (2012).
- MOA for federal Neotropical Migratory Bird Conservation Program and addendum (“Partners in Flight-Aves De Las Americas”) among DoD, through each of the Military Services, and over 110 other federal and state agencies and non-governmental organizations (1991).
- MOU between the DoD and Ducks Unlimited, Inc. to provide a foundation for cooperative development of selected wetlands and associated uplands in order to maintain and increase waterfowl populations and to fulfill the objectives of the North American Waterfowl Management Plan, within the context of DoD’s environmental security and military missions (2006).
- MOU between DoD and NRCS to promote cooperative conservation where appropriate (2006).
- MOU with Watchable Wildlife Incorporated (2002).
- MOU between the DoD and Bat Conservation International (BCI) to identify, document and maintain bat populations and habitats on DoD installations (2011).
- Cooperative Agreement between DoD and The Nature Conservancy to work cooperatively in areas of mutual interest (2010).
- Interagency Agreement (2010) and MOU (2009) between USAF and USFS to enhance cooperation and improve public service, and management of natural and cultural resources on lands managed by the USAF and the USFS.
- MOA (2003) between FAA, USAF, US Army, US EPA, USFWS, and USDA to address aircraft-wildlife strikes, available at [http://water.epa.gov/lawsregs/guidance/wetlands/upload/2003\\_08\\_03\\_wetlands\\_FAAmitigationmoa.pdf](http://water.epa.gov/lawsregs/guidance/wetlands/upload/2003_08_03_wetlands_FAAmitigationmoa.pdf).

For a further list of cooperative agreements and MOUs please visit <http://www.denix.osd.mil/nr/LegislationandPolicy/MOUsandMOAs.cfm> or <http://www.afcee.af.mil/resources/conservation/natural/agreements/index.asp>.

Jefferson Range is contained entirely within the Big Oaks NWR, both of which are on a portion of the former JPG. The land is still owned by the US Army and a MOA was signed in 2000 by US Army, USAF, and USFWS that identifies the

responsibilities of each party (see Appendix H). A portion of the natural resources management on Jefferson Range is conducted by USFWS personnel from Big Oaks NWR, while the INANG is responsible for the management of the refuge fence, some roads, and a few bridges. Both USFWS and USAF use is governed by permits issued under the MOA. INANG also has an agreement with Big Oaks Conservation Society for maintenance and use of Old Timbers Lodge and its grounds. Big Oaks NWR also maintains agreements in support of wildfire responses and Jefferson Range benefits from those agreements.

### **5.3 Funding**

Implementation of this INRMP is subject to the availability of annual funding. Funding sources for specific projects can be grouped into three main categories by source: federal NGB/USAF funds, other federal funds, and non-federal funds. Where projects identified in the plan are not implemented due to lack of funding, or other compelling circumstances, the installation will review the goals and objectives of this INRMP to determine whether adjustments are necessary. The following discussion of funding options is not all-inclusive of funding sources. Many funding sources rely on a variety of grant programs, award criteria and amounts can change considerably from one year to another. Funding through grant programs can occur on a one-time award, annually or in multiples of years.

The NGB is the primary source of funding to support the management of natural resources at Jefferson Range. This budget is managed by the INANG Environmental Manager and the NGB/A7AN Natural Resources Manager. The NGB provides funding for natural resource surveys, environmental monitoring projects, and compliance-related projects.

The Legacy Resource Management Program provides financial assistance to DoD efforts to conserve natural and cultural resources on federal lands. Legacy projects could include regional ecosystem management initiatives, habitat preservation efforts, archeological investigations, invasive species control, and/or flora or fauna surveys. Project proposals are submitted to the program.

There are also grant and assistance programs administered by other federal agencies that could be accessed for natural resources management at Jefferson Range. Examples include funds associated with the Clean Water Act and endangered species.

Other non-federal funding sources that could be considered include The Public Lands Day Program, which coordinates volunteers to improve the public lands they use for recreation, education, and enjoyment, and the National Environmental Education & Training Foundation, which manages, coordinates, and generates financial support for the program. State and local agencies are also a great source of additional resources. For example, the IDNR may consider entering into cooperative or mutual aid agreements with states, local governments, non-governmental organizations, and other individuals.



**Table 9. Recurring Natural Resources Management Activities**

| <b>Table 9. Recurring Natural Resources Management Activities</b> |  |                 |                                    |               |
|---|--|-----------------|------------------------------------|---------------|
| <b>Activity</b>   |  | <b>Priority</b> | <b>Objective(s) in Section 4.0</b> | <b>Timing</b> |
| 1   | Prepare budget to implement the natural resources management program   | 1               | PM1                                | Annual        |
| 2   | Complete annual review of INRMP  | 1               | PM1, PM2                           | Annual        |
| 3   | Complete review for operation and effect at least every 5 years with INRMP Task Force. Initiate update or revision as appropriate.                     | 1               | PM1, PM2, PM5                      | 2016          |
| 4   | Provide environmental and natural resources training to Jefferson Range personnel  | 1               | PM1, PM4, WA1                      | As Needed     |
| 5   | Continue conducting safety briefings for Jefferson Range users   | 1               | PM1, PM3                           | As Needed     |
| 6   | Continue to implement road and fenceline maintenance activities outlined in MOA  | 1               | PM1, SO1, SO2, SO3                 | Annual        |
| 7   | Evaluate effectiveness of erosion and sediment control measures associated with road maintenance   | 1               | PM2, SO1, SO2, SO3, SO4            | Annual        |
| 8   | Monitor at-risk sites to ensure erosion and sediment control measures are effective  | 1               | PM2, SO1, SO2, SO3, WA1            | As Needed     |
| 9   | 181 IW/EM will review activities for potential to impact water resources   | 1               | PM2, WA1                           | As Needed     |
| 10  | If an activity will impact a wetland or other water resource, coordination with IDEM will be completed and mitigation options identified               | 1               | PM1, PM2, PM6, WA1                 | As Needed     |
| 11  | Continue implementing BASH risk reduction measures   | 1               | PM1, FW1                           | Annually      |
| 12  | Modify management strategies if BASH risk increases and/or high BASH risk species increase   | 1               | PM2, FW1                           | As Needed     |
| 13  | When new activities are undertaken at Jefferson Range, a review for impacts to listed species and their habitat should be conducted by the NGB/A7AN to | 1               | PM2, TE1, TE2                      | As Needed     |

**Table 9. Recurring Natural Resources Management Activities**

| <b>Table 9. Recurring Natural Resources Management Activities</b>   |  |                 |                                    |               |
|---|--|-----------------|------------------------------------|---------------|
| <b>Activity</b>   |  | <b>Priority</b> | <b>Objective(s) in Section 4.0</b> | <b>Timing</b> |
|   | determine if there are potential impacts and identify options to minimize those impacts                |                 |                                    |               |
| 14  | Continue to coordinate with Big Oaks NWR for wildland fire support                                     | 1               | PM5, FI1, FI2, FI3, FI4            | Annually      |
| 15  | Maintain accurate fire log (with map) of all wildfires and prescribed fires                            | 1               | PM1, PM5, FI1, FI4                 | Annually      |
| 16  | Ensure that any buffer areas or protected habitat are incorporated into prescribed fire planning       | 1               | PM2, PM5, TE1, TE2, FI4            | As Needed     |
| 17  | Utilize native plant species and materials for landscaping activities                                  | 1               | VE3, IN1                           | As Needed     |
| 18  | Implement IPMP, including methods for control and reporting requirements                               | 1               | PM1, IN1, IN2, IN3                 | Annually      |
| 19  | Monitor for emerald ash borer impacts to ash trees   | 1               | PM2, IN1                           | As Needed     |
| 20  | Monitor regularly for new invasive species or sudden increases in density of existing invasive species | 1               | PM2, IN1                           | As Needed     |
| 21  | Conduct any tree management in accord with USFWS guidelines for Indiana bat                            | 1               | VE1, TE1                           | As Needed     |
| Table is also presented in Appendix B with details of labor hours and estimated costs. Priority Codes: 1=High, 2=Medium, 3=Low. Priority codes are roughly equivalent to funding priorities as described in DoDI 4715.03 and AFI 32-7064. |  |                 |                                    |               |

**Table 10. Projects Identified to Implement the INRMP (Subject to Funding Availability)**

| Project |  | Priority | Objective(s) in Section 4.0  | Projected Date |
|---------|--|----------|------------------------------|----------------|
| 1       | Update/revise INRMP as determined by INRMP Task Force meeting during review for operation and effect   | 1        | PM1, PM2, PM5                | 2016           |
| 2       | Incorporate existing GIS data from ANG and contractors into one GIS dataset with metadata  | 1        | PM1, PM2, PM6                | 2017           |
| 3       | If compensatory water resources mitigation is required, identify mitigation requirement and acquire support to implement mitigation requirements | 1        | PM2, WA1                     | As Needed      |
| 4       | Develop erosion and sediment control manual with site-specific BMPs  | 1        | PM1, SO1, SO2, SO3, SO4      | 2013           |
| 5       | Conduct training for Jefferson Range personnel to implement erosion and sediment control BMPs  | 1        | PM4, SO1, SO2, SO3           | 2013           |
| 6       | Conduct training for Jefferson Range personnel on permitting requirements for water resources  | 1        | PM4, WA1                     | 2013           |
| 7       | Evaluate current methodology for road and fenceline maintenance and identify alternatives with lower costs and lower environmental impacts       | 1        | PM2, SO1, SO2, SO3, SO4, WA1 | 2013           |
| 8       | Install water bars and modifying road grading to minimize erosion associated with roads  | 1        | PM2, SO1, SO2, SO3, SO4, WA1 | As Needed      |
| 9       | Modify/replace stream crossings where there are repeated maintenance problems or significant deterioration of the crossing or stream             | 1        | PM2, SO1, SO2, SO3, SO4, WA1 | As Needed      |
| 10      | Develop comprehensive vegetation community data (based on NVCS classifications), using remote sensing techniques and limited groundtruthing      | 1        | PM2, PM6, VE1, VE4           | 2014           |
| 11      | Continue reducing woody encroachment in grasslands   | 1        | PM1, VE1, VE2, VE4, FW2      | Annual         |
| 12      | Develop BASH plan  | 2        | PM1, FW1                     | 2015           |

**Table 10. Projects Identified to Implement the INRMP (Subject to Funding Availability)**

| Project   |   | Priority | Objective(s) in Section 4.0  | Projected Date |
|---|---|----------|------------------------------|----------------|
| 13  | Evaluate potential roosting habitat for Indiana bats using remote sensing and limited groundtruthing    | 1        | PM6, VE1, TE1                | 2014           |
| 14  | Continue efforts to manage for crawfish frogs   | 1        | PM1, WA3, VE2, TE2           | As Needed      |
| 15  | Continue implementing wildland fire program   | 1        | PM1, TE3, FI1, FI2, FI3, FI4 | Annual         |
| 16  | Continue managing fuel loads to minimize uncontrollable wildfire risk                                   | 1        | PM1, VE1, FI1                | As Needed      |
| 17  | Continue responding to wildfires with appropriately trained personnel and equipment                     | 1        | PM1, FI1, FI2                | Annual         |
| 18  | Conduct prescribed fires in burn units that have not experienced fire recently                          | 2        | PM1, VE1, TE8, FI1, FI4      | As Needed      |
| 19  | Coordinate with Big Oaks NWR to incorporate Jefferson Range into the WFMP                               | 1        | PM1, PM5, FI1                | 2013           |
| 20  | Monitor priority invasive species and implement control projects if needed                              | 1        | PM2, IN1                     | As Needed      |
| 21  | Reduce coverage of invasive plants  | 1        | PM2, SO1, VE3, IN1, IN2, IN4 | As Needed      |
| 22  | Implement management necessary to control emerald ash borer, once found on site, and to mitigate damage | 2        | PM2, VE1, IN1                | As Needed      |
| Table is also presented in Appendix B with details of labor hours and estimated costs. Priority Codes: 1=High, 2=Medium, 3=Low. Priority codes are roughly equivalent to funding priorities as described in DoDI 4715.03 and AFI 32-7064. |   |          |                              |                |

#### 5.4 Natural Resources Management Staffing

The Natural Resources Program at Jefferson Range is administered by the INANG (181 IW/EM and JFAC-IN-DET2/CC) and the NGB/A7AN, in conjunction with Big Oaks NWR. Responsibilities of the INANG in regard to implementation of this INRMP include:

- Providing oversight and coordination with other agencies;
- Developing and implementing programs to ensure the inventory, delineation, classification, and management of applicable natural resources, including forests, wetlands, endangered and threatened species, sensitive or unique habitats, and other natural resource areas of special interest;
- Providing for the environmental training of natural resources and range personnel;
- Maintaining natural resources management records;
- Reviewing environmental documents (e.g., environmental impact assessments and remedial action plans) and construction designs and proposals to ensure adequate consideration of natural resources, while ensuring that technical guidance as presented in this INRMP is adequately considered;
- Evaluating impacts of training missions and providing guidance to trainers;
- Coordinating with the cultural resources program and Section 106 compliance;
- Coordinating with local, state, and federal governmental and civilian conservation organizations relative to the Jefferson Range natural resources management program;
- Implementing and executing AFI 32-7064;
- Identifying additional labor resources, when needed (e.g., federal and state agencies, local regional universities, scouting groups, and conservation groups, such as Audubon Society or sportsmen's clubs).

Currently, the primary responsibilities of Jefferson Range personnel are for range operations, with natural resources management an incidental outcome. Big Oaks NWR, partially due to the presence of necessary expertise and training, provides significant support and implementation of natural resources management. As a result of this result, Big Oaks NWR personnel and equipment are essential to implementing this INRMP and supporting natural resources management on Jefferson Range. Additional sources of temporary labor, hired with term limitations, could be utilized to augment current staff, such as seasonal employees (e.g., grounds maintenance summer hires). Outside agency reimbursable hires and Guardsman, Reservists, or Active Duty USAF personnel

assigned to Jefferson Range on temporary duty are another source of supplemental labor. Implementation of a number of projects discussed in this INRMP will require active outside assistance. The outside assistance could come from state and federal agencies, private consortiums and organizations, universities, and contractors. Using these resources is the most efficient and cost-effective method for acquiring expertise on a temporary basis. Some parties will be reimbursed for their assistance, whereas others will supply their assistance in accordance with cooperative agreements. The INRMP Working Group (including NGB/A7AN when funding is being determined) should assess the level of additional resources necessary to fully implement this INRMP during the INRMP annual review process (see **Section 1.4**), and determine the extent to which outside assistance will be required.

## **5.5 Monitoring INRMP Implementation**

### **5.5.1 Jefferson Range INRMP Implementation Monitoring**

Monitoring of INRMP implementation is necessary to facilitate the legal requirements of the SAIA for review for operation and effect (DoDI 4715.03 and see **Section 1.4.2**). These SAIA implementation criteria do not necessarily measure the effectiveness of an INRMP in facilitating mission accomplishment while conserving natural resources. The Jefferson Range INRMP implementation will be monitored for meeting the legal requirements of the SAIA as well as for other mission and biological measures of effectiveness.

The ultimate successful implementation of this INRMP is realized in no net loss in the capability of the Jefferson Range training lands to support the military mission, while at the same time providing effective natural resources management. Initiation of projects is one measure that is used to monitor INRMP implementation, but it does not give the total picture of the effectiveness of the natural resources management program. Natural resources management is not the sum total of projects, interagency coordination or program funding and staffing. Natural resources management at the Jefferson Range is a program and a philosophy that guides the INANG's approach to land use. A significant portion of INRMP implementation is done through internal coordination in regard to training site operations and land use decision making. This type of implementation cannot be measured by project implementation or funding levels. It is evidenced by such things as the ability to continually train, sustainable land use, ongoing regulatory compliance, retention of species diversity, retention of surface water quality, and the acknowledgement of sustainable natural resources management by partnering conservation agencies and other interested organizations and individuals.

In order to monitor and evaluate the effectiveness of INRMP implementation, the following will be reviewed as applicable and discussed within the context of the annual review and/or a formal review of operation and effect:

- Impacts to/from the military mission;
- Conservation program budget;
- Staff requirements;
- Program and project implementation;
- Trends in species and habitat diversity as evidenced by recurring biological surveys, land use changes, and opinions of natural resource experts;
- Compliance with regulatory requirements; and
- Feedback from military trainers, the USFWS, the IDNR, and others.

Some of these areas may not be looked at every year due to lack of data or pertinent information. The effectiveness of the INRMP as a mission enabling conservation tool will be decided by mutual agreement of the USFWS, the IDNR, and the INANG during annual reviews and / or reviews for operation and effect.

#### **5.5.2 USAF and DoD INRMP Implementation Monitoring**

The USAF uses the Defense Environmental Programs Annual Report to Congress (DEPARC) to monitor SAIA compliance. DEPARC is the automated system used to collect installation environmental information for reporting to DoD and Congress.

Established to fulfill an annual requirement to report the status of DoD's Environmental Quality (EQ) program to Congress, DEPARC collects information on enforcement actions, inspections and other performance measures for high-level reports and quarterly reviews. DEPARC also helps the USAF track fulfillment of DoD Measures of Merit requirements.

The DUSD *Updated Guidance for Implementation of the SAIA* updated Conservation Metrics for Preparing and Implementing INRMPs. Progress toward meeting these measures of merit is reported in the annual report to Congress. DEPARC reporting requirements currently include:

- The installation plans, programs and budgets for actions that support INRMP goals and objectives?
- Was the INRMP "fully-implemented" during previous execution year?
- Were all funds allocated for INRMP implementation (EQ, Reimbursable, and other) executed for the intended purpose?
- Is there adequate participation / collaboration from USFWS during Annual INRMP Review and major revisions?
- Is there adequate participation / collaboration from the State Fish and Wildlife Agency during Annual INRMP Review and major revisions?

- Is the INRMP consistent with the goals of the State Wildlife Action Plan (SWAP), Candidate Conservation Agreements, & other regional ecosystem management agreements for which DoD/AF is signatory?
- Are communications with USFWS and state fish and wildlife agency documented?
- Does the installation have on-site Air Force natural resources management staff employed in the GS-0400 Biological Sciences Job Series?
- Is there a sufficient number of natural resources staff to adequately implement INRMP goals and objectives?
- Are the capabilities of the Air Force natural resources team enhanced through use of volunteers, cooperative agreements with non-governmental organizations, on-site contractor support, or Interagency Agreements with other federal or state agencies?
- Does the installation have adequate conservation law enforcement capability through employment of a credentialed conservation law enforcement officer, or through interagency agreement with another agency?
- Is there adequate participation/collaboration from the Operations Group, Range and Airspace managers, Community Planners, Tenant Organizations and other organizations in INRMP update and revision to ensure mission needs are addressed?
- Does the INRMP support unrestricted use of the installation?
- Has there been a net loss of operations area, airspace, or training lands? Is there a deficiency in capacity, size, or arrangement of the installation natural infrastructure to support the current mission and foreseeable future needs?
- Name the federally listed threatened or Endangered (T&E) species present on the installation.
- List the state protected species present on the installation.
- Have surveys for the presence of potentially-occurring, federally listed T&E species, or suitable habitat within the historic range of a listed species, been conducted on the installation?
- Does the INRMP adequately address potentially-occurring T&E species and/or potentially-suitable habitat within the historic range of a listed species?
- Have T&E species locations, or potentially-suitable habitats within the historic range of a listed species, been mapped and included as part of the Environmental Functional Data Set and Geodatabase?



- Does the INRMP provide adequate conservation measures for identified T&E species and their habitat, as mutually-agreed by USFWS and state fish and wildlife agency during the INRMP Annual Review or major revision coordination?
- Has Critical Habitat for T&E species been designated on the installation?
- Have all major ecosystems (i.e., vegetative communities / habitats) been surveyed and mapped for the installation?
- Does the INRMP address the desired future condition for ecosystems, habitats and communities to sustain current and future mission activities and achieve natural resources management goals and objectives?
- Are native habitat restoration projects to support INRMP goals and objectives being planned, programmed, budgeted and executed?
- Does the INRMP provide for adequate control of invasive and exotic species?
- Does the INRMP address the availability of outdoor recreational opportunities (e.g., hunting, fishing, and other dispersed outdoor recreation) on the installation?
- Does the INRMP address the availability of outdoor recreation opportunities for the public, and establish access and usage categories for installation areas in accordance with mission and security requirements (i.e., Open, Restricted, Off-Limits)?
- For each outdoor recreation access category (Open, Restricted, Off-Limits), does the INRMP address and justify allowable access to those areas by category of participant (e.g., Active Duty Military, Military Dependents, DoD Civilians, Military Retirees, Defense Contractors, General Public)?
- Does the INRMP address program management for hunting, fishing and other outdoor recreation, and the role of the installation natural resources manager?

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## 6.0 ENVIRONMENTAL IMPACT ANALYSIS

### 6.1 Overview

As discussed in **Section 1.2.2**, the adoption of this INRMP requires an Environmental Impact Analysis in accordance with NEPA, CEQ Regulations (40 CFR §1500-1508), and 32 CFR 989. The *purpose* of the Proposed Action, implementation of the Jefferson Range INRMP, is to provide for the effective, long-term management of the site's natural resources while providing a training facility for aircrews to practice the delivery of air-to-ground ordnance in the safest, most realistic environment possible. The INRMP is prepared to ensure natural resource conservation measures and military activities on mission land are integrated and consistent with federal stewardship requirements. The *need* for the Proposed Action is to ensure natural resources are managed effectively on the Jefferson Range, while allowing the training mission(s) to be accomplished in order to provide a fully trained and ready force.

This analysis assesses known, potential, and reasonably foreseeable environmental consequences related to implementing the INRMP and managing natural resources at Jefferson Range. The following sections provide a description of the Proposed Action and alternatives considered (**Section 6.2**), an assessment of the environmental consequences associated with each alternative (**Section 6.3**), and an analysis of potential cumulative effects (**Section 6.4**). The analysis presented herein determines that an EIS is unnecessary for this Proposed Action and that a Finding of No Significant Impact (FONSI) is appropriate.

As discussed in **Section 1.4**, the Jefferson Range INRMP is a “living” document that provides a framework for natural resources management into the future and is reviewed annually. Management practices included in the plan have been developed without compromising long-range goals and objectives. As the plan is implemented and updated, additional environmental analyses might be required as new management activities are developed and specific projects are implemented. The EIAP for the implementation of the Jefferson Range INRMP does not include an analysis of effects for individual actions or projects described in **Section 5** of the INRMP. Individual actions or projects that have the potential to impact the environment will be analyzed separately in accordance with the NEPA process described in **Section 3.3**.

### 6.2 Proposed Action and Alternatives

The Proposed Action includes the implementation of the Jefferson Range natural resources management program in its entirety as presented in **Sections 1.0 – 5.0**. A description of the goals and objectives used to develop management measures for each natural resource area's issues and concerns and the rationale for why certain management measures were selected are provided in **Section**

**4.0.** As such, specific natural resources measures to be implemented under the Proposed Action, and evaluated in this analysis, are not repeated in this section.

The scope of this environmental impact analysis includes the evaluation of two alternatives, summarized as follows:

- Preferred Action Alternative – Implement the Jefferson Range INRMP (Proposed Action).
- No Action Alternative – Continue with operations as currently conducted and do not implement the Proposed Action. Existing conditions and management practices would continue, and no new initiatives would be established. The No Action Alternative is used as a baseline against which the action alternative may be compared. Inclusion of a No Action Alternative is required and will be carried forward for further analysis

The NEPA requires all reasonable alternatives to be explored and objectively evaluated. The development of proposed management strategies for the INRMP included a screening analysis of resource-specific alternatives. The screening analysis involved the use of accepted criteria, standards, guidelines, and best professional judgment to identify management practices for achieving natural resource management objectives and included input from USFWS and IDNR. Other management alternatives were considered during the screening process and development of the INRMP, but were eliminated because they were not economically feasible, ecologically sound, or compatible with the requirements of the military mission.

### **6.3 Environmental Consequences**

The existing physical, natural and human environment at Jefferson Range is described in **Sections 2.0** and **4.0** as well as **Appendices C through F**. In accordance with NEPA, CEQ regulations, AFI 32-7061 and 32 CFR 989, the following resource areas were evaluated: climate, land use, air quality, noise, topography, geology, soils, water resources, biological resources, cultural resources, socioeconomics, environmental justice, infrastructure, and hazardous materials and waste.

Per 40 CFR Part 1501.7(a)(3), the Council of Environmental Quality recommends agencies identify and eliminate from detailed study any issues that are not significant or have been covered in another environmental review, narrowing the discussion to a brief presentation of why they will not have a significant effect on the human environment, or providing a reference to their coverage elsewhere. Resource areas considered but excluded from further analysis include: climate, noise, topography, geology, cultural resources, socioeconomics, environmental justice, safety, airspace management, and infrastructure. No impacts, positive or negative, are anticipated to occur to these resources as a result of the Preferred

Action Alternative or No Action Alternative. Therefore, these resource areas have been eliminated from further discussion to keep the analysis relevant and concise.

Potential environmental consequences associated with the Preferred Action and No Action Alternatives for the remaining resource areas are provided below. A tabular summary of these potential environmental impacts is also presented in **Table 11**.

### **Land Use**

**Preferred Action Alternative:** No change in land use would occur as a result of INRMP implementation. Implementation of the INRMP would have long-term positive effects on the natural environment within Jefferson Range and, over time, ensure the sustainability of INANG lands to support mission requirements and training activities (i.e. no net loss in training land). Due to the integration of mission requirements in the creation of this plan, no negative impacts to training activities would be anticipated.

**No Action Alternative:** Adoption of the No Action Alternative would mean that an INRMP would not be implemented and the existing level of natural resources management would continue. Implementation of the No Action Alternative could cause undeveloped training lands and existing natural resources to degrade over time. This could ultimately affect the military mission at the Jefferson Range, and result in a long-term negative impact.

### **Air Quality**

**Preferred Action Alternative:** *Minor, short-term, occasional adverse* impacts to air quality are possible from smoke generated during prescribed burns by USFWS on Jefferson Range. However, adverse impacts would be minimized by obtaining required permits for open burning and by implementing appropriate smoke management, such as identification of appropriate atmospheric conditions and air quality, the distance and direction of smoke sensitive areas (e.g., nearby residences), and visibility hazards. One of the benefits of prescribed fire is that it can decrease the chance of wildfires. Wildfires generally produce more smoke than prescribed burns.

Because wind erosion is not a concern, it is anticipated that only a *minor, long-term positive* effect would result from erosion control and soil conservation methods recommended in the INRMP.

**No Action Alternative:** Existing natural resources management existing level of natural resources management would continue in accordance with the MOA. Beneficial impacts associated with prescribed fire and erosion and soil conservation recommendations would not be recognized. However, the use of prescribed fire would be limited due to a lack of funding, which could increase the potential for wildfires on Jefferson Range.

## **Soils**

**Preferred Action Alternative:** The INANG would take a proactive approach to prevent soil damage such as erosion or compaction. Indirect, long-term positive impacts would be expected, as undesirable changes in localized topography caused by erosion would be prevented. By implementing an effective soil erosion and sedimentation program, impacts on soils associated with erosion and sedimentation would be minimized, thereby resulting in *long-term beneficial* effects to Jefferson Range.

**No Action Alternative:** The INANG would continue to maintain trails within Jefferson Range and Big Oaks NWR in accordance with the MOA. However, the No Action Alternative does not include the implementation of soil conservation measures, or a plan of action to prevent or minimize potential soil problems related to erosion and sedimentation before their occurrence. It would involve reactive management to problems after their occurrence, rather than managing the resource to prevent impacts. Therefore, implementation of the No Action Alternative could result in *long-term negative* impacts to Jefferson Range natural resources.

## **Water Resources**

**Preferred Action Alternative:** No effect to groundwater resources is anticipated. Implementation of the Proposed Action would be expected to result in beneficial effects to area water resources (i.e. surface waters, wetlands, floodplains) and water quality. Maintenance of sensitive areas, riparian buffers, and low water crossings would protect streams and wetlands by intercepting sediments, fertilizers, and pest control chemical residue transported in storm events, thereby protecting water quality on Jefferson Range, Big Oaks NWR, and off-site downstream locales. In addition, proactive soil management practices and erosion control projects could prevent adverse impacts to water quality.

Implementation of the Preferred Action Alternative would protect wetlands through conservation and preservation. It would promote environmental awareness of Jefferson Range staff and users about jurisdictional waters (including wetlands), their value, and requirements for their protection. Increased understanding of the laws and regulations by Jefferson Range staff would help ensure INANG remains in compliance and obtains the necessary permits prior to initiating work with the potential to impact water resources. Overall, implementation of the INRMP would be anticipated to result in several *long-term positive* impacts to water resources and water quality.

**No Action Alternative:** Implementation of the No Action Alternative could result in *major, long-term negative* impacts to water resources due to a lack of information and environmental awareness regarding surface waters, floodplains, and wetlands at Jefferson Range and applicable laws and regulations. If appropriate permits are not obtained due to lack of knowledge of water resources present,

this could result in a violation of the CWA as well as other federal and state regulations, which could indirectly harm the mission of Jefferson Range. Typically, however, all necessary permits would be obtained even without the INRMP. No effect to groundwater resources is anticipated under this alternative.

### **Biological Resources**

**Preferred Action Alternative:** Implementation of the INRMP would provide *long-term beneficial* effects to biological resources by maintaining and improving habitat conditions on Jefferson Range. Abundant vegetation at Jefferson Range and Big Oaks NWR provides fuel for wildland fires, which can quickly destroy entire training areas and surrounding lands. If not controlled, wildfire has potential to threaten human health and safety, cause harm to personal property, and degradation to military training lands. In addition to damaging facilities and ranges, wildfire can destroy vegetation communities essential to a realistic training environment.

Prescribed fire would be used on Jefferson Range to prevent woody encroachment in grasslands and maintain fuel loads, thereby maintaining and enhancing native grassland habitat on Jefferson Range and ensuring no loss in training lands. Maintaining and enhancing grassland habitat would provide beneficial effects to native grassland species, including many rare species (i.e., crawfish frogs, Henslow's sparrows, grasshopper sparrows, dickcissels, etc.). Open grassland habitat is also beneficial to the INANG mission, as it is the preferred habitat for INANG's training mission at Jefferson Range. Therefore, implementation of the INRMP would result in a proactive approach to vegetation and wildlife management at Jefferson Range that would reduce the need for herbicide use, ensure no net loss of training land from damaging wildfires, and maintain/enhance existing habitats and levels of biodiversity.

Implementation of the INRMP would benefit threatened and endangered species at Jefferson Range due to enhanced environmental awareness of protection and management measures for these species. However, responsibilities for protection of federally-listed species under the ESA would not change.

The National Defense Authorization Act (NDAA) of 2004 made a significant revision to the ESA. NDAA stated, "The Secretary [of the Interior] shall not designate as critical habitat any lands or other geographical areas owned or controlled by the DoD, or designated for its use, that are subject to an INRMP prepared under section 101 of the Sikes Act (16 USC 670a), if the Secretary determines in writing that such plan provides a benefit to the species for which critical habitat is proposed for designation." Under the 2004 NDAA, a military installation may have its INRMP obviate the need for critical habitat designation if the INRMP provides a benefit to listed species, and manages for long-term conservation of the species. This INRMP is intended to provide a benefit to the following species: Indiana bat and running buffalo clover. To date, no critical

habitat has been designated or has been proposed at Jefferson Range. If critical habitat for these or other species is proposed in the future within Jefferson Range in the future, the INRMP would be used to gain an exemption from such a designation.

**No Action Alternative:**

Implementation of the No Action Alternative could result in direct, long-term adverse effects to native vegetation communities and biodiversity as a result of habitat degradation. The use of prescribed fire would be limited due to a lack of funding, which could increase the potential for wildfires on Jefferson Range.

Under the No Action Alternative, responsibilities for protection of federally-listed species under the ESA would not change. However, the USFWS could, if appropriate, designate critical habitat for the Indiana bat or running buffalo clover within Jefferson Range boundaries, as no protection under the NDAA would be available to the INANG.

**Hazardous Materials and Waste**

**Preferred Action Alternative:** INRMP implementation would result in a more proactive approach to vegetation management at Jefferson Range, resulting in more effective and decreased use of herbicides. A minor, beneficial impact associated with a reduction in hazardous materials use could be recognized as a result of the Proposed Action.

**No Action Alternative:** No change to the existing use of hazardous and toxic materials and waste generation would result. The Jefferson Range would continue to use pesticides and herbicides in accordance with applicable laws and regulations.

| Table 11. Summary of Environmental Consequences |                              |                       |
|---|------------------------------|-----------------------|
| Impact Issue                                    | Preferred Action Alternative | No Action Alternative |
| Climate   | ○                            | ○                     |
| Land Use  | +                            | ⊗                     |
| Air Quality                                     | + / ○                        | ⊗                     |
| Noise   | ○                            | ○                     |
| Topography                                      | ○                            | ○                     |
| Geology   | ○                            | ○                     |
| Soils   | +                            | ○                     |
| Water Resources                                 | +                            | ⊗                     |
| Biological Resources                            | +                            | ⊗                     |
| Cultural Resources                              | ○                            | ○                     |



| Table 11. Summary of Environmental Consequences   |                              |                       |
|---|------------------------------|-----------------------|
| Impact Issue  | Preferred Action Alternative | No Action Alternative |
| Socioeconomics  | ○                            | ○                     |
| Environmental Justice   | ○                            | ○                     |
| Infrastructure  | ○                            | ○                     |
| Hazardous and Toxic Materials/Wastes  | +                            | ○                     |
| Safety  | ○                            | ○                     |
| Airspace Management   | ○                            | ○                     |
| <b>LEGEND:</b><br>○ = No Impact<br>○ = Less-than-Significant Short-term Adverse Impact<br>○ = Less-than-Significant Long-term Adverse Impact<br>+ = Beneficial Impact |                              |                       |

## 6.4 Cumulative Effects

Cumulative impacts on environmental resources result from incremental impacts of the Proposed Action when combined with other past, present, and reasonably foreseeable future projects in an affected area. Cumulative impacts can result from minor but collectively substantial actions undertaken over a period of time by various agencies (federal, state, or local) or persons. In accordance with the NEPA, a discussion of cumulative impacts resulting from projects that are proposed, ongoing, recently completed, or anticipated to be implemented in the near future is required.

A range tower and headquarters building were recently constructed within the primary Jefferson Range parcel. Installation of a potable water line is currently occurring within and in the vicinity of this parcel. No other proposed or anticipated future development projects, mission changes, or land management strategies were identified for Jefferson Range or Big Oaks NWR. In general land development and ground disturbance is severely limited within Jefferson Range and Big Oaks NWR due to a large amount of UXO throughout the former JPG.

Land use has changed very little in the immediate vicinity of Jefferson Range and Big Oaks NWR even though the local population has grown over the past decade. In addition, a number of public lands surround the NWR, which also limits development and land use change (see **Section 2.2**). Therefore, although development in the surrounding area is always possible, no large-scale changes are anticipated.

In 2006 the state of Indiana developed the IN CWS with the intent of managing public and private lands throughout the state in the best way possible to benefit all of Indiana's wildlife, particularly those with declining populations (see **Section**

3.8). The USFWS is also in the process of developing a CCP for Big Oaks NWR (see **Section 3.9**) as well site specific plans for wildland fire management, habitat management, hunting and fishing and visitor services.

### **Preferred Action Alternative**

Implementation of the INRMP would result in a comprehensive natural resources management strategy for the Jefferson Range that includes compliance, restoration, prevention, and conservation of military training lands. The goals and objectives of the INRMP, if implemented, would improve the existing management approach for natural resources on the Range, and meet legal and policy requirements consistent with natural resources management philosophies. Implementation of the INRMP would have long-term positive effects on the natural environment within Jefferson Range and, over time, ensure the sustainability of INANG lands to support mission requirements and training activities. Due to the integration of mission requirements in the creation of this plan, no negative impacts to training activities would be anticipated.

The Jefferson Range INRMP was developed to be consistent with regional natural resource management goals and objectives in the IN CWS and Big Oaks NWR. Minor, adverse effects associated with prescribed fire use are possible. However, these impacts would be temporary in nature and would not be cumulative in nature. Implementation of the Jefferson Range INRMP in concert with nearby conservation efforts would provide an overall net benefit to the conservation of natural resources on a regional level. As development continues in the County and in areas adjacent to the Big Oaks NWR, protection of natural resources within the boundaries of Jefferson Range and Big Oaks NWR will become more and more important on a regional basis. As such, a *long-term, positive* cumulative effect would be expected to natural resources as a result of the Jefferson Range INRMP and other natural resources management activities occurring within the region.

### **No Action Alternative**

Adoption of the No Action Alternative would mean that an INRMP would not be implemented and the existing level of natural resources management would continue. Under the No Action Alternative, the use of prescribed fire within training lands may be limited, thereby, increasing the potential for wildfires to occur. Because Jefferson Range is situated within the center of Big Oaks NWR, this could result in adverse cumulative effects to surrounding natural resources if the wildfire continued to burn well outside the installation boundary. Furthermore, regional cumulative benefits associated with implementing natural resources management activities consistently with other regional plans would not be recognized. The INANG would not be in compliance with the Sikes Act and DoD policy which requires that all facilities with significant natural resources prepare and implement an INRMP.

## 6.5 Conclusions

The environmental analysis performed concludes there would be *no significant impact*, either individually or cumulatively, to the local environment or quality of life as a result of implementing the Preferred Action Alternative. This determination is based on thorough review and analysis of existing resource information, and coordination with knowledgeable, responsible personnel from the Jefferson Range, Big Oaks NWR, and other relevant local, state, and federal agencies.

Generally, the potential environmental consequences associated with implementing the Preferred Action Alternative, as proposed, would be expected to result in either a positive effect or no effect to the natural, cultural, and socioeconomic environments. Overall, through its emphasis on resource avoidance, repair and/or monitoring, implementation of the INRMP is anticipated to result in net positive effects by sustaining and enhancing extant on-site natural resources while allowing training to proceed, and has been determined to be the best, most appropriate, and most practicable alternative.

Adoption of the No Action Alternative would mean that an INRMP would not be implemented and the existing level of natural resources management would continue. Implementation of the No Action Alternative could cause undeveloped training lands and existing natural resources to degrade over time. This could ultimately affect the military mission at the Jefferson Range. Implementation of the No Action Alternative would therefore be expected to result in a long-term negative impact.

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**APPENDIX A: ACRONYMS**

|        |  |
|--------|--|
| 122 FW | 122 <sup>nd</sup> Fighter Wing                           |
| 181 IW | 181 <sup>st</sup> Intelligence Wing                      |
| AF     | Air Force  |
| AFB    | Air Force Base   |
| AFI    | Air Force Instruction                                    |
| AHAS   | Avian Hazard Advisory System                             |
| ANG    | Air National Guard                                       |
| ARNG   | Army National Guard                                      |
| ATCAA  | Air Traffic Control Association Area                     |
| BASH   | Bird/Wildlife Aircraft Strike Hazard                     |
| BDU    | Bomb Dummy Unit  |
| BFO    | Bloomington Field Office                                 |
| BMP    | Best Management Practice                                 |
| BRAC   | Base Realignment and Closure                             |
| CAS    | Close Air Support  |
| CCP    | Comprehensive Conservation Plan                          |
| CEQ    | Council on Environmental Quality (CEQ)                   |
| CFR    | Code of Federal Regulations                              |
| CIP    | Common Installation Picture                              |
| CWA    | Clean Water Act  |
| dbh    | Diameter Breast Height                                   |
| DEPARC | Defense Environmental Programs Annual Report to Congress |
| DoD    | Department of Defense                                    |
| DoDI   | DoD Instruction  |
| DU     | Depleted Uranium   |
| DUSD   | Deputy under Secretary of Defense                        |
| EA     | Environmental Assessment                                 |
| EIAP   | Environmental Impact Analysis Process                    |
| EIS    | Environmental Impact Statement                           |
| EM     | Environmental Manager                                    |
| EMS    | Environmental Management System                          |
| EQ     | Environmental Quality                                    |
| EO     | Executive Order  |

|              |  |
|--------------|--|
| EROS         | USGS Earth Resources Observation and Science                                     |
| ESA          | Endangered Species Act   |
| ESCP         | Erosion Sediment Control Plan  |
| °F           | degrees Fahrenheit   |
| FEMA         | Federal Emergency Management Agency  |
| FGDC         | Federal Geographic Data Committee  |
| FIRM         | Federal Insurance Rate Maps  |
| FNW          | Federal Noxious Weed   |
| FONSI        | Finding of No Significant Impact   |
| ft bgs       | feet below ground surface  |
| FTU          | Flight Training Unit   |
| FSC          | Federal Species of Concern   |
| FY           | Fiscal Year  |
| gpm          | gallons per minute   |
| GIS          | Geographic Information System  |
| HARB         | High Altitude Release Bomb   |
| HUC          | Hydrologic Unit Code   |
| IAC          | Indiana Administrative Code  |
| IC           | Indiana Code   |
| ICAPS        | Indiana Cooperative Agricultural Pest Survey                                     |
| ICRMP        | Integrated Cultural Resources Management Plan                                    |
| IDEM         | Indiana Department of Environmental Management                                   |
| IDNR         | Indiana Department of Natural Resources  |
| IICEP        | Interagency and Intergovernmental Coordination for Environmental Planning        |
| IN           | Indiana  |
| IN CWS       | Indiana Comprehensive Wildlife Strategy  |
| INANG        | Indiana Air National Guard   |
| INRMP        | Integrated Natural Resources Management Plan                                     |
| IPM          | Integrated Pest Management   |
| IPMP         | Integrated Pest Management Plan  |
| ISO          | International Standards Organization   |
| JFAC-IN-DET2 | Joint Forces Air Component Headquarters Detachment 2, Indiana Air National Guard |
| JPG          | Jefferson Proving Ground   |

|          |   |
|----------|---|
| JR       | Jefferson Range   |
| LANTIRN  | Low Altitude Navigation and Targeting Infrared for Night            |
| MBTA     | Migratory Bird Treaty Act   |
| MOA      | Memorandum of Agreement   |
| MOA      | Military Operations Area  |
| MOU      | Memorandum of Understanding   |
| MUTC     | Muscatatuck Urban Training Center                                   |
| NCOIC    | Non-Commissioned Officer-In-Charge                                  |
| NDAA     | National Defense Authorization Act                                  |
| NEPA     | National Environmental Policy Act                                   |
| NGB      | National Guard Bureau   |
| NGB/A7AN | National Guard Bureau, Environmental Division, Environmental Branch |
| NHPA     | National Historic Preservation Act                                  |
| NOI      | Notice of Intent  |
| NPDES    | National Pollutant Discharge Elimination System                     |
| NRCS     | Natural Resources Conservation Service                              |
| NWI      | National Wetland Inventory  |
| NWP      | Nation Wide Permit  |
| NWR      | National Wildlife Refuge  |
| PGM      | Precision Guided Munitions  |
| PLS      | Planning Level Survey   |
| RGP      | Regional General Permit   |
| ROW      | Right of Way  |
| SAIA     | Sikes Act Improvement Act   |
| SGCN     | Species of Greatest Conservation Need                               |
| SNW      | State Noxious Weed  |
| SWANCC   | Solid Waste Agency of Northern Cook County                          |
| SWAP     | State Wildlife Action Plan  |
| SWCD     | Soil and Water Conservation District                                |
| SWPPP    | Stormwater Pollution Prevention Plan                                |
| T&E      | Threatened and Endangered   |
| UAV      | Unmanned Aerial Vehicles  |
| US       | United States   |

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|            |   |
|------------|---|
| USACE      | United States Army Corps of Engineers   |
| USAF       | United States Air Force   |
| USC        | United States Code  |
| USDA       | United States Department of Agriculture   |
| USDA-APHIS | United States Department of Agriculture Animal and Plant Health Inspection Services |
| USEPA      | United States Environmental Protection Agency                                       |
| USFS       | United States Forest Service  |
| USFWS      | United States Fish and Wildlife Service   |
| USGS       | United States Geological Survey   |
| USMC       | United States Marine Corps  |
| UXO        | Unexploded Ordinance  |
| WFMP       | Wildland Fire Management Plan   |
| WQC        | Water Quality Certification   |

## **APPENDIX B: DETAILED INRMP IMPLEMENTATION TABLES**

Detailed Jefferson Range INRMP Implementation Activities ..... Table B-1

Detailed Jefferson Range INRMP Implementation Projects ..... Table B-2

Abbreviated Tables are presented in Section 5.0

Table B-1 provides an overview of recurring natural resource management activities. These activities are generally performed by INANG Environmental Manager, Jefferson Range Command personnel and, occasionally by Big Oaks NWR Refuge personnel. The implementation schedule and planned projects for this updated INRMP are detailed in Table B-2. Table B-2 will be used to develop budget requests and schedule annual project requirements. Funding requests will be submitted in accordance with current NGB procedures for conservation projects. Schedules are only estimates and are based on availability of funding.

| Table B-1. Detailed Jefferson Range INRMP Implementation Activities |  |          |                             |                             |      |      |      |      |      |      |      |      |      |      |                            |      |      |      |      |      |      |      |      |      |      |        |
|---|--|----------|-----------------------------|-----------------------------|------|------|------|------|------|------|------|------|------|------|----------------------------|------|------|------|------|------|------|------|------|------|------|--------|
| Abbreviated Table Presented in Section 5.0, Table 9                 |  |          |                             | Jefferson Range Labor Hours |      |      |      |      |      |      |      |      |      |      | Equipment & Supply Funding |      |      |      |      |      |      |      |      |      |      |        |
| Activity  |  | Priority | Objective(s) in Section 4.0 | Timing                      | FY13 | FY14 | FY15 | FY16 | FY17 | FY18 | FY19 | FY20 | FY21 | FY22 | TBD FY                     | FY13 | FY14 | FY15 | FY16 | FY17 | FY18 | FY19 | FY20 | FY21 | FY22 | TBD FY |
| 1   | Prepare budget to implement the natural resources management program   | 1        | PM1                         | Annual                      | 40   | 40   | 40   | 40   | 40   | 40   | 40   | 40   | 40   | 40   |                            |      |      |      |      |      |      |      |      |      |      |        |
| 2   | Complete annual review of INRMP  | 1        | PM1, PM2                    | Annual                      | 80   | 80   | 80   | 80   | 80   | 80   | 80   | 80   | 80   | 80   |                            |      |      |      |      |      |      |      |      |      |      |        |
| 3   | Complete review for operation and effect at least every 5 years with INRMP Task Force. Initiate update or revision as appropriate (see Projects for update/revision)   | 1        | PM1, PM2, PM5               | 2016                        |      |      |      | 160  |      |      |      |      |      | 160  |                            |      |      |      |      |      |      |      |      |      |      |        |
| 4   | Provide environmental and natural resources training to Jefferson Range personnel  | 1        | PM1, PM4, WA1               | As Needed                   |      |      |      |      |      |      |      |      |      |      | 40                         |      |      |      |      |      |      |      |      |      |      |        |
| 5   | Continue conducting safety briefings for Jefferson Range users   | 1        | PM1, PM3                    | As Needed                   |      |      |      |      |      |      |      |      |      |      | 20                         |      |      |      |      |      |      |      |      |      |      |        |
| 6   | Continue to implement road and fenceline maintenance activities outlined in MOA  | 1        | PM1, SO1, SO2, SO3          | Annual                      | 400  | 400  | 400  | 400  | 400  | 400  | 400  | 400  | 400  | 400  |                            |      |      |      |      |      |      |      |      |      |      |        |
| 7   | Evaluate effectiveness of erosion and sediment control measures associated with road maintenance   | 1        | PM2, SO1, SO2, SO3, SO4     | Annual                      | 80   | 80   | 80   | 80   | 80   | 80   | 80   | 80   | 80   | 80   |                            |      |      |      |      |      |      |      |      |      |      |        |
| 8   | Monitor at-risk sites to ensure erosion and sediment control measures are effective  | 1        | PM2, SO1, SO2, SO3, WA1     | As Needed                   |      |      |      |      |      |      |      |      |      |      | 80                         |      |      |      |      |      |      |      |      |      |      |        |
| 9   | 181 IW/EM will review activities for potential to impact water resources   | 1        | PM2, WA1                    | As Needed                   | 80   | 80   | 80   | 80   | 80   | 80   | 80   | 80   | 80   | 80   |                            |      |      |      |      |      |      |      |      |      |      |        |
| 10  | If an activity will impact a wetland or other water resource, coordination with IDEM will be completed and mitigation options identified   | 1        | PM1, PM2, PM6, WA1          | As Needed                   |      |      |      |      |      |      |      |      |      |      | 140                        |      |      |      |      |      |      |      |      |      |      |        |
| 11  | Continue implementing BASH risk reduction measures   | 1        | PM1, FW1                    | Annually                    | 120  | 120  | 120  | 120  | 120  | 120  | 120  | 120  | 120  | 120  |                            |      |      |      |      |      |      |      |      |      |      |        |
| 12  | Modify management strategies if BASH risk increases and/or high BASH risk species increase   | 1        | PM2, FW1                    | As Needed                   |      |      |      |      |      |      |      |      |      |      | 60                         |      |      |      |      |      |      |      |      |      |      |        |
| 13  | When new activities are undertaken at Jefferson Range, a review for impacts to listed species and their habitat should be conducted by the NGB/ATAN to determine if there are potential impacts and identify options to minimize those impacts | 1        | PM2, TE1, TE2               | As Needed                   |      |      |      |      |      |      |      |      |      |      | 40                         |      |      |      |      |      |      |      |      |      |      |        |
| 14  | Continue to coordinate with Big Oaks NWR for wildland fire support   | 1        | PM5, F11, F12, F13, F14     | Annually                    | 80   | 80   | 80   | 80   | 80   | 80   | 80   | 80   | 80   | 80   |                            |      |      |      |      |      |      |      |      |      |      |        |
| 15  | Maintain accurate fire log (with map) of all wildfires and prescribed fires  | 1        | PM1, PM5, F11, F14          | Annually                    | 120  | 120  | 120  | 120  | 120  | 120  | 120  | 120  | 120  | 120  |                            |      |      |      |      |      |      |      |      |      |      |        |
| 16  | Ensure that any buffer areas or protected habitat are incorporated into prescribed fire planning   | 1        | PM2, PM5, TE1, TE2, F14     | As Needed                   |      |      |      |      |      |      |      |      |      |      | 80                         |      |      |      |      |      |      |      |      |      |      |        |
| 17  | Utilize native plant species and materials for landscaping activities  | 1        | VE3, IN1                    | As Needed                   |      |      |      |      |      |      |      |      |      |      | 40                         |      |      |      |      |      |      |      |      |      |      |        |
| 18  | Implement IPMP, including methods for control and reporting requirements   | 1        | PM1, IN1, IN2, IN3          | Annually                    | 80   | 80   | 80   | 80   | 80   | 80   | 80   | 80   | 80   | 80   |                            |      |      |      |      |      |      |      |      |      |      |        |
| 19  | Monitor for emerald ash borer impacts to ash trees   | 1        | PM2, IN1                    | As Needed                   |      |      |      |      |      |      |      |      |      |      | 40                         |      |      |      |      |      |      |      |      |      |      |        |
| 20  | Monitor regularly for new invasive species or sudden increases in density of existing invasive species   | 1        | PM2, IN1                    | As Needed                   |      |      |      |      |      |      |      |      |      |      | 40                         |      |      |      |      |      |      |      |      |      |      |        |
| 21  | Conduct any tree management in accord with USFWS guidelines for Indiana bat  | 1        | VE1, TE1                    | As Needed                   |      |      |      |      |      |      |      |      |      |      | 40                         |      |      |      |      |      |      |      |      |      |      |        |



| Abbreviated Table Presented in Section 5.0, Table 10 |  |                             |                              | Table B-2. Detailed Jefferson Range INRMP Implementation Projects |      |      |      |      |      |      |      |      |      |        |      |                            |      |      |      |      |      |      |      |      |        |      |      |                    |      |      |      |      |      |      |      |        |      |               |      |      |      |      |      |      |      |      |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|--|--|-----------------------------|------------------------------|---|------|------|------|------|------|------|------|------|------|--------|------|----------------------------|------|------|------|------|------|------|------|------|--------|------|------|--------------------|------|------|------|------|------|------|------|--------|------|---------------|------|------|------|------|------|------|------|------|--------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Project  | Priority   | Objective(s) in Section 4.0 | Projected Date               | Labor Hours (Jefferson Range and Contract Man-Hours)              |      |      |      |      |      |      |      |      |      |        |      | Equipment & Supply Funding |      |      |      |      |      |      |      |      |        |      |      | Contractor Funding |      |      |      |      |      |      |      |        |      | Total Funding |      |      |      |      |      |      |      |      |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |                             |                              | FY13  | FY14 | FY15 | FY16 | FY17 | FY18 | FY19 | FY20 | FY21 | FY22 | TBD FY | FY13 | FY14                       | FY15 | FY16 | FY17 | FY18 | FY19 | FY20 | FY21 | FY22 | TBD FY | FY13 | FY14 | FY15               | FY16 | FY17 | FY18 | FY19 | FY20 | FY21 | FY22 | TBD FY | FY13 | FY14          | FY15 | FY16 | FY17 | FY18 | FY19 | FY20 | FY21 | FY22 | TBD FY |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1  | Update/revise INRMP as determined by INRMP Task Force meeting during review for operation and effect   | 1                           | PM1, PM2, PM5                | 2016  |      |      |      | 40   |      |      |      | 40   |      |        |      |                            |      |      |      |      |      |      |      |      |        |      |      |                    |      |      |      |      |      |      |      |        |      |               |      |      |      |      |      |      |      |      |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2  | Incorporate existing GIS data from ANG and contractors into one GIS dataset with metadata  | 1                           | PM1, PM2, PM6                | 2017  |      |      |      |      | 80   |      |      |      |      |        |      |                            |      |      |      |      |      |      |      |      |        |      |      |                    |      |      |      |      |      |      |      |        |      |               |      |      |      |      |      |      |      |      |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 3  | If compensatory water resources mitigation is required, identify mitigation requirement and acquire support to implement mitigation requirements                                 | 1                           | PM2, WA1                     | As Needed   |      |      |      |      |      |      |      |      |      | 50     |      |                            |      |      |      |      |      |      |      |      |        |      |      |                    |      |      |      |      |      |      |      |        |      |               |      |      |      |      |      |      |      |      |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 4  | Develop erosion and sediment control manual with site-specific BMPs  | 1                           | PM1, SO1, SO2, SO3, SO4      | 2013  | 120  |      |      |      |      |      |      |      |      |        |      |                            |      |      |      |      |      |      |      |      |        |      |      |                    |      |      |      |      |      |      |      |        |      |               |      |      |      |      |      |      |      |      |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 5  | Conduct training for Jefferson Range personnel to implement erosion and sediment control BMPs  | 1                           | PM4, SO1, SO2, SO3           | 2013  | 40   |      |      |      |      |      |      |      |      |        |      |                            |      |      |      |      |      |      |      |      |        |      |      |                    |      |      |      |      |      |      |      |        |      |               |      |      |      |      |      |      |      |      |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 6  | Conduct training for Jefferson Range personnel on permitting requirements for water resources  | 1                           | PM4, WA1                     | 2013  | 40   |      |      |      |      |      |      |      |      |        |      |                            |      |      |      |      |      |      |      |      |        |      |      |                    |      |      |      |      |      |      |      |        |      |               |      |      |      |      |      |      |      |      |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 7  | Evaluate current methodology for road and fence-line maintenance and identify alternatives with lower costs and lower environmental impacts                                      | 1                           | PM2, SO1, SO2, SO3, SO4, WA1 | 2013  | 100  |      |      |      |      |      |      |      |      |        |      |                            |      |      |      |      |      |      |      |      |        |      |      |                    |      |      |      |      |      |      |      |        |      |               |      |      |      |      |      |      |      |      |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 8  | Install water bars and modifying road grading to minimize erosion associated with roads  | 1                           | PM2, SO1, SO2, SO3, SO4, WA1 | As Needed   |      |      |      |      |      |      |      |      |      | 160    |      |                            |      |      |      |      |      |      |      |      |        |      |      |                    |      |      |      |      |      |      |      |        |      |               |      |      |      |      |      |      |      |      |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 9  | Modify/replace stream crossings where there are repeated maintenance problems or significant deterioration of the crossing or stream   | 1                           | PM2, SO1, SO2, SO3, SO4, WA1 | As Needed   |      |      |      |      |      |      |      |      |      | 240    |      |                            |      |      |      |      |      |      |      |      |        |      |      |                    |      |      |      |      |      |      |      |        |      |               |      |      |      |      |      |      |      |      |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 10   | Develop comprehensive vegetation community data (based on National Vegetation Classification System classifications), using remote sensing techniques and limited groundtruthing | 1                           | PM2, PM6, VE1, VE4           | 2014  | 200  |      |      |      |      |      |      |      |      |        |      |                            |      |      |      |      |      |      |      |      |        |      |      |                    |      |      |      |      |      |      |      |        |      |               |      |      |      |      |      |      |      |      |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 11   | Continue reducing woody encroachment in grasslands   | 1                           | PM1, VE1, VE2, VE4, FW2      | Annual  | 60   | 60   | 60   | 60   | 60   | 60   | 60   | 60   | 60   | 60     |      |                            |      |      |      |      |      |      |      |      |        |      |      |                    |      |      |      |      |      |      |      |        |      |               |      |      |      |      |      |      |      |      |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 12   | Develop BASH plan  | 2                           | PM1, FW1                     | 2015  |      |      | 120  |      |      |      |      |      |      |        |      |                            |      |      |      |      |      |      |      |      |        |      |      |                    |      |      |      |      |      |      |      |        |      |               |      |      |      |      |      |      |      |      |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 13   | Evaluate potential roosting habitat for Indiana bats using remote sensing and limited groundtruthing   | 1                           | PM6, VE1, TE1                | 2014  |      | 120  |      |      |      |      |      |      |      |        |      |                            |      |      |      |      |      |      |      |      |        |      |      |                    |      |      |      |      |      |      |      |        |      |               |      |      |      |      |      |      |      |      |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 14   | Continue efforts to manage for crawfish frogs  | 1                           | PM1, WA3, VE2, TE2           | As Needed   |      |      |      |      |      |      |      |      |      | 40     |      |                            |      |      |      |      |      |      |      |      |        |      |      |                    |      |      |      |      |      |      |      |        |      |               |      |      |      |      |      |      |      |      |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 15   | Continue implementing wildland fire program  | 1                           | PM1, TE3, F11, F12, F13, F14 | Annual  | 40   | 40   | 40   | 40   | 40   | 40   | 40   | 40   | 40   | 40     |      |                            |      |      |      |      |      |      |      |      |        |      |      |                    |      |      |      |      |      |      |      |        |      |               |      |      |      |      |      |      |      |      |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 16   | Continue managing fuel loads to minimize uncontrollable wildfire risk  | 1                           | PM1, VE1, F11                | As Needed   |      |      |      |      |      |      |      |      |      | 180    |      |                            |      |      |      |      |      |      |      |      |        |      |      |                    |      |      |      |      |      |      |      |        |      |               |      |      |      |      |      |      |      |      |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 17   | Continue responding to wildfires with appropriately trained personnel and equipment  | 1                           | PM1, F11, F12                | Annual  |      |      |      |      |      |      |      |      |      | 120    |      |                            |      |      |      |      |      |      |      |      |        |      |      |                    |      |      |      |      |      |      |      |        |      |               |      |      |      |      |      |      |      |      |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 18   | Conduct prescribed fires in burn units that have not experienced fire recently   | 2                           | PM1, VE1, TE8, F11, F14      | As Needed   |      |      |      |      |      |      |      |      |      | 100    |      |                            |      |      |      |      |      |      |      |      |        |      |      |                    |      |      |      |      |      |      |      |        |      |               |      |      |      |      |      |      |      |      |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 19   | Coordinate with Big Oaks NWR to incorporate Jefferson Range into the WFPMP   | 1                           | PM1, PM5, F11                | 2013  | 40   |      |      |      |      |      |      |      |      |        |      |                            |      |      |      |      |      |      |      |      |        |      |      |                    |      |      |      |      |      |      |      |        |      |               |      |      |      |      |      |      |      |      |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 20   | Monitor priority invasive species and implement control projects if needed   | 1                           | PM2, IN1                     | As Needed   |      |      |      |      |      |      |      |      |      | 80     |      |                            |      |      |      |      |      |      |      |      |        |      |      |                    |      |      |      |      |      |      |      |        |      |               |      |      |      |      |      |      |      |      |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 21   | Reduce coverage of invasive plants   | 1                           | PM2, SO1, VE3, IN1, IN2, IN4 | As Needed   |      |      |      |      |      |      |      |      |      | 100    |      |                            |      |      |      |      |      |      |      |      |        |      |      |                    |      |      |      |      |      |      |      |        |      |               |      |      |      |      |      |      |      |      |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 22   | Implement management necessary to control emerald ash borer, once found on site, and to mitigate damage  | 2                           | PM2, VE1, IN1                | As Needed   |      |      |      |      |      |      |      |      |      | 80     |      |                            |      |      |      |      |      |      |      |      |        |      |      |                    |      |      |      |      |      |      |      |        |      |               |      |      |      |      |      |      |      |      |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

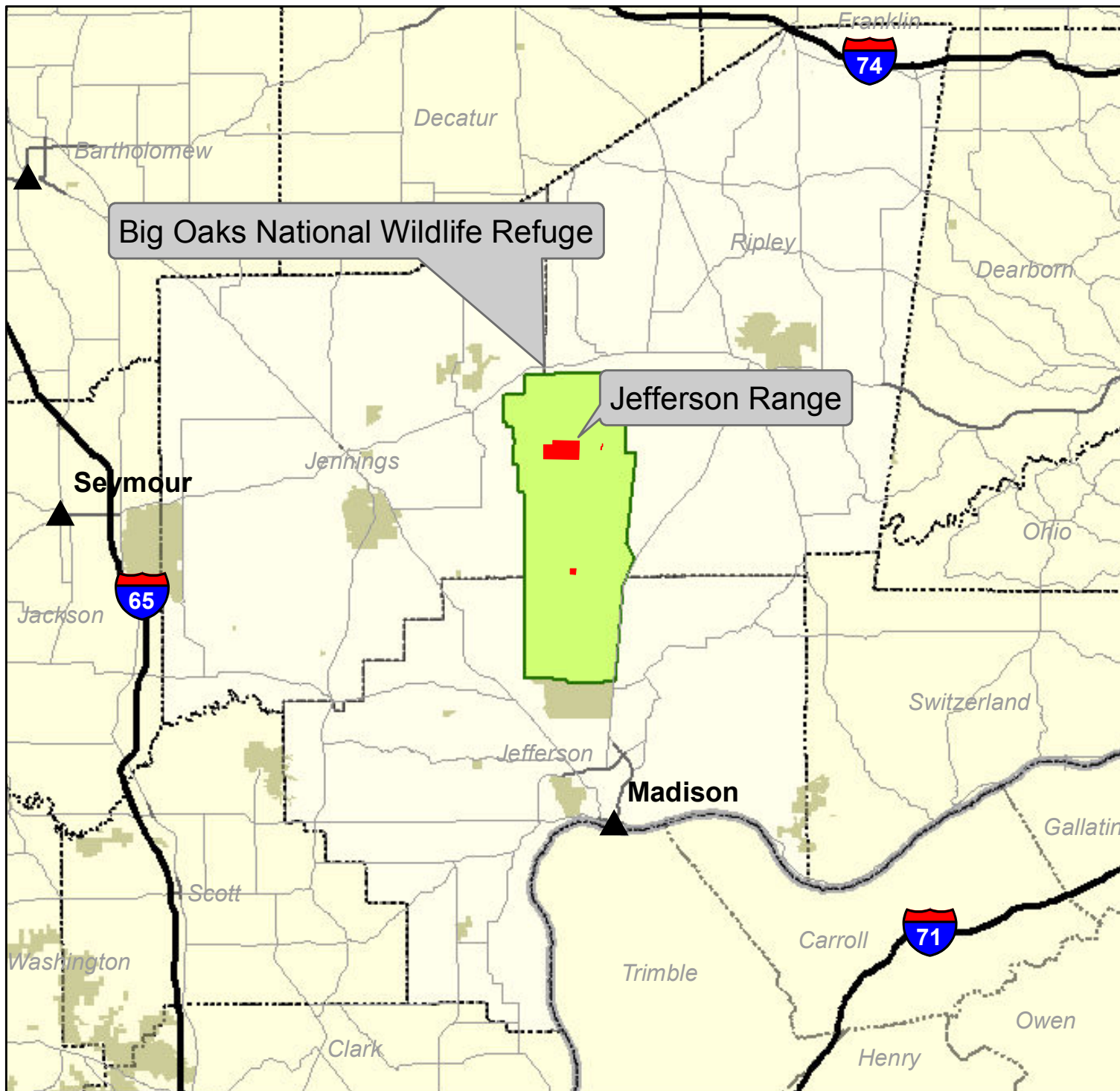
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## APPENDIX C: MAPS FOR JEFFERSON RANGE INRMP

|  |        |
|--|--------|
| Regional Location Map .....                | Map 1  |
| Facility Overview Map .....                | Map 2  |
| Jefferson Range Parcels Map .....          | Map 3  |
| Limited and Public Access Map .....        | Map 4  |
| Aerial Imagery Map .....                   | Map 5  |
| Constraints Map .....                      | Map 6  |
| Topography Overview Map .....              | Map 7  |
| Topography By Parcel Map .....             | Map 8  |
| Soils Map .....                            | Map 9  |
| Water Resources Overview Map .....         | Map 10 |
| Water Resources by Parcel Map .....        | Map 11 |
| Vegetation Communities Overview Map .....  | Map 12 |
| Vegetation Communities by Parcel Map ..... | Map 13 |
| Wildland Fire Burn Unit Map .....          | Map 14 |
| Fire History Map .....                     | Map 15 |

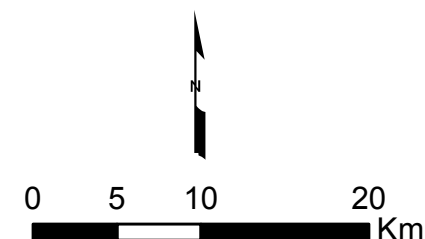
Map data are derived from multiple sources, primarily from the Common Installation Picture (CIP) data provided by the NGB/A7AN, data provided by Big Oaks NWR, and data downloaded from a variety of state and national sources.

| GIS Data  | Source                      |
|---|-----------------------------|
| Boundary  | Created                     |
| Building Infrastructure, Fences & Gates, Roads, Training Infrastructure, and Elevations | CIP                         |
| Restricted Areas, Land Cover, Burn Units, Fire History                                  | Big Oaks NWR                |
| Streams, Open Water, and Watersheds   | National Hydrology Dataset  |
| Wetlands  | National Wetlands Inventory |
| Floodplains   | FEMA                        |
| Soils   | NRCS                        |
| Aerial Imagery  | Multiple Sources            |



**Map Features**

- Big Oaks National Wildlife Refuge (USFWS)
- Jefferson Range Parcels
- Indiana Department of Natural Resources

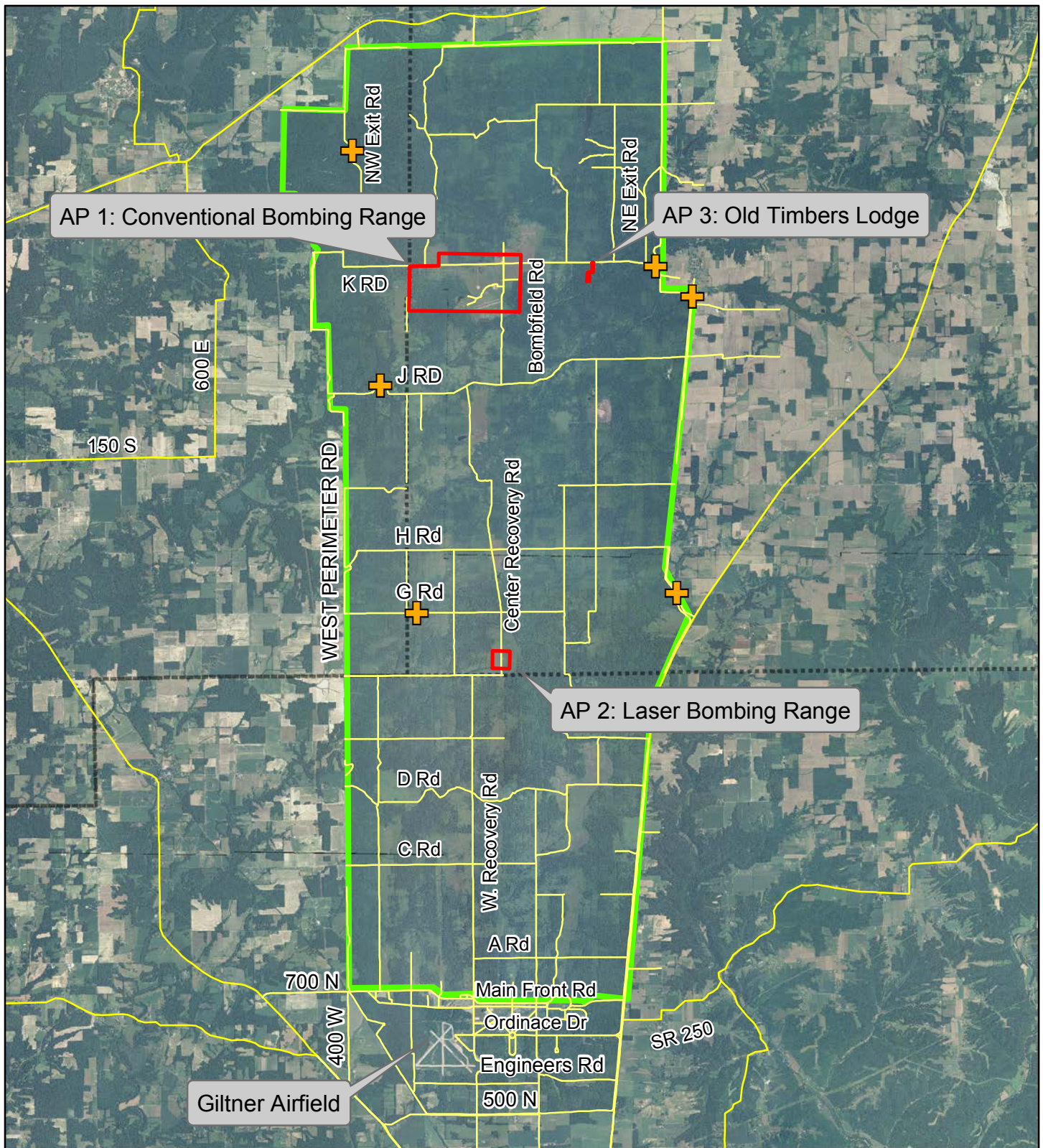


Map 1  
REGIONAL LOCATION MAP

Integrated Natural Resources  
Management Plan  
Jefferson Range

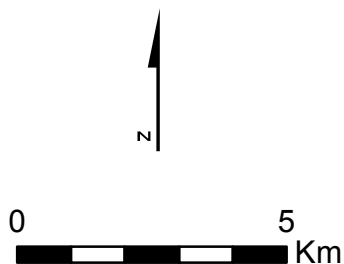
Date: 08/24/2011





## Map Features

- Big Oaks National Wildlife Refuge (USFWS)
- Jefferson Range Parcels
- County Boundaries
- Facility Roads
- + Bridges

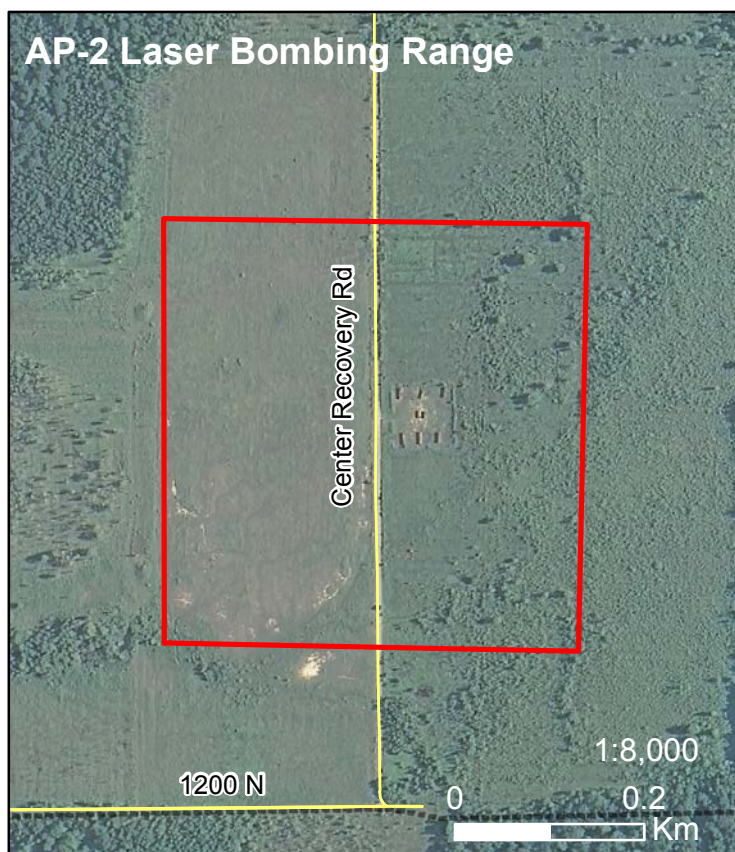
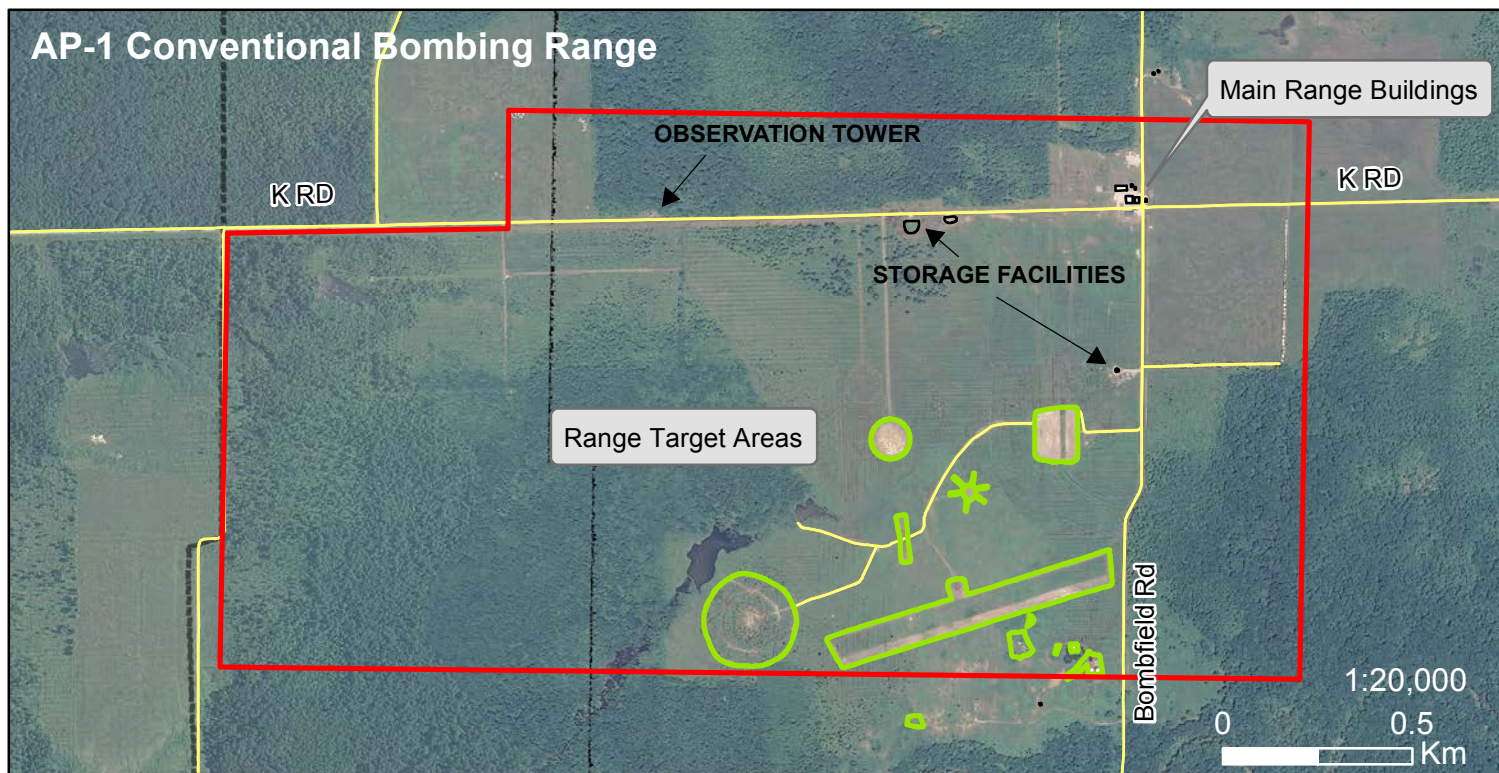


## Map 2 FACILITY OVERVIEW MAP

Integrated Natural Resources  
Management Plan  
Jefferson Range

Date: 10/17/2011





#### Map Features

- Jefferson Range Parcels
- Target Areas
- Facility Roads
- County Boundaries

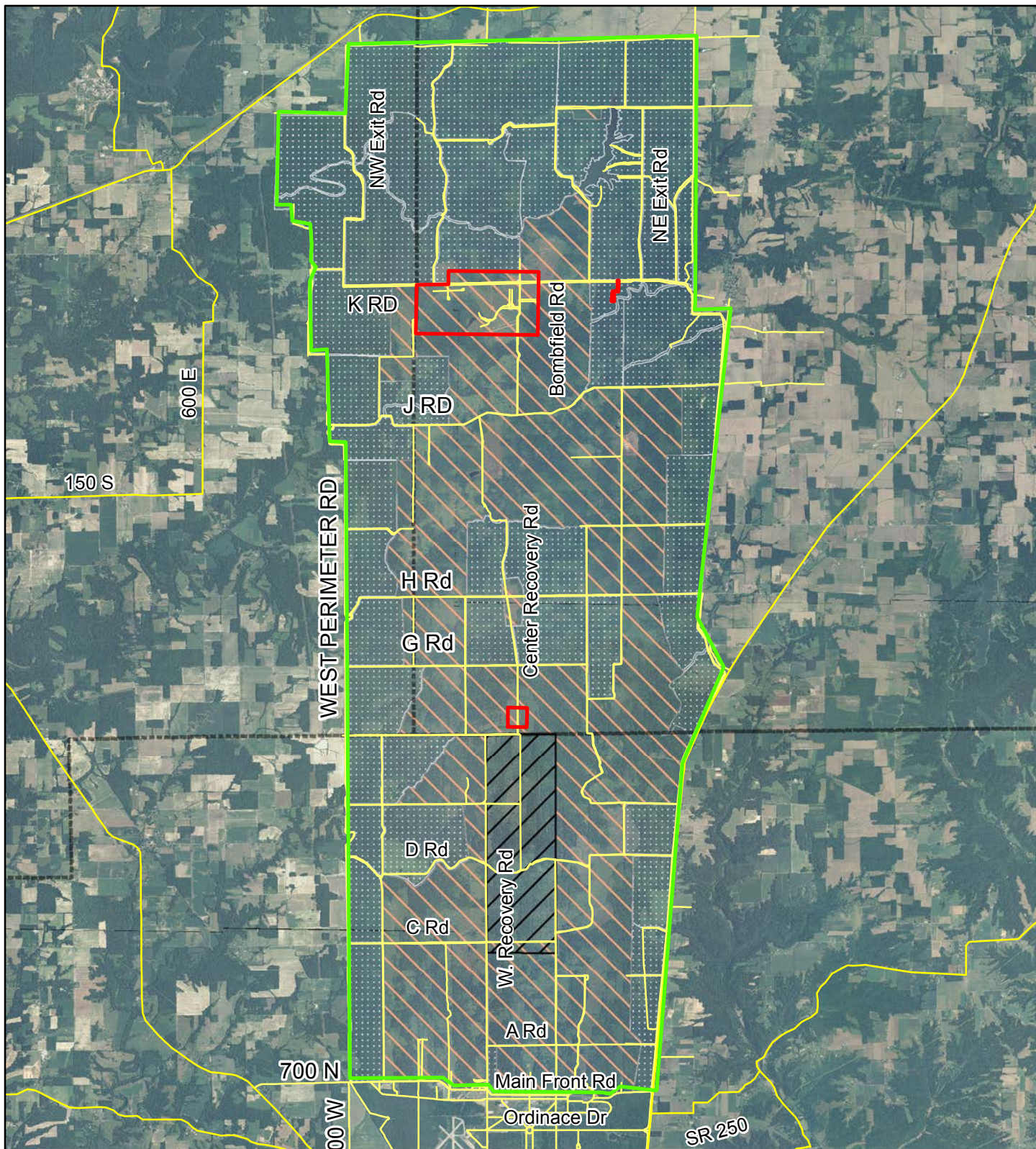


#### Map 3 JEFFERSON RANGE PARCELS

Integrated Natural Resources  
Management Plan  
Jefferson Range

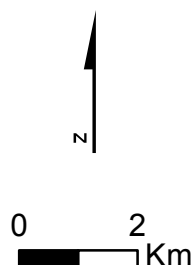
Date: 10/17/2011





## Map Features

- |   |  |
|---|--|
| Big Oaks National Wildlife Refuge (USFWS) | Restricted Access - Depleted Uranium     |
| Jefferson Range Parcels                   | Restricted Access - Unexploded Ordinance |
| Facility Roads                            | Hunting Access                           |

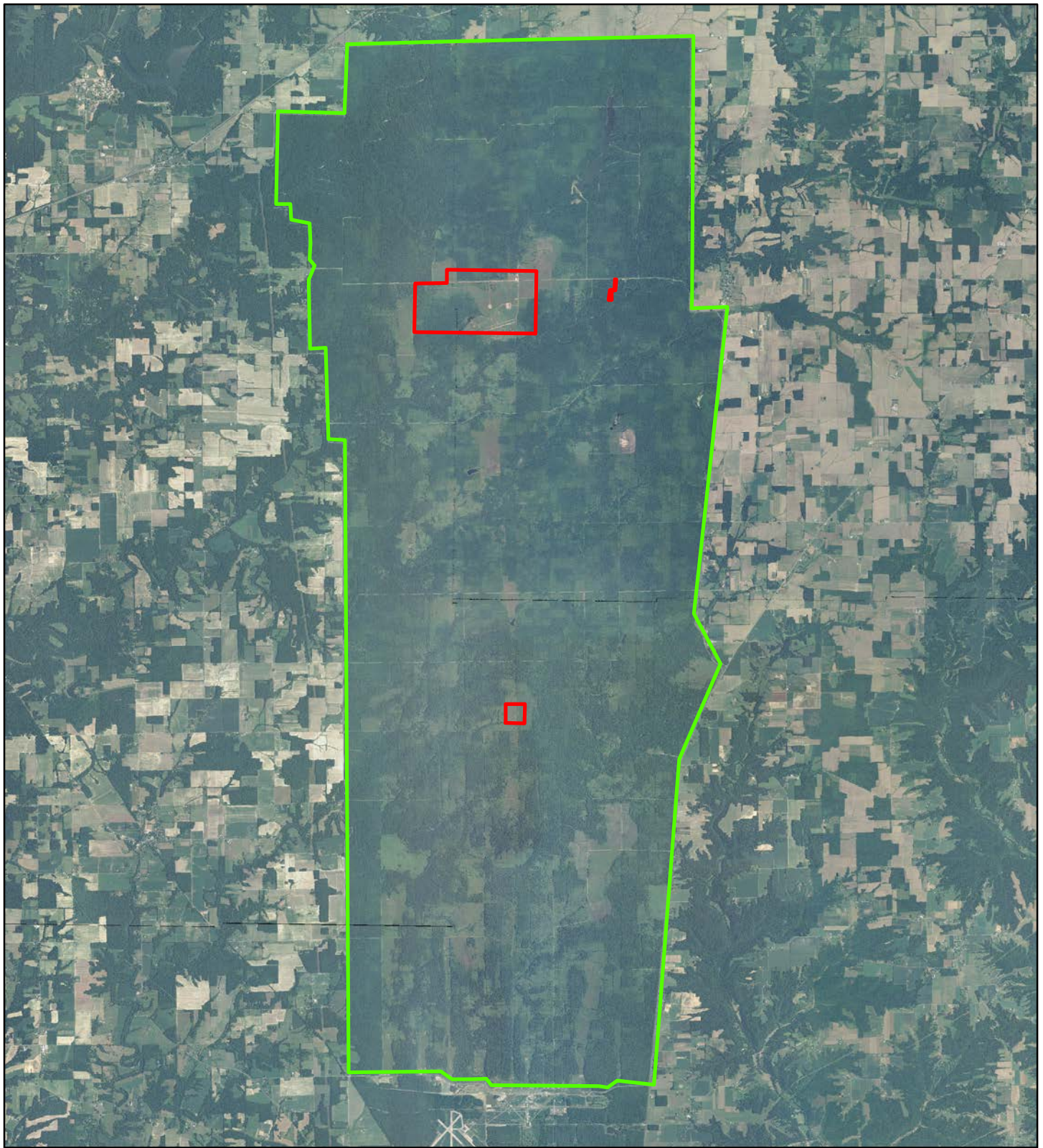


## Map 4 LIMITED AND PUBLIC ACCESS



Integrated Natural Resources  
Management Plan  
Jefferson Range

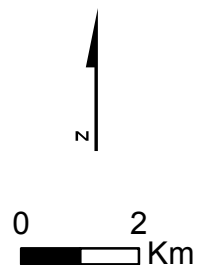
Date: 10/17/2011





### Map Features

-  Big Oaks National Wildlife Refuge (USFWS)
-  Jefferson Range Parcels

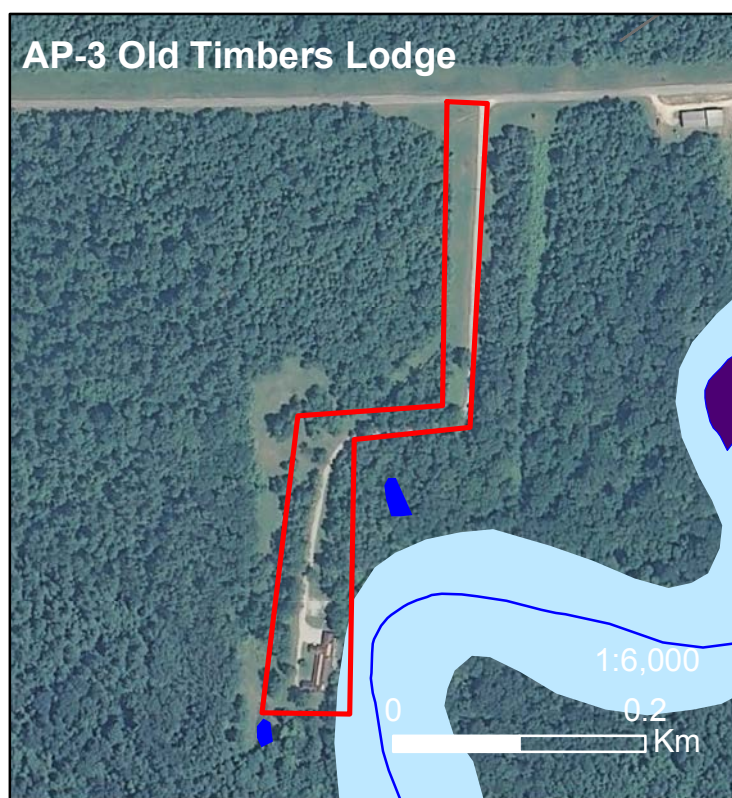
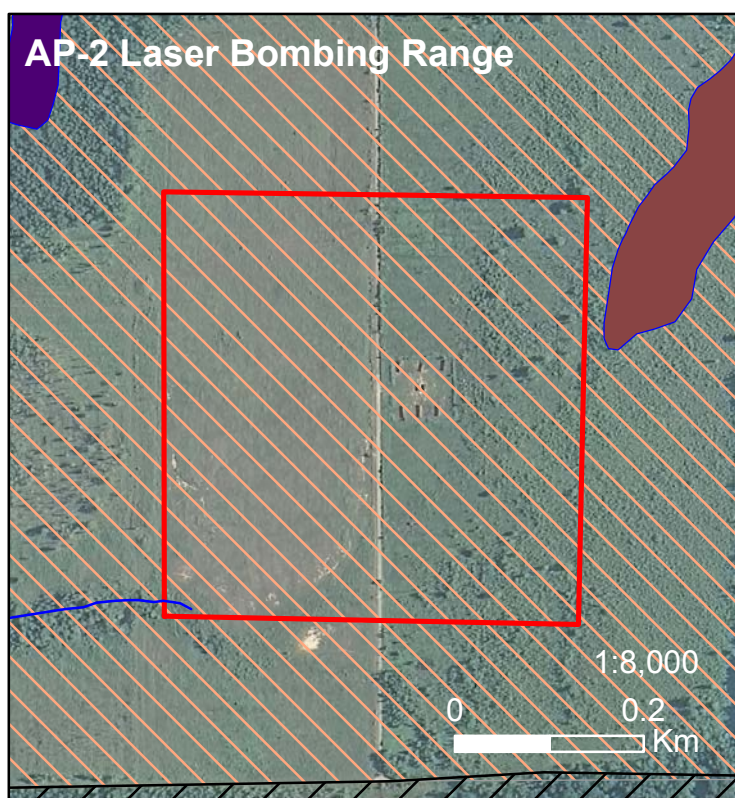
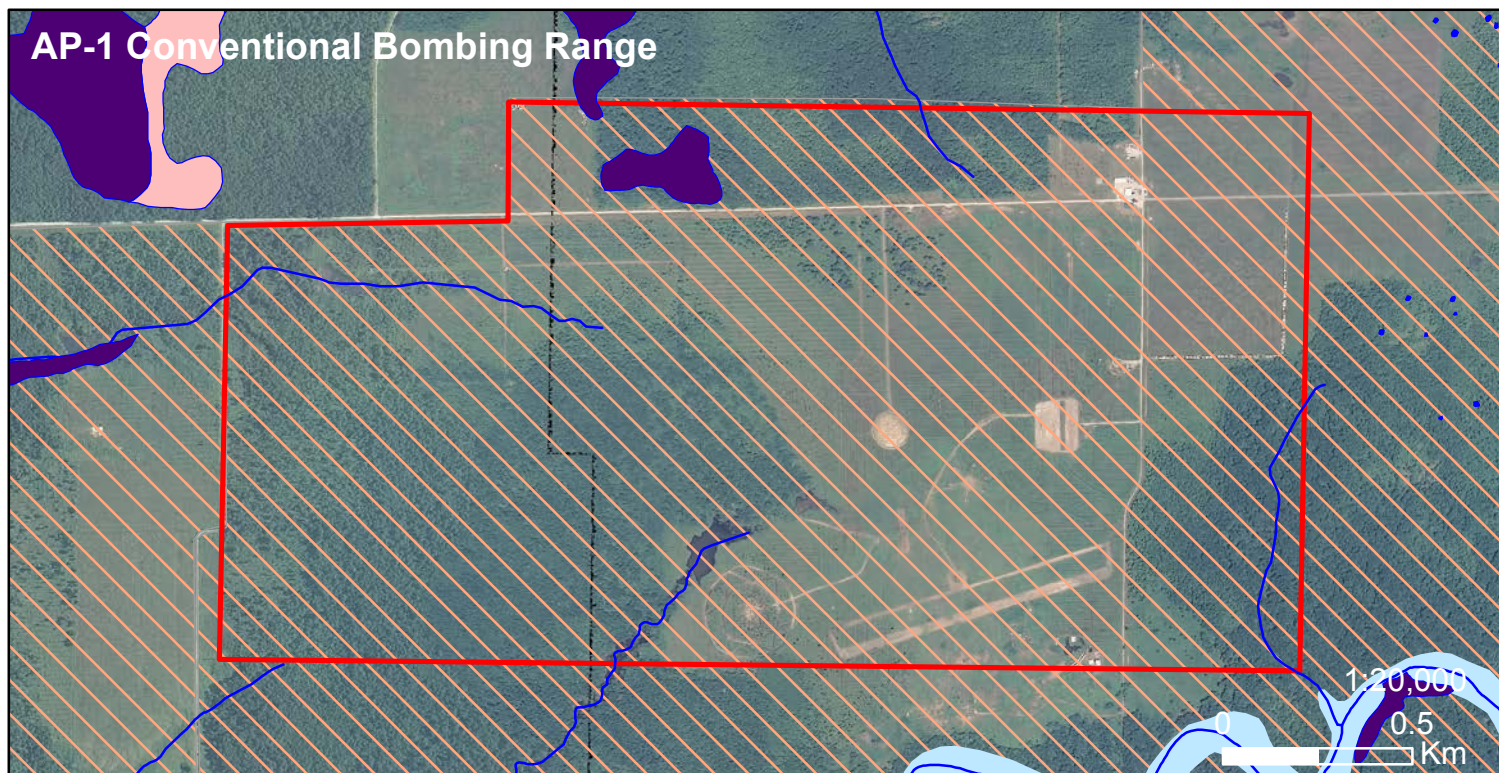


### Map 5 AERIAL IMAGERY MAP WITH PARCELS

Integrated Natural Resources  
Management Plan  
Jefferson Range

Date: 10/17/2011





#### Map Features

- Jefferson Range Parcels
- Streams
- Water Bodies
- Floodplains
- Restricted Access - Depleted Uranium
- Restricted Access - Unexploded Ordinance

#### Wetlands Type

- Palustrine Dec. Forest, Temporarily Flooded
- Palustrine Dec. Forest, Temporarily Flooded, Partially Drained
- Palustrine Dec. Scrub-Shrub, Temporarily Flooded
- Palustrine Dec. Scrub-Shrub, Temporarily Flooded, Partially Drained

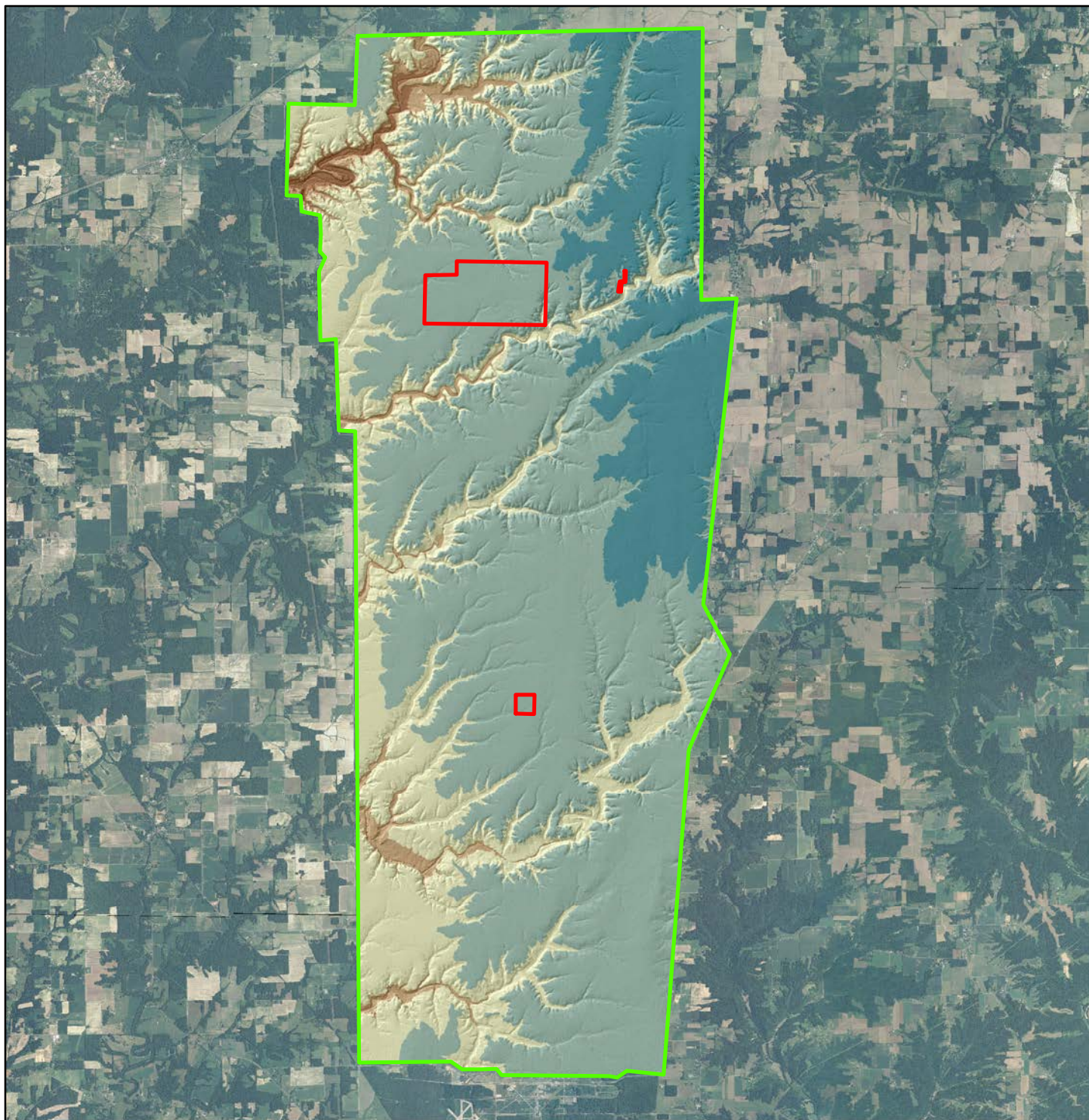


#### Map 6 CONSTRAINTS

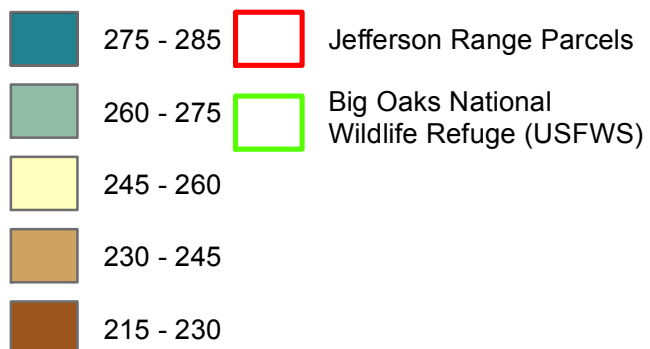
Integrated Natural Resources  
Management Plan  
Jefferson Range

Date: 10/17/2011





### Elevation in Meters

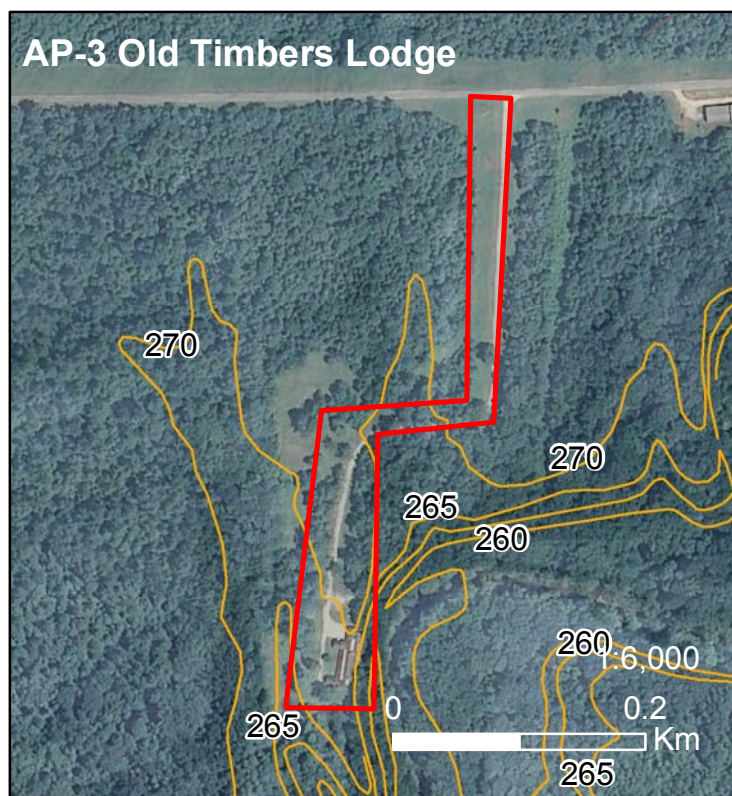
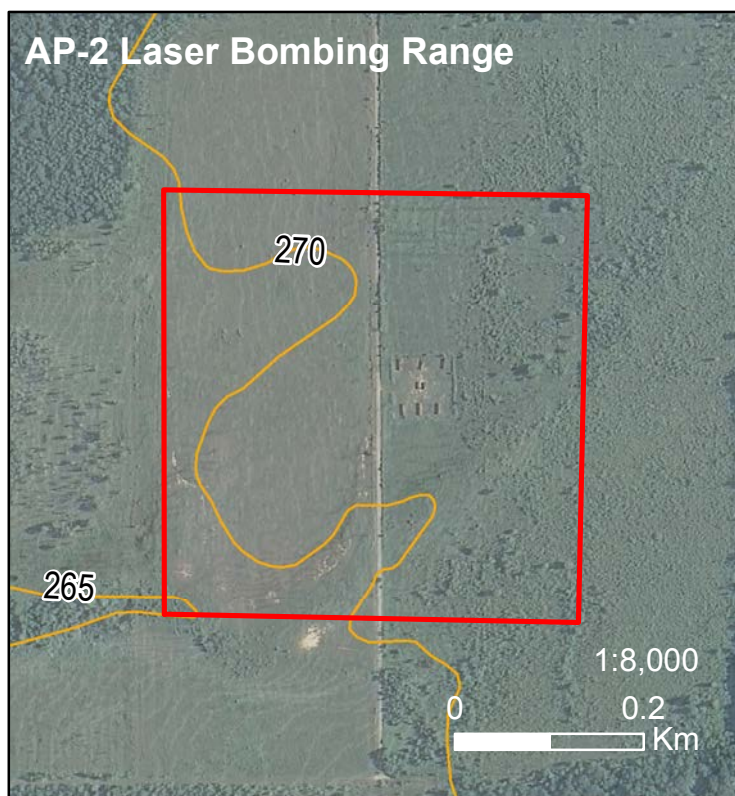
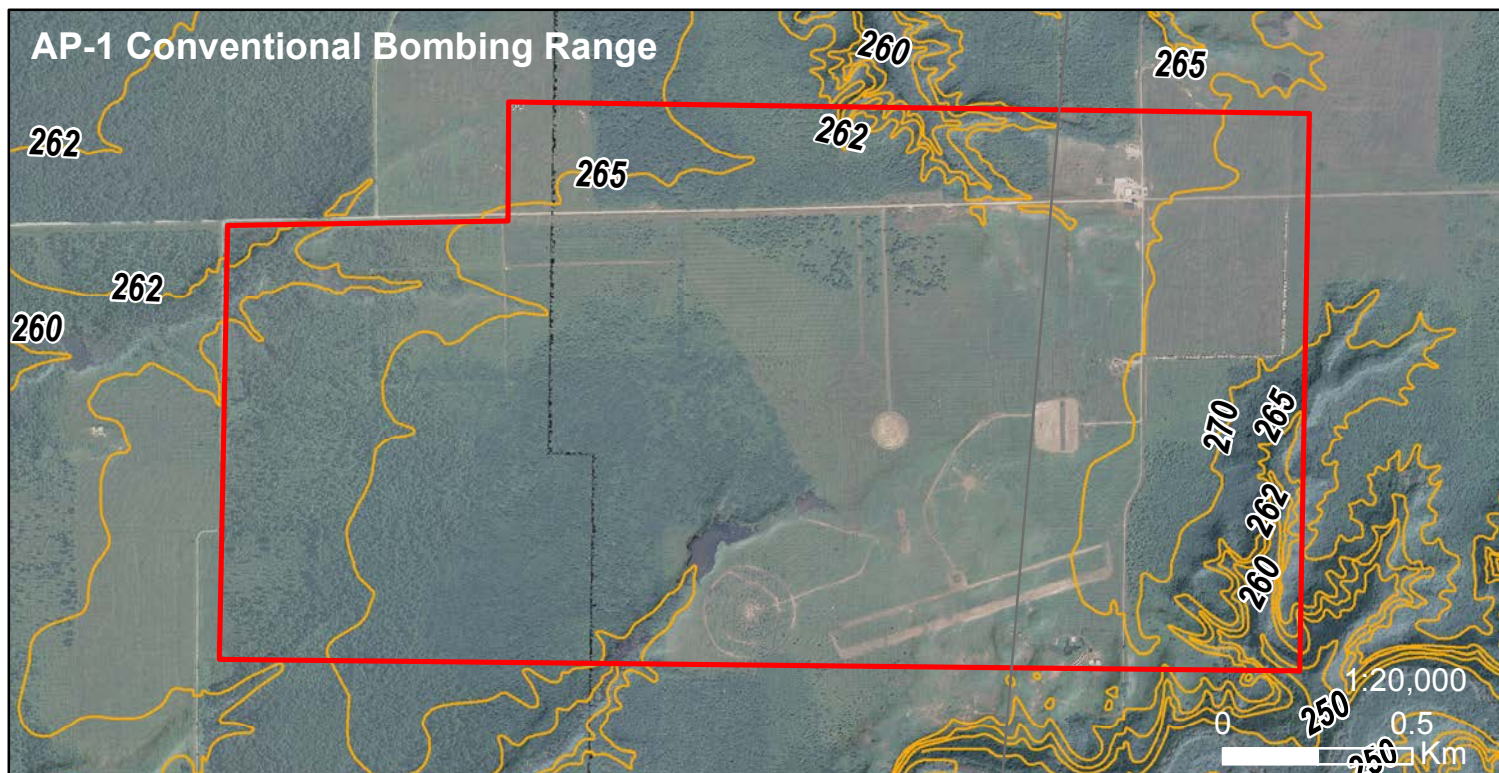


### Map 7 TOPOGRAPHIC OVERVIEW

Integrated Natural Resources  
Management Plan  
Jefferson Range

Date: 10/17/2011





## Map Features

— Contour Interval ~ 10 M

□ Jefferson Parcels

Hillshade over 2010 aerial photograph. Topography also illustrated with contour lines at an interval of about 10 meters. Because of the relatively low relief in AP-2 a 5 meter contour interval is used.

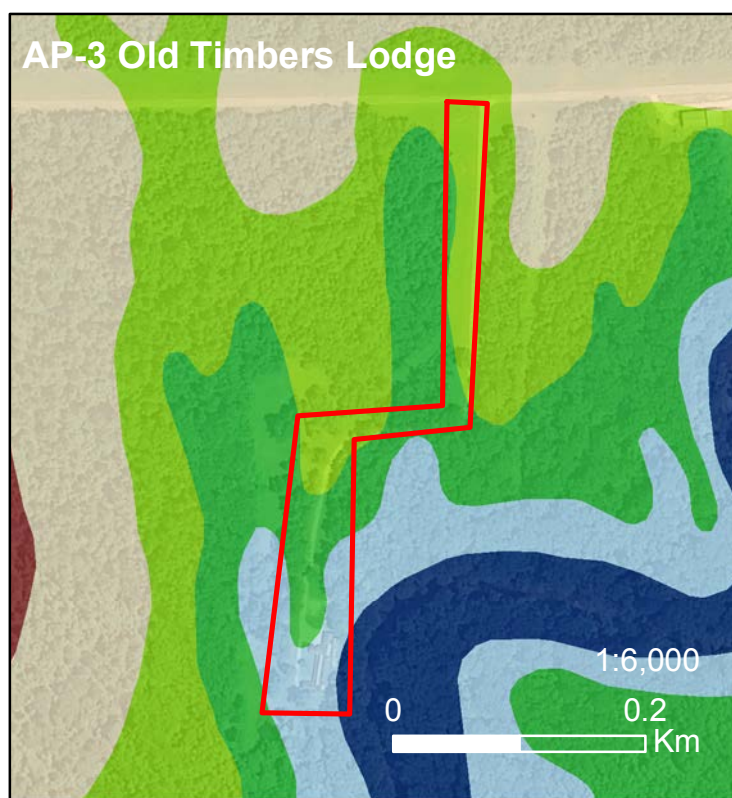
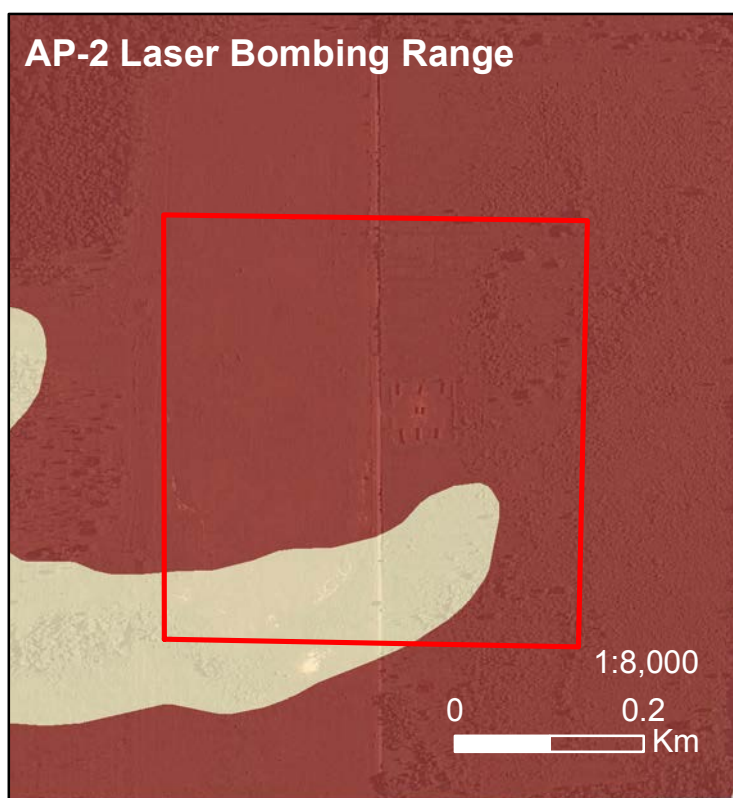
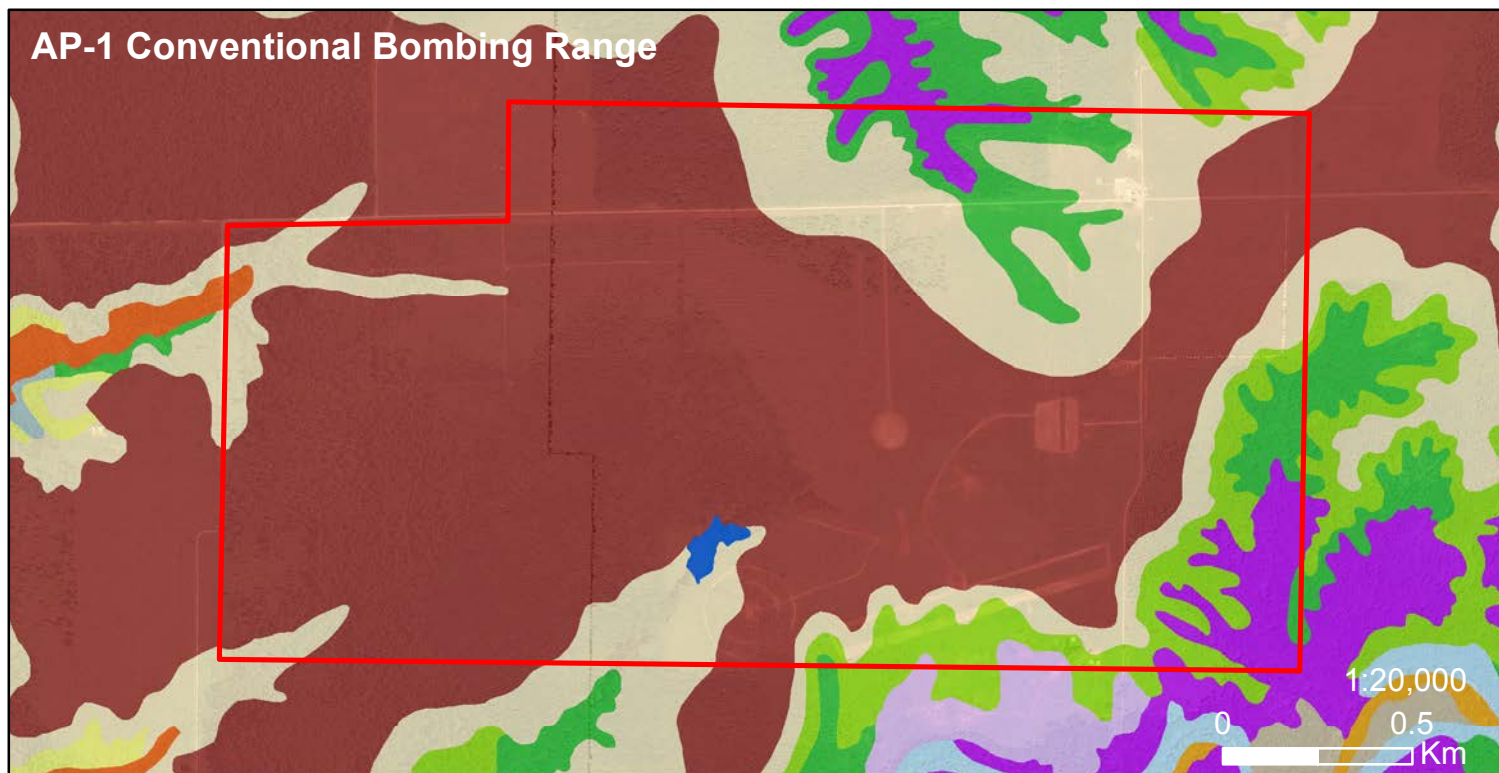


Map 8  
TOPOGRAPHY  
BY PARCEL

Integrated Natural Resources  
Management Plan  
Jefferson Range

Date: 10/17/2011





## Map Features

### Soil Series Name

|  |            |  |             |  |           |
|--|------------|--|-------------|--|-----------|
|  | Avonburg   |  | Elkinsville |  | Rossmoyne |
|  | Blocher    |  | Grayford    |  | Ryker     |
|  | Cincinnati |  | Holton      |  | Wirt      |
|  | Cobbsfork  |  | Nabb        |  | Wakeland  |
|  | Eden       |  | Pekin       |  | Water     |

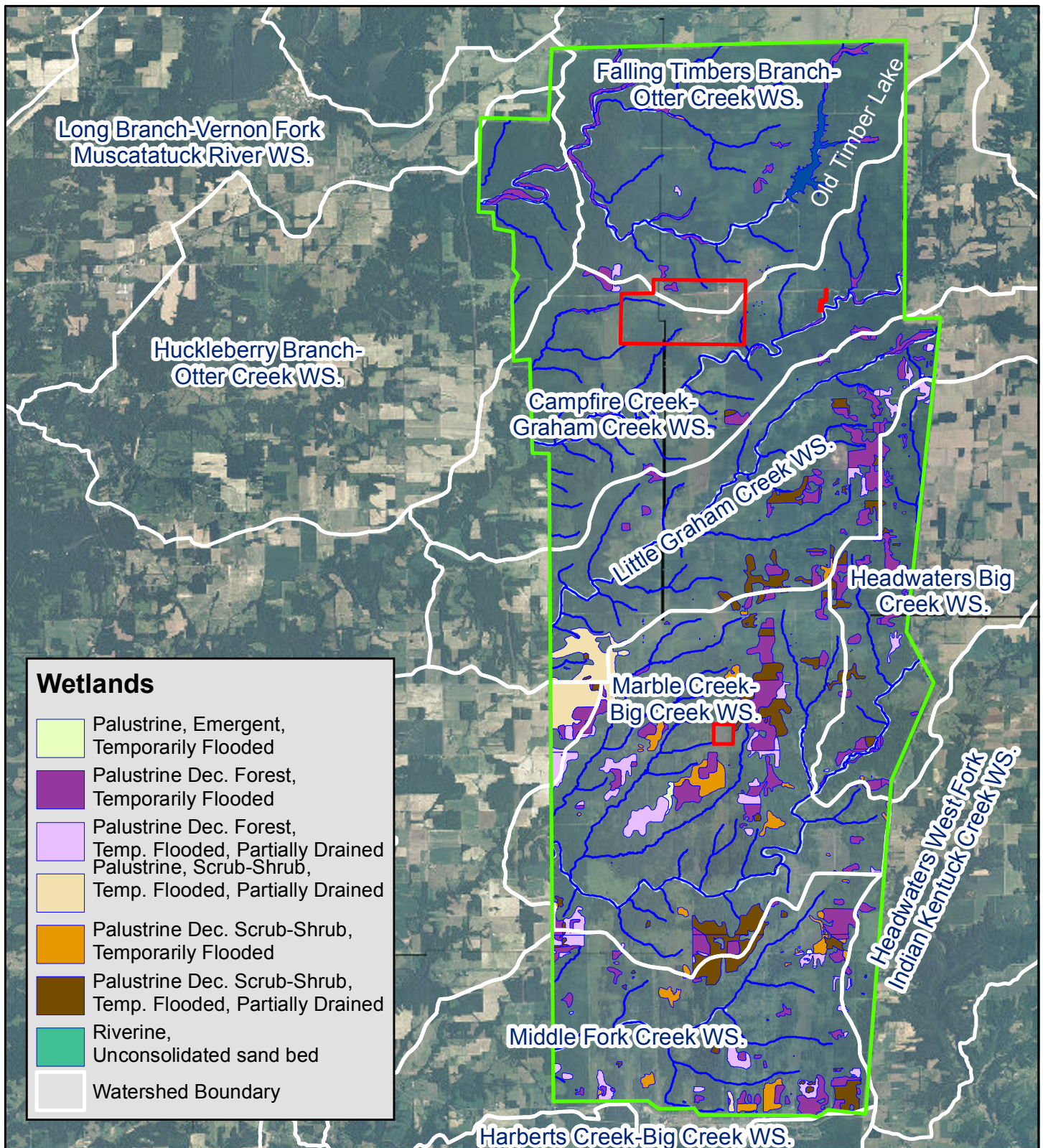


Map 9  
SOIL TYPES  
BY PARCEL

Integrated Natural Resources  
Management Plan  
Jefferson Range

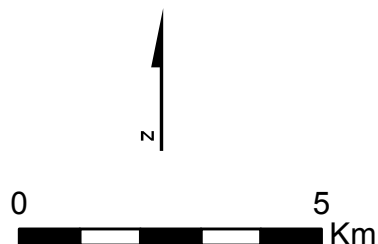
Date: 10/17/2011





### Map Features

- Big Oaks National Wildlife Refuge (USFWS)
- Jefferson Range Parcels
- Floodplains
- Streams and Waterbodies

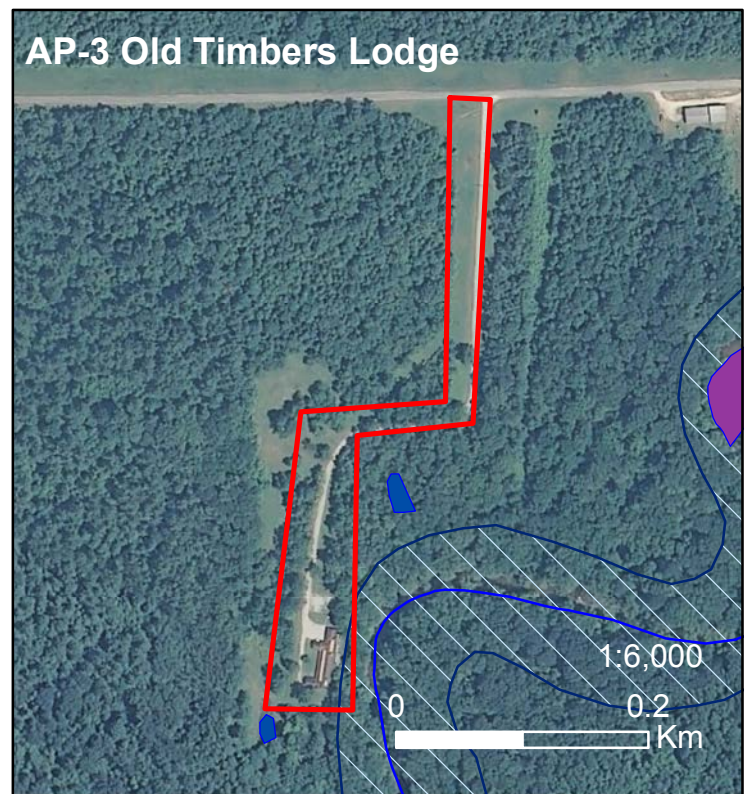
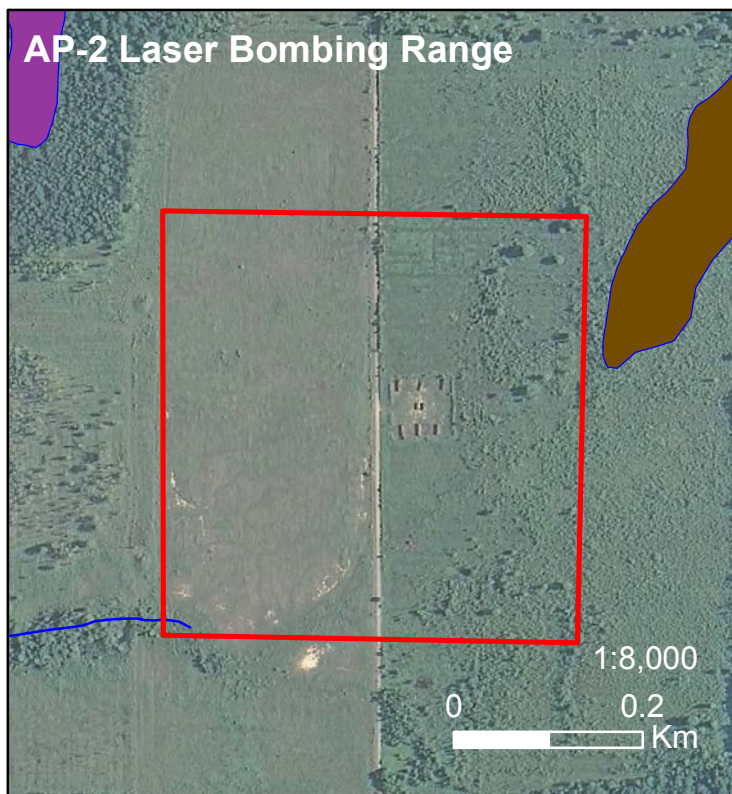
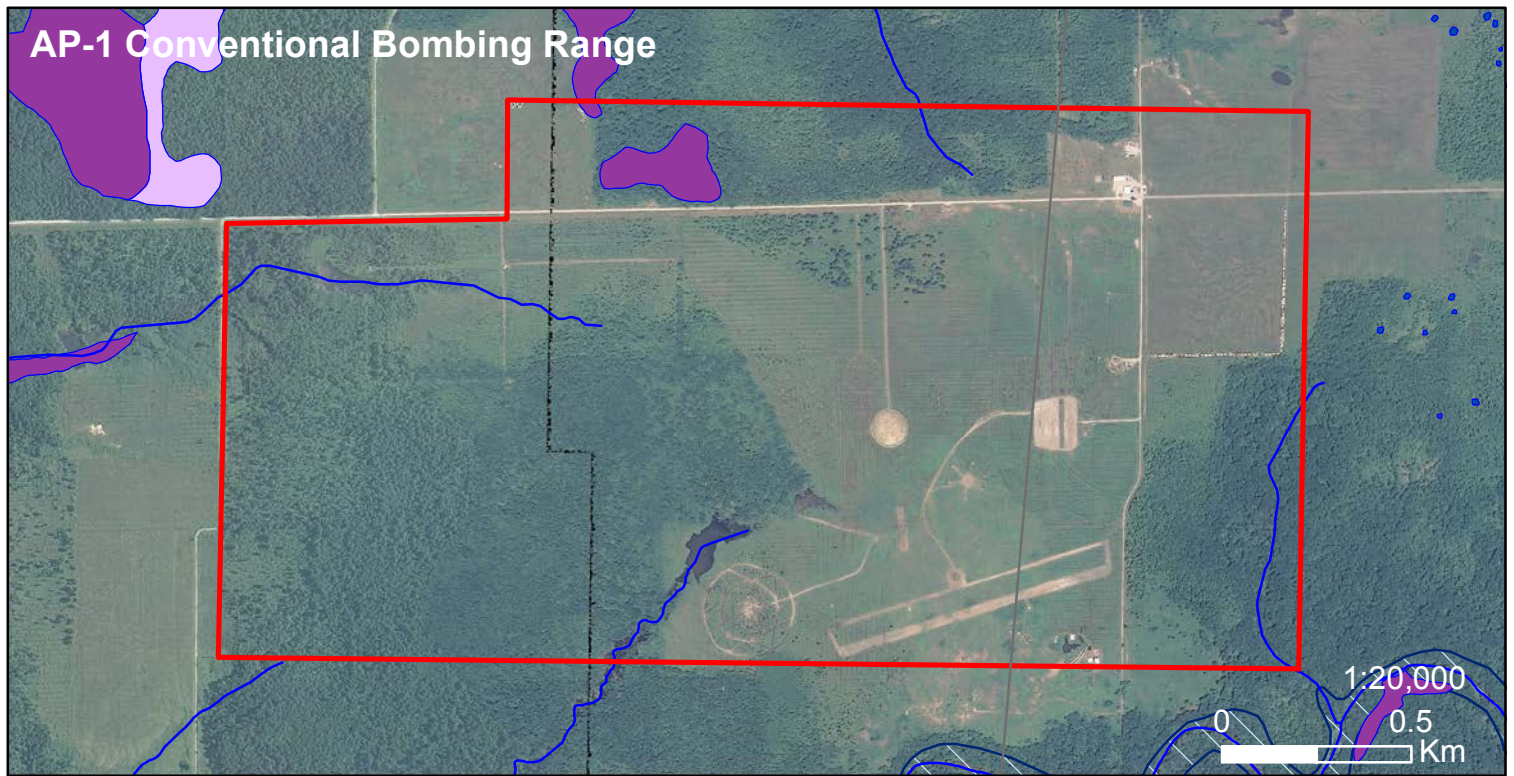


Map 10  
WATER RESOURCES:  
WETLANDS & FLOODPLAINS




Integrated Natural Resources  
Management Plan  
Jefferson Range

Date: 10/17/2011








#### Map Features

-  Streams & Lakes
-  Floodplains
-  Waterbodies

#### NWI Type

-  Palustrine Dec. Forest, Temporarily Flooded
-  Palustrine Dec. Forest, Temp. Flooded, Partially Drained
-  Palustrine Dec. Scrub-Shrub, Temp. Flooded, Partially Drained

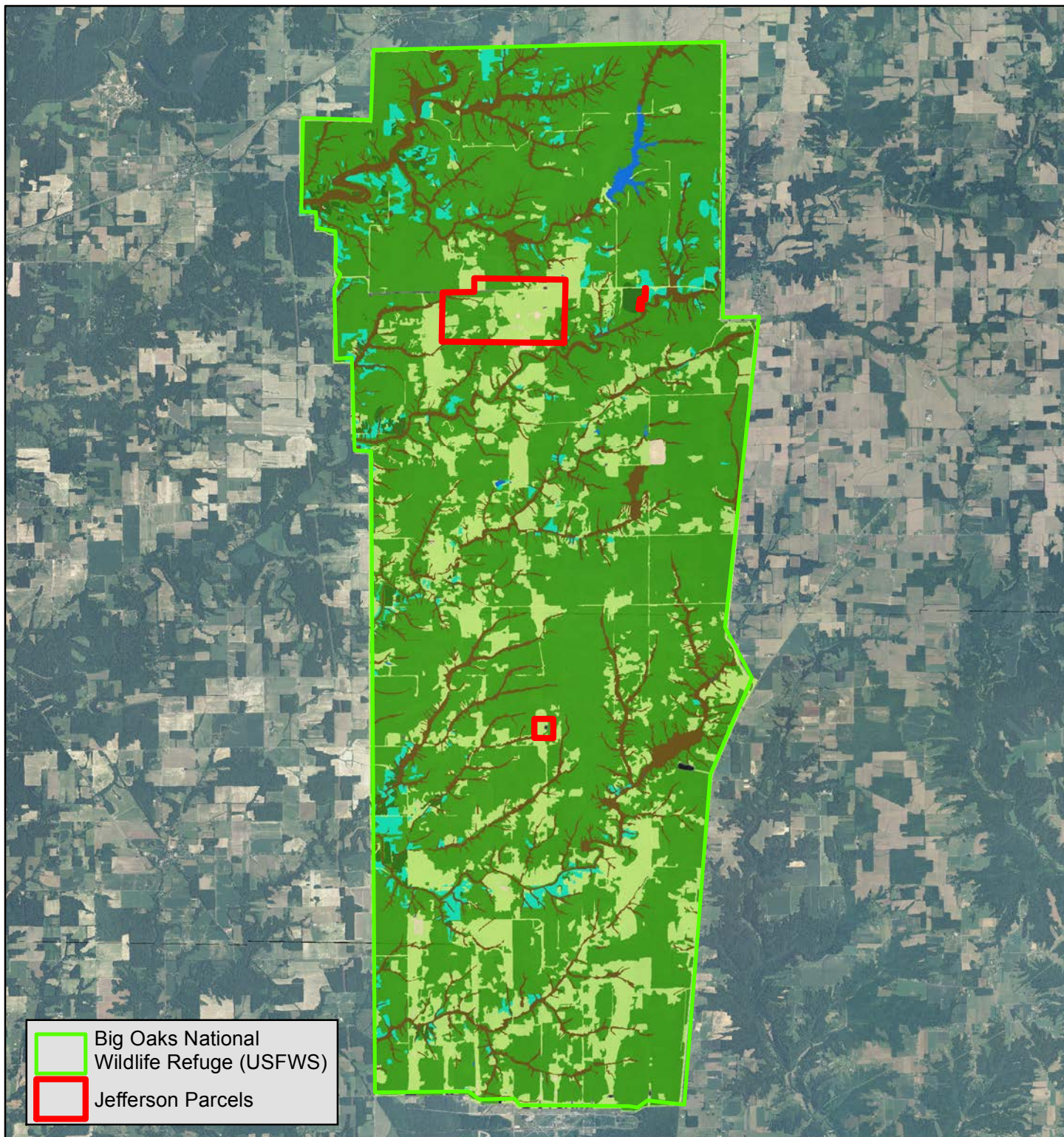


#### Map 11 WATER RESOURCES

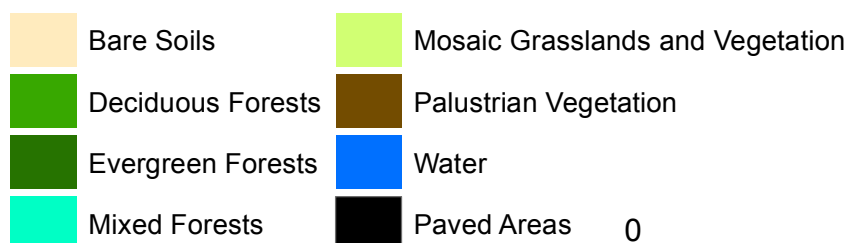
Integrated Natural Resources  
Management Plan  
Jefferson Range

Date: 10/17/2011





## Map Features



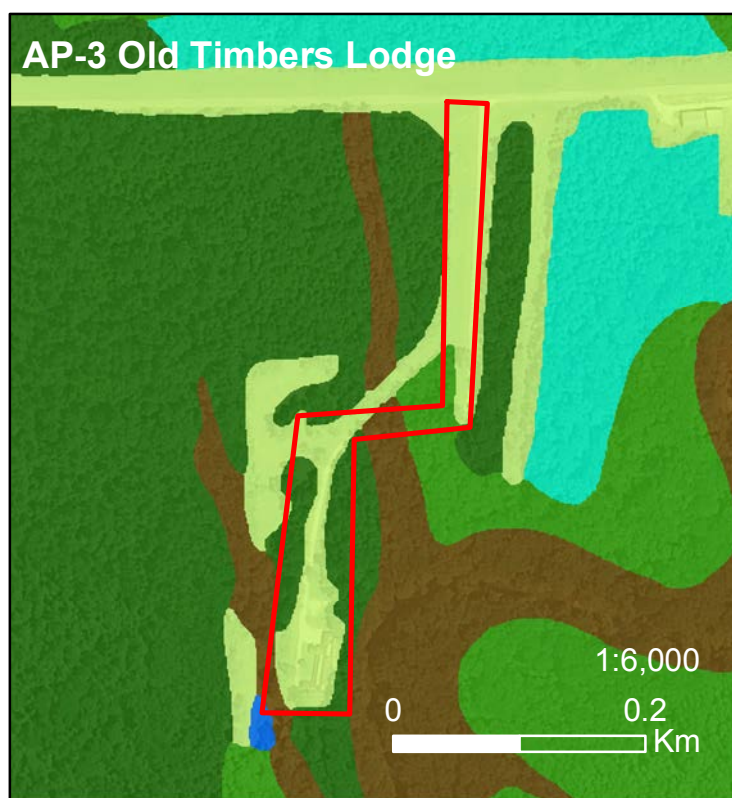
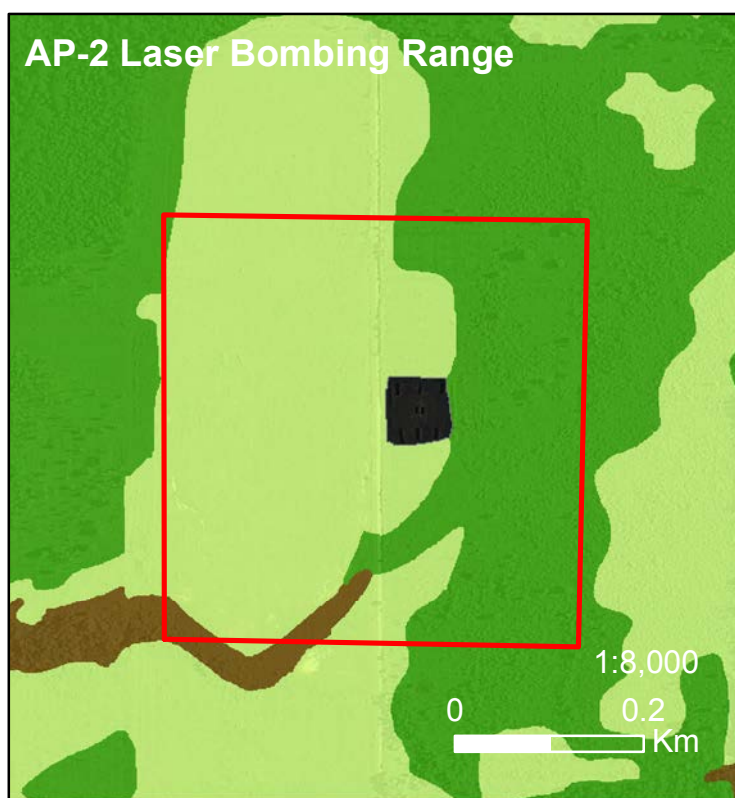
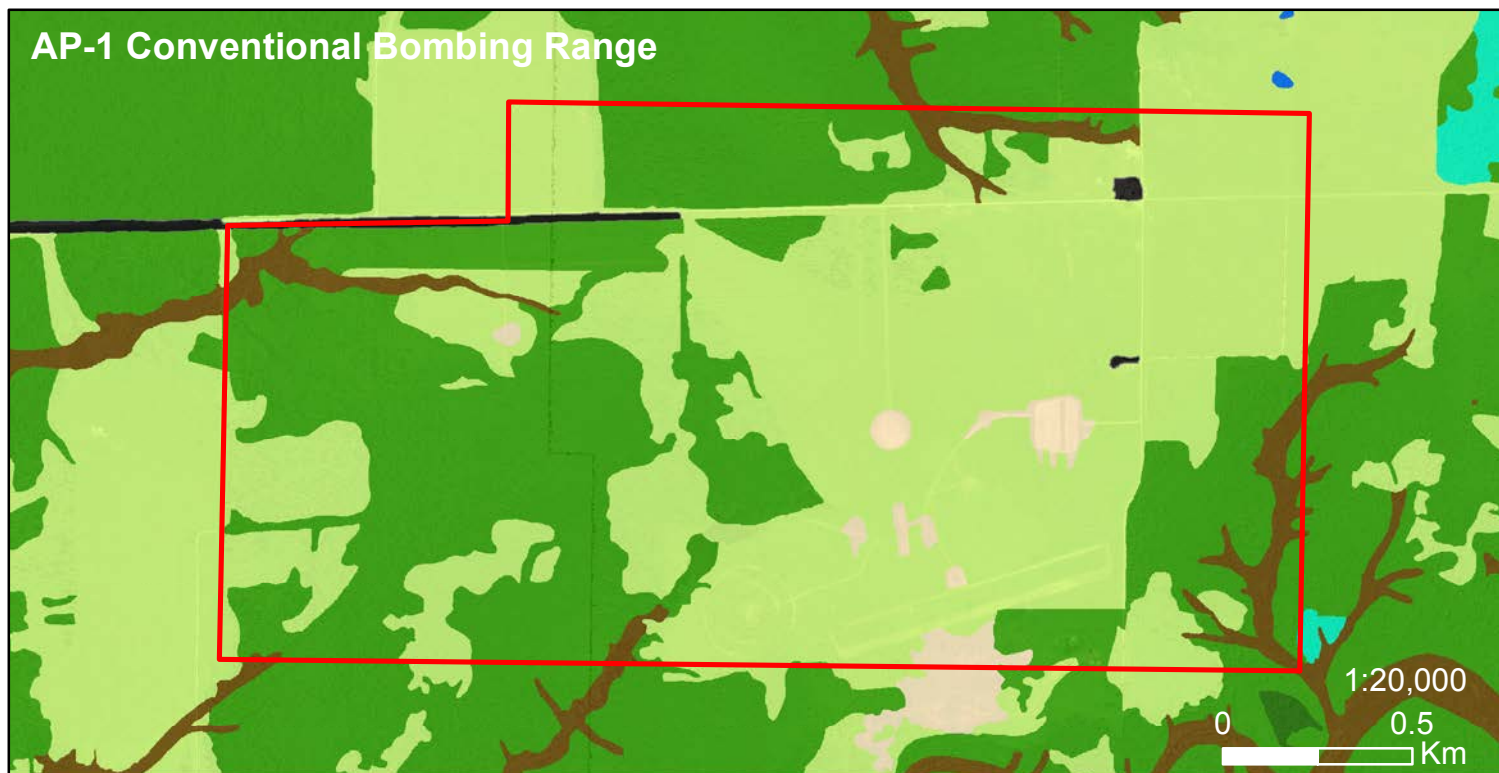
0 5 Km

## Map 12 GENERALIZED VEGETATION COMMUNITIES

Integrated Natural Resources  
Management Plan  
Jefferson Range

Date: 10/17/2011





## Map Features

### Generalized Vegetation Type

|   |                   |   |                                  |
|---|-------------------|---|----------------------------------|
|  | Bare Soils        |  | Mosaic Grasslands and Vegetation |
|  | Deciduous Forests |  | Palustrian Vegetation            |
|  | Evergreen Forests |  | Water                            |
|  | Mixed Forests     |  | Paved Areas                      |

 Jefferson Range Parcels

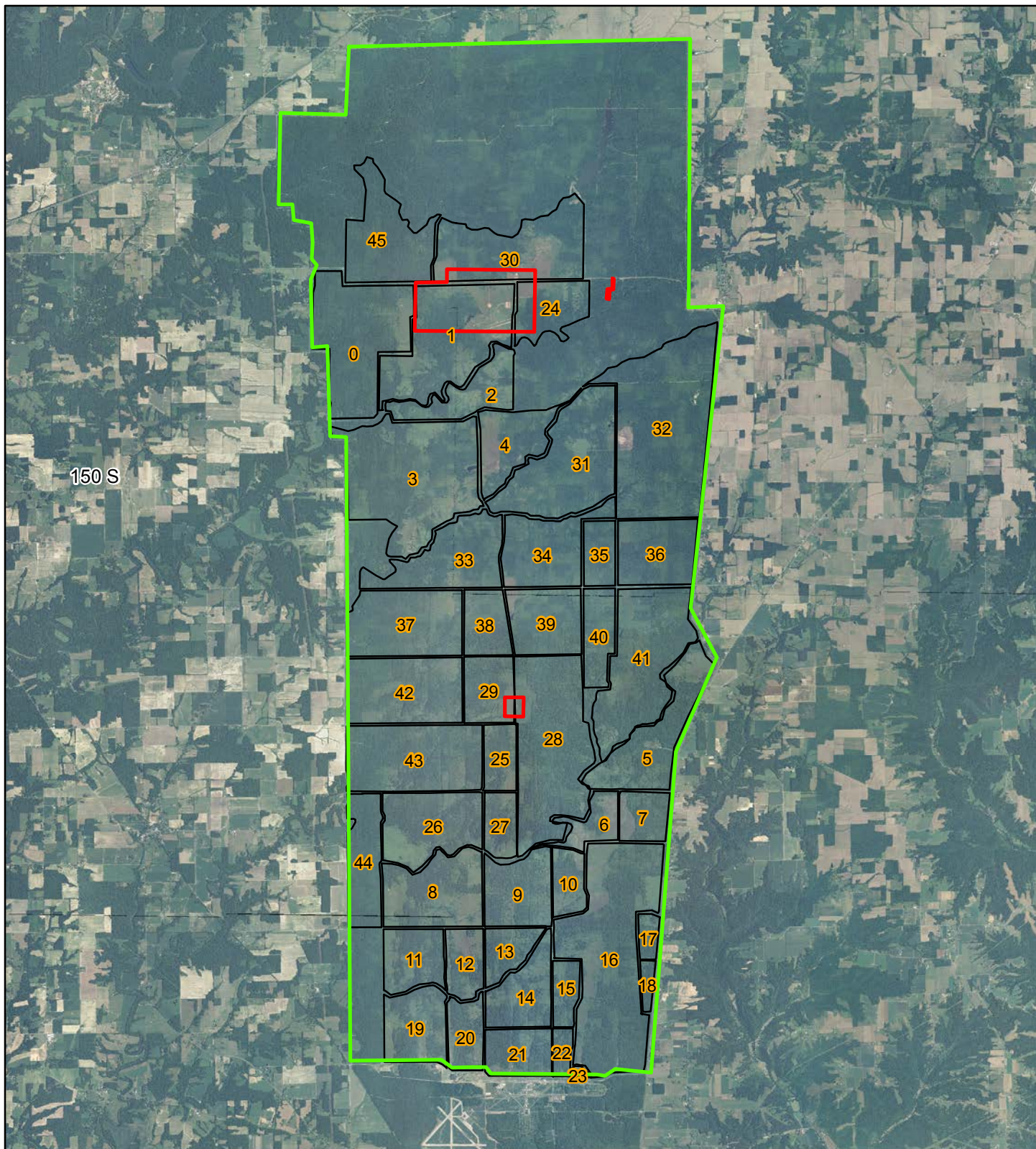


Map 13  
VEGETATION TYPES

Integrated Natural Resources  
Management Plan  
Jefferson Range

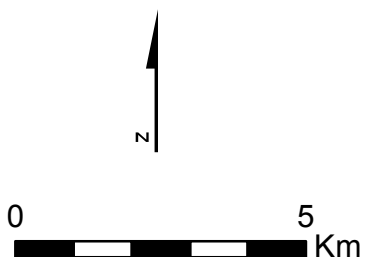
Date: 10/17/2011





## Map Features

- Big Oaks National Wildlife Refuge (USFWS)
- Jefferson Range Parcels
- Burn Units Boundaries

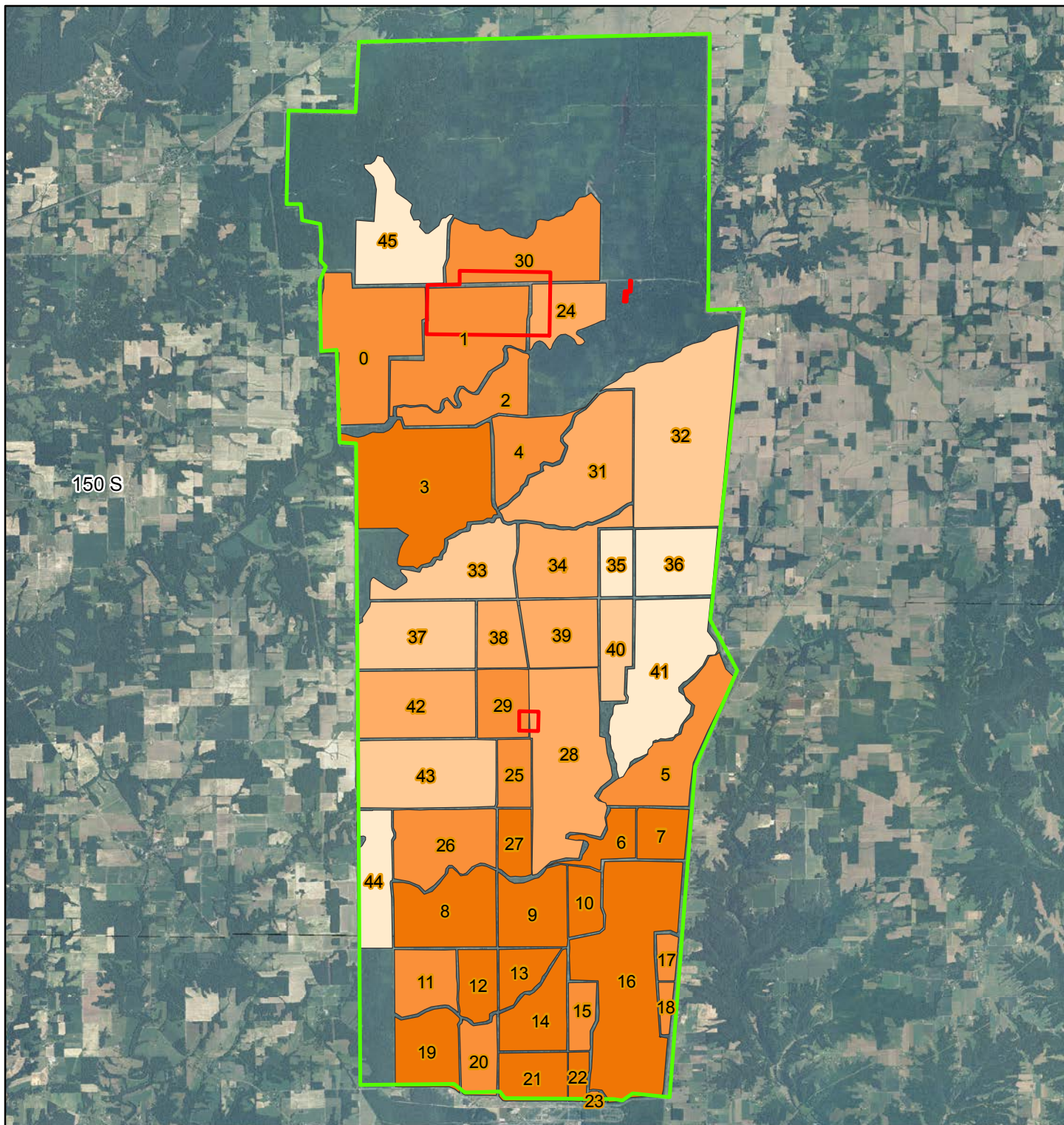


## Map 14 BURN UNITS

Integrated Natural Resources  
Management Plan  
Jefferson Range

Date: 10/17/2011





## Map Features

### Number of Burns

0

1

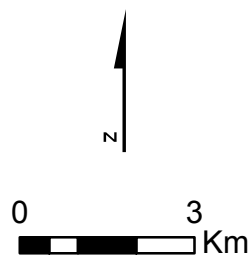
2 - 3

4 - 5

6 - 8

Big Oaks National  
Wildlife Refuge (USFWS)

Jefferson Range Parcels



Fire history indicates number of burns within each burn unit between 1997 and 2010.

## Map 15 FIRE HISTORY

Integrated Natural Resources  
Management Plan  
Jefferson Range

Date: 10/17/2011

## APPENDIX D: ENVIRONMENTAL SUMMARY

### D.1 Physical Environment

#### D.1.1 Climate

Jefferson Range lies within the hot continental division of humid temperate domain (Bailey 1995) and is characterized by hot summers and cool winters. Within Ripley County relative humidity averages approximately 60% in the mid-afternoon with humidity being the highest in the evenings and averaging 80% at dawn. Winds are generally from the southwest with the highest average wind speed, 11 miles per hour, occurring in the spring (McWilliams 1985).

Average rainfall and temperatures for North Vernon, Indiana, which is located approximately 8 miles from the Jefferson Range, are provided in **Table D-1**. The warmest month has been July with an average maximum temperature of 86 degrees Fahrenheit (°F), while the month of January has been the coldest with an average minimum temperature of 22°F. The annual precipitation is approximately 44.5 inches, ranging from 2.7 to 4.7 inches per month, and is distributed fairly evenly throughout the year, which includes approximately 16.7 inches of snow per year (November through March) (Indiana State Climatology Office [ISCO] 2011).

| <b>Table D-1. Average Precipitation and Temperatures for North Vernon, Indiana (1971-2000)</b>         |                                  |                                 |                |             |
|--|----------------------------------|---------------------------------|----------------|-------------|
| <b>Month</b>   | <b>Average Rainfall (inches)</b> | <b>Average Temperature (°F)</b> |                |             |
|  |                                  | <b>Minimum</b>                  | <b>Maximum</b> | <b>Mean</b> |
| January  | 2.97                             | 21.6                            | 38.5           | 30.1        |
| February   | 2.71                             | 25.4                            | 44.6           | 35.0        |
| March  | 3.76                             | 34.1                            | 55.0           | 44.6        |
| April  | 4.37                             | 42.6                            | 65.7           | 54.2        |
| May  | 4.72                             | 52.3                            | 75.0           | 63.7        |
| June   | 3.82                             | 61.1                            | 82.7           | 71.9        |
| July   | 4.42                             | 65.0                            | 86.0           | 75.5        |
| August   | 4.42                             | 63.0                            | 84.1           | 73.6        |
| September  | 2.89                             | 55.7                            | 78.4           | 67.1        |
| October  | 3.19                             | 44.3                            | 67.4           | 55.9        |
| November   | 3.83                             | 36.1                            | 54.4           | 45.3        |
| December   | 3.40                             | 26.8                            | 43.0           | 34.9        |
| <b>Total/Avg</b>   | <b>44.5</b>                      | <b>44.0</b>                     | <b>64.6</b>    | <b>54.3</b> |
| Source: ISCO 2011 *North Vernon, IN is located approximately 8 miles west-northwest of Jefferson Range |                                  |                                 |                |             |

### **D.1.2 Topography**

Indiana has been shaped by two physiographic provinces, the Central Lowland and the Interior Low Plateau; both regions form part of a larger natural Division, the Interior Plains. The Interior Plains consist of a plateau area bounded on the east by the Appalachian Highlands, on the south and west by the overlapping edge of the Cretaceous coastal (Atlantic) Plain Sediments, and on the north by the overlapping southern edge of the glacial drift (Laurentian Upland) (Gray 2000).

Jefferson Range is within the Interior Low Plateau physiographic province, which consists of a plateau area bounded on the east by the Appalachian plateaus, on the south and west by the overlapping edge of the Cretaceous coastal plain sediments, and on the north by the overlapping southern edge of the glacial drift (Flint 1928). The Interior Low Plateau is characterized by un-glaciated hills, subjected to erosion, and characterized by sharp ridges, deep gorges and waterfalls. There are also numerous caves and sinkholes. Jefferson Range lies specifically within the Southern Hills and Lowlands Region of Indiana and the Muscatatuck Plateau Physiographic Division in Indiana (Gray 2001).

In general, the area around the range is a gentle rolling plain and exhibits limited topographic relief and topographic features. The northern range parcel is fairly flat with the exception of the far southeastern corner along the unnamed tributary to Graham Creek; elevations range from approximately 240 to 270 meters above mean sea level (**Map 8**). The small southern range parcel is also fairly flat with elevations ranging from 262 to 270 meters above mean sea level. The Old Timbers Lodge parcel has elevations that range from 265 to 271 above mean sea level.

### **D.1.3 Geology and Soils**

Jefferson Range lies on the western limb of the Cincinnati Arch, a plunging anticline, and is underlain by deposits of wind-blown non-stratified silts and clays and glacial till of Illinoian and Wisconsin Age (United States [US] Army 1995). Surficial deposits mapped within Ripley County include till of Illinoian age from ground-moraine deposits, till of late Wisconsin and Holocene age from end moraine deposits, colluvium of Holocene and late and middle Pleistocene originating from carbonate-boulder or carbonate-clast colluviums and channel and flood-plain alluvium of Holocene and late Wisconsin age from channel and flood plain alluvium (National Atlas 2011). The thickness of unconsolidated sediments overlying bedrock in Ripley County is quite variable, ranging from typically less than 30 feet in the south to in excess of 110 feet in the northeast (Schrader 2004).

The unconsolidated aquifer system, Dissected Till and Residuum Aquifer System, predominantly consists of thin, eroded bedrock residuum and pre-Wisconsin tills as well as relatively thin deposits of alluvium and colluviums in many stream valleys. In Ripley County, rock types exposed at the bedrock surface are typically poorly producing limestones and dolomites with varying amounts of interbedded shales to poorly

producing shales with limestone interbeds. Bedrock aquifers are only minor groundwater sources of groundwater in this county. Two bedrock aquifer systems are mapped in Ripley County: Silurian and Devonian Carbonates and Ordovician-Maquoketa Group.

Big Oaks National Wildlife Refuge (NWR) and Jefferson Range are located within one of the two known karst areas in Indiana. Two karst studies have been conducted at the former Jefferson Proving Ground and/or within the region of the Jefferson Range. The first karst study, Jefferson Proving Ground Karst Study, Jefferson Proving Ground, Madison, Indiana, surveyed six creeks and reported 32 caves with 52 entrances (Sheldon 1998). Encountered wildlife (above and below ground), homestead foundations and arched limestone bridges were also reported. An additional survey focused on cave animals on Big Oaks NWR, The Subterranean Fauna of the Big Oaks National Wildlife Refuge, was completed in 2002 that included surveys within the caves identified in 1998 (Lewis and Rafail 2002). None of the caves previously studied are known to occur within the Jefferson Range. However, 7 of the 32 caves were found along Graham Creek (Sheldon 1998), which lies south of the primary range parcel and adjacent to Old Timbers Lodge.

There are no saleable or leasable mineral resources documented in the area of the Jefferson Range. However there are several crushed stone operations and facilities within Ripley County and near the immediate vicinity of the Jefferson Range.

The US Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) has mapped and classified the soils of Ripley County, Indiana (NRCS 2011a). Approximately 87 percent of Jefferson Range soils are characterized as Avonburg and Cobbersfork silt loams. Cobbersfork silt loams are identified as hydric soils in Ripley County (NRCS 2011b). Both of these soils are erodible and care should be taken when disturbing them. The remaining 13 percent of Jefferson Range soils are comprised of Cincinnati, Grayford, Holton, Rossmoy, Ryker and Wakeland silt loams and Eden-rock outcrop complex. Soils types are illustrated on **Map 9** and described in **Table D-2**.

Table D-2. Major Soil Type Descriptions for Jefferson Range

| Map Unit Name                    | Map Symbol   | Site Cover (acres) | Slope (%) | Description  |
|----------------------------------|--------------|--------------------|-----------|--|
| <b>Avonburg</b> silt loam        | AvA<br>AvB2  | 203.7              | 0 to 2    | Eroded. Till plain landform with typical profile of 0 to 21 inches silt loam, 21 to 37 inches silty clay loam, 37 to 83 inches silt loam, 83 to 90 inches clay loam. Fluctuating water table of 6 to 24 inches. Permeability is low to moderately high. Poorly drained soil with a moderate available water capacity (about 9.0 inches). Vegetative classification is woody; trees/timber.   |
| <b>Cincinnati</b> silt loam      | CcB2<br>CcC3 | 47.5               | 2 to 6    | Eroded to severely eroded. Moderately well drained till plain silt loam or deeper (72 to 80 inches) clay loam with a low water capacity (about 5.9 inches). Water table depth approximately 20 to 36 inches. Low to moderately high permeable soil characteristic of wooded areas.   |
| <b>Cobbsfork</b> silt loam       | Cm           | 698.1              | 0 to 1    | Silt loam (0 to 85 inches) or deeper (85 to 90 inches) clay loam from flats on till plains. Poorly drained silt loam with a high water capacity (about 9.6 inches). Low to moderately low permeable soil with frequent ponding. Vegetative classification is woody; trees/timber.  |
| <b>Eden-rock</b> outcrop complex | ErF          | 1.4                | 25 to 50  | Profile: 0 to 5 inches silt loam, 5 to 12 inches silty clay loam, 12 to 34 inches clay, and 34 to 60 inches unweathered bedrock. Parent material to this complex is clayey residuum over Ordovician limestone and shale. Well drained soil with moderately low to moderately high permeability. Low (about 4.6 inches) available water capacity and characteristic of wooded areas.  |
| <b>Grayford</b> silty clay loam  | GrD2<br>GrE  | 33.2               | 12 to 35  | Eroded. Till plain landform with typical profile of 0 to 20 inches silty clay loam, 20 to 51 inches clay loam, and 51 to 80 inches clay. Well drained soil with moderately high to high permeability. High available water capacity (about 9.6 inches). Vegetative classification is woody; trees/timber.  |
| <b>Holton</b> silt loam          | Hn           | 1.4                | NA        | Frequently flooded. Flood plain landform with typical profile of 0 to 14 inches silt loam, 14 to 41 inches fine sandy loam and 41 to 60 inches stratified fine sandy loam to loam to loamy sand to sandy clay loam. Poorly drained soil with moderately high to high permeability. Fluctuating water table of 6 to 24 inches with high (about 11.0 inches available water capacity). Vegetative classification is woody; trees/timber. |
| <b>Rossmoyne</b> silt loam       | RoB2         | 48.2               | 2 to 6    | Eroded. Till plain soils with a profile that consists of silt loam, silty clay loam and clay loam. Moderately well drained soil with low to moderately low permeability and moderate available water capacity. Vegetative classification is woody; trees/timber.   |
| <b>Ryker</b> silt loam           | RyC2         | 2.9                | 6 to 12   | Well drained silt loam, silty clay loam, silty clay till plain profile. Permeability is moderately high to high with a high (about 10.1 inches) available water capacity.  |
| <b>Wakeland</b> silt loam        | Wa           | 0.1                | NA        | Frequently flooded, floodplain landform comprised of silt loam or stratified silt loam to loam. Poorly drained soil with fluctuating water table of 6 to 24 inches. Moderately high to high permeability with very high (about 12.9 inches) available water capacity. Vegetative classification is woody; trees/timber.  |
| Source: NRCS 2011a               |              |                    |           |  |

### **D.1.4 Water Resources**

Water resources encompass both surface and groundwater. Surface water resources include lakes, rivers and streams, and are important for a variety of reasons including ecological, economic, recreational and human health. Groundwater comprises subsurface water resources and is an essential resource in many areas because it is used as a source of potable water, for agricultural irrigation, and for industrial purposes. Groundwater properties are often described in terms of depth to aquifer, aquifer or well capacity, water quality and the surrounding geology.

Ripley County has a relatively low risk of droughts and floods. Mild droughts occasionally occur in the summer due to elevated evaporation and increased dependence on rainfall for crop irrigation. Floods occur in some part of the state nearly every year and have occurred in every month of the year. The months of greatest flood frequency are from December through April. The primary cause of floods is prolonged periods of heavy rains, although rain falling on snow and frozen ground is a contributing factor (ISCO 2011).

#### **D.1.4.1 Groundwater Resources**

The unconsolidated aquifer systems in Ripley County comprise sediments that were primarily deposited by (or resulted from) glaciers and their meltwaters, or are thin, eroded residuum. The Dissected Till and Residuum Aquifer System, which covers about 95 percent of Ripley County, has the most limited groundwater resources of the unconsolidated aquifer systems in the county. Total thickness of this system in the county typically ranges from about 10 to 50 feet (Schrader 2004a). There is little potential for water production in the Dissected Till and Residuum Aquifer System in Ripley County. However, this aquifer system is commonly chosen for well development rather than the underlying bedrock. Static water levels are typically between 14 and 26 feet below ground surface (ft bgs) and yield only 0.5 to 3 gallons per minute (gpm); generally for livestock and domestic use. The Dissected Till and Residuum Aquifer System is transected by the Muscatatuck Plateau Till / Dearborn Upland Till Aquifer Subsystem. The boundaries between these systems are transitional in many areas of the county (Schrader 2004a).

Two bedrock aquifer systems are mapped in Ripley County: Silurian and Devonian Carbonates and Ordovician-Maquoketa Group. The Silurian and early Devonian age carbonate aquifer system also includes the overlying middle Devonian age Muscatatuck Group, composed mostly of limestone and dolomite with some interbedded shale units. The outcrop/subcrop area of the Silurian and Devonian carbonates covers roughly the western half of the county, but are absent where larger streams have cut down to expose the underlying Maquoketa Group. In Ripley County the thickness of the Silurian and Devonian Carbonates Aquifer System is less than 100 feet, with depth to bedrock surface generally less than 50 feet. Some wells installed in the Carbonate System produce over 5 gpm, with the majority reported to be dry or pumped dry. Most bedrock wells within the outcrop/subcrop are extended into the deeper carbonates of the underlying Maquoketa Group (Schrader 2004b).



The Maquoketa Group in Ripley County covers much of the eastern half of the county and many bedrock valleys in the western part of the county. The Maquoketa Group consists in ascending order the Kope, Dillsboro, and Whitewater Formations. It unconformably overlies the Trenton Limestone and Lexington Limestone in the northwestern and southeastern part of the county, respectively. The Maquoketa Group consists mostly of shales with interbedded limestone units. Although this system is approximately 880 to 900 feet thick in the county, the Maquoketa Group is considered a minor groundwater source in the county. Most wells for homes, irrigation, and stock produce between 1 and 5 gpm. Localized yields may exceed 20 gpm; however, (pumped) dry holes are quite common (Schrader 2004b).

#### **D.1.4.2 Surface Water**

Jefferson Range is in the Muscatatuck watershed (Hydrologic Unit Code [HUC] 05120207), within the Patoka-White River Basin in the Wabash River Subregion of the Ohio River Region. The primary range parcel is split between two watersheds. The northeast corner drains into Otter Creek (HUC 0512020707), while the remainder drains into Graham Creek (HUC 0512020703). Old Timbers Lodge is located on and also drains into Graham Creek. The southern range parcel drains into Marble Creek and then into Big Creek (HUC 0512020701) (see **Map 10**).

In general, surface water flows northeast to southwest on Jefferson Range with Otter, Graham and Big Creeks all merging into the Muscatatuck River west of Big Oaks NWR. There are a limited number of defined channel drainages on any of the Jefferson Range parcels, although Old Timbers Lodge does border Graham Creek. The drainages present on Jefferson Range parcels include five headwater streams (see **Map 11**).

There appears to be one pond on the main parcel based on the aerial imagery but there has been no groundtruthing to confirm. Otherwise, there are no known ponds or other open water on any of the range parcels. There is a small dammed pond adjacent to the Old Timbers Lodge. In general, the density of known open water on former Jefferson Proving Ground (JPG) is relatively low compared to surrounding areas, likely due to inability to groundtruth as a result of unexploded ordinance (UXO) and depleted uranium (DU) contamination.

#### **D.1.4.3 Floodplains**

Floodplains generally are areas of low, level ground present on one or both sides of a stream channel that are subject to either periodic or infrequent inundation by flood waters. Floodplains are typically the result of lateral erosion and deposition that occurs as a river valley is widened. The porous material that composes the floodplain is conducive to retaining water that enters the soil via flooding events and elevated groundwater tables. Inundation dangers associated with floodplains have prompted federal, state, and local legislation limiting the development in these areas to recreation, agriculture, and preservation activities. Floodplains are regulated by the Federal Emergency Management Agency (FEMA) with standards outlined in 44 Code of Federal Regulation (CFR) Part 60.3. Executive Order (EO) 11988 (Floodplain Management)



requires agencies to assess the effects that their actions may have on floodplains and to consider alternatives to avoid adverse effects and incompatible development on floodplains.

While FEMA has identified 100-year and 500-year floodplains on Big Oaks NWR, none of them are located on Jefferson Range parcels (Flood Insurance Rate Maps [FIRM] 1802210003B and 1802210005B, 1802210004B, 1802210006B, Unmapped\_180392 effective 4 April 1983). Old Timbers Lodge is located just outside the floodplain on a ledge above Graham Creek and is not within the floodplain (see **Map 11**). All the floodplains are associated with the larger creeks: Little Otter, Otter, Little Graham, Graham and Big Creeks (see **Map 10**).

#### **D.1.4.4 Wetlands**

EO 11990 (Protection of Wetlands) requires Federal agencies to take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the beneficial values of wetlands. Wetlands are an important natural system because of the diverse biological and hydrologic functions they perform. These functions may include water quality improvement, groundwater recharge, pollution treatment, nutrient cycling, the provision of wildlife habitat and niches for unique flora and fauna, storm water storage and erosion protection. The United States Army Corps of Engineers (USACE) defines wetlands as

“those areas that are inundated or saturated with ground or surface water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted to life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas (33 CFR 328).”

Wetlands are protected as a subset of the “waters of the United States” under Section 404 of the Clean Water Act (CWA). Jurisdictional waters of the United States are areas regulated under the CWA and may also include coastal and inland waters, lakes, rivers, ponds, streams, intermittent streams, vernal pools, and other waters, that if degraded or destroyed could affect interstate commerce. For an area to be classified as a jurisdictional wetland, three conditions must be present: (1) wetland hydrology; (2) hydric soil; and (3) hydrophytic vegetation. Areas that may be periodically wet, but that do not meet the requisite criteria, are not classified as “jurisdictional” wetlands.

Section 404 of the CWA authorizes the USACE to issue permits for the discharge of dredged or fill into the “waters of the United States,” including wetlands. Section 401 of the CWA gives the State of Indiana the authority to regulate, through the State water quality certification program, proposed federally-permitted activities that may result in a discharge to water bodies, including wetlands. To prevent the loss of non-jurisdictional wetlands, Indiana passed the Isolated Wetlands Law (Indiana Code [IC] 13-18-22). This law gives the Indiana Department of Environmental Management (IDEM) the authority

to issue isolated wetlands permits. Further discussion on regulatory authority and protection of wetlands is included in **Section 4.4.1** of the INRMP.

There have been no surveys to characterize wetlands at Jefferson Range due to the presence of UXO and resulting lack of ground disturbance. Based on the EIS for the former JPG and the National Wetland Inventory (NWI) data (US Army 1995), there are roughly 6,000 acres of wetlands on the former JPG. Based on NWI data, there are four wetlands on the primary range parcel and none on the southern range parcel or near Old Timbers Lodge (USFWS 2003). The southern range parcel is located in between two large wetland complexes and is located uphill from them. A summary of wetlands identified in the NWI data on Jefferson Range is presented in **Table D-3**. **Map 11** shows the location of these wetlands areas on Jefferson Range.

| Table D-3. Summary of National Wetlands Inventory Wetlands at Jefferson Range |   |         |               |
|---|---|---------|---------------|
| Cowardin Classification(s)  | Description   | Acreage | Parcel        |
| PFO1A   | Palustrine forested broad leaved deciduous temporarily flooded            | 9.30    | Primary Range |
| PFO1A   |   | 0.46    | Primary Range |
| PUBGH   | Palustrine unconsolidated bottom, intermittently exposed, diked/impounded | 0.12    | Primary Range |
| PUBGH   |   | 0.08    | Primary Range |
| Source: USFWS 2003, Cowardin 1979   |   |         |               |

## **D.2 Ecosystems & Biotic Environment**

### **D.2.1 Ecosystem Classification**

Jefferson Range is in the Eastern Broadleaf Forest (Continental) Province as described by Bailey (1995), which is equivalent to the Eastern Temperate Forest in the US Environmental Protection Agency (USEPA) Ecoregions (Level I, Woods et al. 1999). The Eastern Broadleaf Forest Province is dominated by broadleaf deciduous forest, in particular the drought-resistant oak-hickory association. This oak-hickory forest transitions to savanna with increasing prairie toward the western and southern portions of this province. There is typically a well developed understory with distinct shrub species. Glaciated areas of Ohio and Indiana feature a beech-maple forest defined by American beech (*Fagus grandifolia*) and sugar maple (*Acer saccharum*).

Following the USEPA ecoregion hierarchy, Jefferson Range is located within the Eastern Corn Belt Plains (Level III) within the Central US Plains (Level II, Woods et al. 1999). The Eastern Corn Belt Plains ecoregion is primarily a rolling till plain with local end moraines. Originally, natural tree cover was significant with beech forests common on Wisconsinian soils, while beech forests and elm-ash swamp forests dominated the wetter pre-Wisconsinian soils. The natural vegetation of the area consisted of diverse hardwood forests, predominantly American beech and sugar maple. A significant amount of white oak (*Quercus alba*), black oak (*Q. velutina*), northern red oak (*Q.*

*rubra*), yellow poplar (*Liriodendron tulipifera*), hickory (*Carya* spp.), white ash (*Fraxinus americana*), and black walnut (*Juglans nigra*) exists. Wet sites include white oak, pin oak (*Q. palustris*), northern red oak, yellow poplar, ash, and sweetgum (*Liquidambar styraciflua*) primarily, and shingle oak (*Q. imbricaria*), black oak, and hickory also occur. Silver maple (*A. saccharinum*), cottonwood (*Populus deltoides*), sycamore (*Platanus occidentalis*), pin oak (*Q. palustris*), elm (*Ulmus* spp.), and sweetgum grow along rivers and stream corridors. Today, extensive corn, soybean, and livestock production occurs (nearly 75% of land use in the ecoregion) and has affected vegetation cover and stream chemistry and turbidity.

Specifically Jefferson Range is located within the Pre-Wisconsinian Drift Plains ecoregion (Level IV, Woods et al. 1999). This ecoregion is differentiated from the surrounding ecoregions by its deeply-leached, acidic, pre-Wisconsinian till and thin loess; widespread areas of nearly flat, very poorly-drained soils with fragipans are also distinctive. Streams often have more sustained runoff and biotic diversity than those of neighboring ecoregions. Originally, beech forests and elm-ash swamp forests were dominant.

Within Indiana, Homoya et al. (1985) identified 12 natural regions. Jefferson Range is located within the Muscatatuck Flats and Canyons Section of the Bluegrass Natural Region (Hedge et al. 1993). The Bluegrass Natural Region is identified and named not for a predominance of bluegrass, but for similarities of the physiography and natural communities to the Bluegrass Region of Kentucky. Although the entire natural region has been covered by one or more of the pre-Wisconsin ice sheets, today much of it is mantled by only a relatively thin veneer of till. The northern boundary of the region approximates the southern terminus of Wisconsinian glaciation. This boundary marks the northern limit in this region for several southern plant species, as well as many herpetofaunal species. Most of the natural region was originally forested, although a few glade, cliff, and barrens remnants are known, as well as non-forested aquatic communities (from Hedge et al. 1993).

The Muscatatuck Flats and Canyons Section consists primarily of a broad, relatively flat west sloping plain with steep-walled canyons entrenched by major streams. The plain is characterized best by the presence of poorly drained, acidic Cobbsfork and Avonhurg silt loam soils and the occurrence of a southern flatwoods natural community type. These flatwoods typically have American beech, red maple (*A. rubrum*), sweetgum, pin oak, swamp chestnut oak (*Q. michauxii*), and yellow poplar. A few species are restricted geographically here, including fox grape (*Vitis labrusca*), blunt-lobed grape-fern (*Botrychium oneidense*), swamp dewberry (*Rubus hispidus*), dwarf ginseng (*Panax trifolium*) and false lily-of-the-valley (*Maianthemum canadense*). In canyons, cliffs and slopes of Silurian and Devonian limestone provide an environment quite unlike the flats. These sites are comparatively rich floristically, and have a predominantly mixed mesophytic forest composition. Canada violet (*Viola canadensis*), long-spurred violet (*V. rostrata*), and crinkleroot (*Dentaria diphylla*) are more common here than elsewhere in southern Indiana. American pennywort (*Hydrocotyle americana*), wideleaf ladies'-tresses (*Spiranthes lucida*), and *Carex pedunculata* are restricted geographically here.

Sullivantia (*Sullivantia sullivantii*) and golden St. John's wort (*Hypericum frondosum*) are known in Indiana only from canyons in this section. The dusky salamander (*Desmognathus fusca*) is a distinctive species of this section and Bluegrass Natural Region. Non-forested community types include small areas of limestone gravel wash and limestone glade, the latter harboring the only Indiana occurrence of Michaux leavenworthia (*Leavenworthia uniflora*). Minor areas of karst topography occur along valley borders. The major aquatic features include medium-gradient streams with beds of pavement-like limestone, such as Graham Creek, Big Creek, and the upper stretches of the Vernon Fork of the Muscatatuck River (from Hedge et al. 1993).

The forests and savannas that dominant this ecoregion generally benefit from the presence of wildland fire. The maintenance of savannas and prairie mosaics requires the regular presence of wildfires or prescribed fire. Therefore, a prescribed fire program is essential at Jefferson Range to maintain ecosystem health and prairie mosaics (see **Section 4.8**).

### D.2.2 Vegetation

Due to the restricted access, limited ground disturbance and regular wildland fire on Jefferson Range, large tracts of native vegetation and open grassland are present and provide habitat for both common and rare plant species. The Indiana Department of Natural Resources (IDNR) performed an inventory of special status plants and natural areas at various locations throughout the former JPG in both 1992 and 1999 (Hedge et al. 1993, Hedge et al. 1999). For a list of rare plant species potentially occurring on Jefferson Range, refer to **Appendix F**. For a list of special status plant species with the potential to occur on Jefferson Range, refer to **Appendix E**.

A vegetation cover map was created for JPG based on aerial imagery (Mallarach and Schools 1998), which also encompassed Jefferson Range (**Map 12**). Based on the 1998 mapping, vegetation cover within JPG was comprised of approximately 54 percent forest, 17 percent grassland, 12 percent early successional habitat, 10 percent wetland, and 6 percent woodland, with the remaining 1 percent was comprised of open water, bare soils and paved areas. In comparison, Jefferson Range was comprised of 53 percent grassland, 19 percent forest, 13 percent early successional habitat, 4 percent wetland, and 4 percent woodland. The remaining 7 percent was characterized as open water, bare soils and paved areas. Vegetation cover on Jefferson Range has not changed dramatically since this analysis. There have been no vegetation community analysis conducted in compliance with the National Vegetation Classification System for either Jefferson Range or Big Oaks NWR. Vegetation communities found within Jefferson Range (see **Map 13**) are summarized in greater detail in **Table D-4** and below.

| Table D-4. Summary of Vegetation Communities and Other Land Cover within Jefferson Range |  |                                     |         |
|--|--|-------------------------------------|---------|
| Primary Land Cover   | Habitat Type   | % tree cover or non-vegetated areas | Acreage |
| Grasslands   | Grasslands   | NA                                  | 386.2   |
|  | Grasslands with Scattered Trees                              | <20                                 | 93.0    |
|  | Mosaic of grasslands with non-vegetated areas                | NI                                  | 0.1     |
|  |  | <25                                 | 58.0    |
|  |  | 25-50                               | 14.7    |
| Successional   | Deciduous Early Successional                                 | NI                                  | 68.3    |
|  |  | <50                                 | 3.5     |
|  |  | 50-90                               | 5.3     |
| Successional   | Deciduous Early Successional with Scattered Trees            | NI                                  | 31.4    |
|  | Mosaic Deciduous Successional and Woodlands                  | NI                                  | 9.0     |
|  | Mosaic Deciduous Successional and Deciduous Woodlands        | NI                                  | 19.9    |
| Woodlands  | Deciduous Woodland   | NI                                  | 17.3    |
|  |  | 20-40                               | 22.0    |
| Forest   | Deciduous Forest Undifferentiated                            | NI                                  | 0.9     |
|  | Immature Deciduous Forest                                    | NI                                  | 36.3    |
|  |  | 60-90                               | 61.0    |
|  |  | >90                                 | 38.9    |
|  | Mature Deciduous Forest                                      | NI                                  | 5.3     |
|  |  | 60-90                               | 4.5     |
|  |  | >90                                 | 51.1    |
|  | Evergreen Forest Undifferentiated                            | NI                                  | 1.5     |
|  | Mixed Forest Undifferentiated                                | NI                                  | 0.1     |
| Wetlands   | Palustrine Emergent (marshes, wet prairies)                  | NI                                  | 5.3     |
|  | Palustrine Deciduous Shrubland and Successional (river bars) | NI                                  | 1.4     |
|  | Palustrine Deciduous Woodlands                               | NI                                  | 7.0     |
|  | Palustrine Deciduous Forest (alluvial, swamps)               | NI                                  | 24.1    |

| Table D-4. Summary of Vegetation Communities and Other Land Cover within Jefferson Range  |  |                                     |         |
|---|--|-------------------------------------|---------|
| Primary Land Cover  | Habitat Type                                     | % tree cover or non-vegetated areas | Acreage |
|   | Palustrine Evergreen Forest (alluvial)           | NI                                  | 0.2     |
| Other   | Bare Soils (bomb craters, bulldozed areas, etc.) | NI                                  | 19.2    |
|   | Paved or Other Non-Vegetated Areas               | NI                                  | 7.1     |
|   | Palustrine with no vegetation; permanent pond    | NI                                  | 47.4    |
| NI – Not indicated in mapping data due not applicability or lack of stereoscopic coverage. Areas without stereoscopic coverage are less accurate, thus details such as % cover could not be identified. |  |                                     |         |
| Source: Mallarach and Schools 1998  |  |                                     |         |

**Grasslands** are the most abundant habitat on Jefferson Range with approximately 552 acres occurring in the three parcels. A large portion of the grassland habitat was previously former pastures or agricultural fields that have reverted back to more natural vegetation. Prescribed fire was used on this land by the U.S. Army to prevent wildfires from training activities, and most recently by Big Oaks NWR to maintain and enhance grassland bird habitat, which has prevented woody encroachment in these areas over the years. The dominant grassland species appears to be broomsedge (*Andropogon* sp.). In order to maintain open grassland habitat at Jefferson Range, prescribed burning or mowing/brush-hogging should be implemented to prevent woody encroachment (Hedge et al. 1999).

**Mosaic/early successional grasslands and woodlands** comprise approximately 177 acres throughout Jefferson Range and indicate habitat that is transitioning from grasslands to forest. This habitat type requires the most active management, primarily as a result of woody encroachment (e.g., sweetgum, black locust (*Robinia pseudoacacia*), and sumac [*Rhus* spp.]).



Figure D- 1. Grassland on southern range parcel.



Figure D- 2. Mosaic Grassland with Upland Forest in background on primary range parcel.



These early successional plant communities on Jefferson Range provide habitat for several rare plants and animals (see **Appendix E**). The use of prescribed fire to manage the invasion of woody plants in these successional areas is recommended (Hedge et al. 1999).

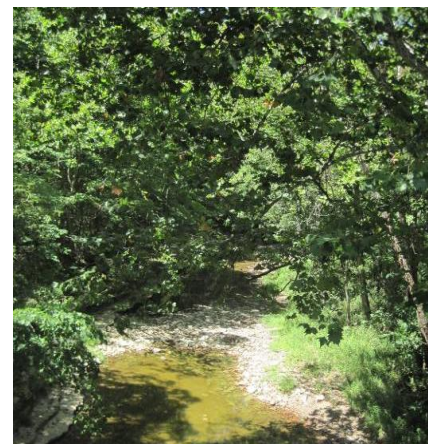
**Upland forests** are found within approximately 200 acres within Jefferson Range. The upland forest classification includes both evergreen and deciduous forest with individual trees ranging in age from young (~15-30 years) to mature (>50 years) (Winters and Robb 2006). However, less than 1 percent of Jefferson Range contains evergreen forest. The primary evergreen species is eastern red cedar (*Juniperus virginiana*). Dominant deciduous trees include sweetgum, red maple and black gum (*Nyssa sylvatica*) on poorly drained upland depression sites. Yellow poplar and white ash are the species making up a majority of the young upland forests on well drained sites. White oak, red oak and shagbark hickory (*Carya ovata*) are the dominant species on intermediate sites and within some mature upland forests. American beech and sugar maple dominate the remainder of the mature upland forests.



**Figure D- 3. Upland Forest on Big Oaks NWR.**

Most of the upland forests are mesic upland forests, but there are also areas of dry-mesic forest on some of the south-facing slopes (Hedge et al. 1993). Mesic upland forests in this section of the Bluegrass Natural Region typically have a mix of canopy dominants which characteristically include American beech, sugar maple, black maple (*A. nigrum*), tulip poplar, white ash, red oak, American basswood (*Tilia americana*), black walnut, and black cherry (*Prunus serotina*). There are many herbaceous species, particularly spring ephemerals. Dry-mesic upland forest is less common and occurs mainly on better drained upper slopes that have a south or west aspect. Oaks are more common on these sites, including chinquapin oak (*Quercus muhlenbergii*), white oak, and some black oak. Other dominants include shagbark hickory (*Carya ovata*), blue ash (*Fraxinus quadrangulata*), white ash, and hop hornbeam (*Ostrya virginiana*).

**Palustrine wetlands** occur on approximately 38 acres of Jefferson Range with nearly 82 percent being characterized as palustrine forested or woodland. The remaining wetland areas are characterized as palustrine emergent and scrub-shrub. Palustrine forests, or riparian forests, are less common on Jefferson Range due to the limited streams and narrowness of their valleys. Palustrine forests contain a slightly different mix of



**Figure D- 4. Riparian Forest on Big Oaks NWR.**

species and provide important habitat for a number of riparian-associated species. Most notably species more tolerant of wetness are also present in addition to the species typical of the upland forests. American sycamore, Eastern cottonwood, boxelder (*Acer negundo*), silver maple, red maple, bluebells (*Mertensia virginiana*), false mermaid weed (*Floerka proserpinacoides*), blue-eyed Mary's (*Collinsia verna*), and cutleaf coneflower (*Rhudebeckia laciniata*) are typical.

**Flatwoods**, a high quality natural community in Indiana, are found throughout the Big Oaks NWR land. Flatwoods are forested areas that form on level or nearly level soils that are poorly drained with a shallow perched water table; they are generally found in association with Cobbsfork and Avonburg soils. The flatwoods on Big Oaks NWR are the southern or bluegrass till plain natural community type and are characterized by having poorly drained acidic soils (Hedge et al. 1993). These areas are in various stages of succession, ranging from open flats to regrowth flatwoods. Disturbances from past agricultural uses, and more recently fire, are undoubtedly a factor in species density and diversity. Characteristic species in Bluegrass Till Plain Flatwoods are red maple, sweetgum, black gum, pin oak, American beech and yellow poplar. More mature flatwoods tended to have more of an oak component and included swamp white oak (*Quercus bicolor*) and swamp chestnut oak (*Q. michauxii*). Cleared open flats were characterized by spike-rush (*Eleocharis tenuis*), early goldenrod (*Solidago juncea*), beard-tongue (*Penstemon digitalis*), narrow-leaved mountain mint (*Pycnanthemum tenuifolium*), boneset (*Eupatorium perfoliatum*), hyssop-leaved boneset (*E. hyssopifolium*), and hardhack (*Spiraea tomentosa*). Hedge et al. (1999) recommended minimizing physical disturbance and fragmentation of flatwoods habitat, and suggested the use of prescribed fire to enhance ground cover diversity.

Vegetation mapping developed by Mallarch and Schools (1998) does not specifically identify flatwoods habitat; however it is known to occur along the northern perimeter of Jefferson Range. Flatwoods would be included in the upland forest and palustrine forest categories from Mallarach and Schools (1998).

### D.2.3 Fish and Wildlife

Big Oaks NWR provides large areas of unfragmented habitat, including wet woodlands, dry-upland forests, successional shrublands, and grasslands. Jefferson Range is situated directly in the center of the Big Oaks NWR and provides many of these same habitats. The diverse habitat types support a high level of biodiversity. **Sections 4.5 and 4.6** provide specific guidance on how to manage Jefferson Range wildlife habitat and how to ensure connectivity to the surrounding region.

Although numerous studies have occurred over the years in the former JPG property and subsequently Big Oaks NWR (see **Appendix G**), comprehensive surveys have not been conducted for all fauna. In addition, no fauna surveys have been conducted specifically for Jefferson Range. Based on previous survey data and observations over the years, Big Oaks NWR habitat is known to support a wide variety of wildlife species. Fauna observed previously are summarized below (USFWS 2011a, Pruitt et al. 1994).



- *Birds*: Over 220 bird species have been observed on the refuge. Of these bird species, approximately 120 of them have nested on-site and over 30 of them are known to occur year round. The Big Oaks NWR was named a globally important bird area by the American Bird Conservancy in 1998.
- *Herpetofauna*: Approximately 25 amphibians and 20 reptiles are known to occur on the refuge, including the state endangered northern crawfish frog and four-toed salamander.
- *Mammals*: Approximately 37 mammals are known to occur on the refuge. Of these mammal species, nine of them are bats, including the federally endangered Indiana bat. Only portions of the refuge have been surveyed for bats, and none of the surveys have included Jefferson Range. The state endangered river otter was released on Big Oaks NWR in 1998.
- *Fish*: Over 40 species have been observed in the lakes and streams on the former JPG. Periodic surveys are conducted Old Timber Lake is the only waterbody open for fishing at Big Oaks NWR by the public.
- *Mussels and Crustaceans*: Approximately nine mussels, including the state listed species of concern salamander mussel (*Simpsonaias ambigua*), and the federal species of concern rusty crayfish (*Orconectes rusticus*) are known to occur on the refuge.
- *Butterflies*: Approximately 60 butterfly species have been observed at Big Oaks NWR, which is known for its butterfly diversity in the State. Since 1999 the refuge has conducted an annual North American Butterfly Association count on 4 July, resulting in 40 or more species being collected regularly.

For a list of wildlife species documented on or with the potential to occur on Big Oaks NWR, refer to **Appendix F**. For a list of special status plant species with the potential to occur on Jefferson Range, refer to **Appendix E**.

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## APPENDIX E: ENDANGERED, THREATENED AND SPECIAL STATUS SPECIES SUMMARY

### E.1 Federally Listed Species

Federal status, as a threatened or endangered species, is derived from the Endangered Species Act (ESA) of 1973 (16 US Code [USC] 1531 *et seq.*) and is administered by the United States Fish and Wildlife Service (USFWS). Federally listed species with known occurrence in Ripley County, Indiana include the endangered Indiana bat (*Myotis sodalis*) and endangered running buffalo clover (*Trifolium stoloniferum*). Federally listed species with known occurrence for the two adjacent counties (Jefferson and Jennings) are similar. The Indiana bat has been captured throughout the Big Oaks National Wildlife Refuge (NWR) during previous mist netting efforts. The running buffalo clover has not been documented within the Big Oaks NWR or Jefferson Range to date (USFWS 2011b). No critical habitat exists on Jefferson Range.

In addition to listing under the ESA, the USFWS Region 3 has designated some species as Federal Species of Concern (FSC) because they are considered rare and declining and may be in need of concentrated conservation actions. An FSC designation does not provide legal protection and it does not mean that the species will eventually be proposed for listing as a threatened or endangered species. Ten bird species designated as FSC have been documented on Big Oaks NWR. **Table E-1** presents a list of federally listed species with known occurrence on Big Oaks NWR and in Ripley County, Indiana.

| <b>Table E-1. Potential Federally Listed Species on Jefferson Range</b><br>(known to occur in Big Oaks NWR and Ripley County, Indiana) |                               |                |              |   |
|--|-------------------------------|----------------|--------------|---|
| Common Name  | Scientific Name               | Federal Status | State Status | Habitat   |
| Indiana bat**  | <i>Myotis sodalis</i>         | E              | E            | Hibernation occurs in caves and mines; Summer roosting and foraging habitat occurs in wooded stream corridors and forests |
| Running buffalo clover   | <i>Trifolium stoloniferum</i> | E              | E            | Disturbed bottomland meadows; open woodlands  |
| American woodcock**  | <i>Scolopax minor</i>         | FSC            | -            | moist woodland, thickets  |
| Bobolink**   | <i>Dolichonyx oryzivorus</i>  | FSC            | -            | weedy meadows   |

**Table E-1. Potential Federally Listed Species on Jefferson Range**  
(known to occur in Big Oaks NWR and Ripley County, Indiana)

| Common Name           | Scientific Name              | Federal Status | State Status | Habitat                              |
|-----------------------|------------------------------|----------------|--------------|--------------------------------------|
| Cerulean warbler**    | <i>Dendroica cerulea</i>     | FSC            | E            | swamps, bottomlands, mixed woodlands |
| Dickcissel**          | <i>Spiza americana</i>       | FSC            | -            | weedy meadows, prairies              |
| Eastern meadowlark**  | <i>Sturnella magna</i>       | FSC            | -            | fields, meadows                      |
| Grasshopper sparrow** | <i>Ammodramus savannarum</i> | FSC            | -            | grasslands, old fields               |
| Henslow's sparrow**   | <i>Ammodramus henslowii</i>  | FSC            | E            | moist meadows and fields             |
| Loggerhead shrike**   | <i>Lanius ludovicianus</i>   | FSC            | SC           | open or brushy areas                 |
| Red-shouldered hawk** | <i>Buteo lineatus</i>        | FSC            | SC           | moist, mixed woodlands               |
| Sedge wren**          | <i>Cistothorus platensis</i> | FSC            | E            | moist meadows                        |

E = Endangered = Danger of extinction throughout range or within Indiana

FSC = Federal Species of Concern = Not a legal designation; species may need concentrated conservation actions.

SC= State Special Concern = Any animal species about which some problems of limited abundance or distribution in Indiana

\*\*Species has been documented at Big Oaks NWR

Source: USFWS 2011a, Indiana Department of Natural Resources (IDNR) 2011

## E.2 State Listed Species

Nongame and endangered animals in the State of Indiana are regulated under Indiana Code (IC) 14-22-34-1 *et seq.* Plants have no legal protection in Indiana unless they are listed under the ESA. Nongame species are defined as any wild mammal, bird, amphibian, reptile, fish, mollusk, crustacean, or other wild animal not otherwise legally classified by Indiana statute or rule. Endangered species are defined as any species or subspecies of wildlife whose prospects of survival or recruitment within Indiana are in jeopardy or are likely within the foreseeable future to become so due to any or all of the following factors: (1) destruction, drastic modification, or severe curtailment of the habitat; (2) overutilization for scientific, commercial, or sporting purposes; (3) effect on the wildlife of disease, pollution, or predation; and (4) other natural or manmade factors affecting the prospects of survival or recruitment within Indiana.

In addition to the federally endangered species and species of special concern discussed in **Section E.1**, approximately 162 rare state species are known to occur within Jefferson, Jennings and Ripley counties, including 5 amphibians, 2 arachnids, 2 beetles, 27 birds, 4 butterflies, 6 crustaceans, 1 dragonfly, 1 damselfly, 1 flatworm, 6 mammals, 2 millipedes, 9 mussels, 2 reptiles, 4 springtails, and 87 vascular plants. Of these species, 74 species are known to occur within the Big Oaks NWR and 64 species have the potential to occur on the Jefferson Range (IDNR 2011, USFWS 2011b). **Table E-2** presents a list of rare state listed species with the potential to occur on Big Oaks NWR and Jefferson Range.

**Table E-2. Rare State Listed Species with the Potential to Occur at Big Oaks NWR and Jefferson Range**

| Common Name             | Scientific Name                                   | State Status* | Known on Big Oaks NWR* | Potential on Jefferson Range | Habitat                                      |
|-------------------------|---|---------------|------------------------|------------------------------|--|
| <b>Amphibians</b>       |   |               |                        |                              |  |
| Eastern hellbender      | <i>Cryptobranchus alleganiensis alleganiensis</i> | E             |                        | Unlikely                     | streams, rivers                              |
| Eastern spadefoot       | <i>Scaphiopus holbrookii holbrookii</i>           | SC            |                        |                              | forest areas w/sandy soils                   |
| Four-toed salamander    | <i>Hemidactylium scutatum</i>                     | E             | ✓                      | Likely                       | Sphagnum areas and wet mossy forest wetlands |
| Common mudpuppy         | <i>Necturus maculosus</i>                         | SC            | ✓                      | Unlikely                     | river, streams, ponds                        |
| Northern crawfish frog  | <i>Rana areolata circulosa</i>                    | E             | ✓                      | Likely                       | crawfish holes                               |
| <b>Arachnids</b>        |   |               |                        |                              |  |
| Appalachian cave spider | <i>Porhomma cavernicola</i>                       | E             |                        | Unlikely                     | caves  |
| Pseudoscorpion          | <i>Chthonius virginicus</i>                       | E             |                        | Unlikely                     | caves  |
| <b>Beetles</b>          |   |               |                        |                              |  |
| Cave ground beetle      | <i>Pseudanophthalmus chthonius</i>                | R             |                        | Unlikely                     | caves  |
| NA                      | <i>Atheta troglaphila</i>                         | R             |                        | Unlikely                     | caves  |
| <b>Birds</b>            |   |               |                        |                              |  |
| American Bittern        | <i>Botaurus lentiginosus</i>                      | E             | ✓                      | Likely                       | marsh and wet meadows                        |
| Bachman's Sparrow       | <i>Aimophila aestivalis</i>                       | E             |                        | Unlikely                     | dry open woods                               |
| Bald Eagle              | <i>Haliaeetus leucocephalus</i>                   | E             | ✓ (M)                  | Likely                       | lacustrine, riverine, forests                |
| Barn Owl                | <i>Tyto alba</i>                                  | E             |                        | Likely                       | grasslands                                   |
| Black-and-White Warbler | <i>Mniotilta varia</i>                            | SC            | ✓ (B)                  | Likely                       | mixed mature woodlands                       |

**Table E-2. Rare State Listed Species with the Potential to Occur at Big Oaks NWR and Jefferson Range**

| Common Name               | Scientific Name               | State Status* | Known on Big Oaks NWR* | Potential on Jefferson Range | Habitat                              |
|---------------------------|-------------------------------|---------------|------------------------|------------------------------|--------------------------------------|
| Black-crowned Night-Heron | <i>Nycticorax nycticorax</i>  | E             | ✓ (M)                  |                              | moist woods, swamps                  |
| Broad-winged Hawk         | <i>Buteo platypterus</i>      | SC            | ✓ (M)                  | Likely                       | woodlands                            |
| Canada Warbler            | <i>Wilsonia canadensis</i>    | SC            | ✓ (M)                  | Likely                       | dense woodlands                      |
| Cerulean Warbler          | <i>Dendroica cerulea</i>      | E             | ✓ (B)                  | Likely                       | swamps, bottomlands, mixed woodlands |
| Golden-winged Warbler     | <i>Vermivora chrysoptera</i>  | E             | ✓ (M)                  | Likely                       | shrub/scrub                          |
| Great Blue Heron          | <i>Ardea herodias</i>         | SC            | ✓ (B)                  |                              | marshes, streams                     |
| Great Egret               | <i>Ardea alba</i>             | SC            | ✓ (M)                  |                              | marshes                              |
| Henslow's Sparrow         | <i>Ammodramus henslowii</i>   | E             | ✓ (B)                  | Likely                       | moist meadows and fields             |
| Hooded Warbler            | <i>Wilsonia citrina</i>       | SC            | ✓ (B)                  | Likely                       | moist mature woodlands               |
| King Rail                 | <i>Rallus elegans</i>         | E             |                        | Likely                       | swamps and marshes                   |
| Kirtland's Warbler        | <i>Dendroica kirtlandii</i>   | E             |                        |                              | open woodlands, shrub, thickets      |
| Least Bittern             | <i>Ixobrychus exilis</i>      | E             | ✓ (M)                  |                              | marshes, wet meadows                 |
| Marsh Wren                | <i>Cistothorus palustris</i>  | E             | ✓ (M)                  |                              | marshes and swamps                   |
| Northern Harrier          | <i>Circus cyaneus</i>         | E             | ✓ (YR)                 | Likely                       | wetlands and open fields             |
| Osprey                    | <i>Pandion haliaetus</i>      | E             | ✓ (M)                  |                              | riverine, lacustrine                 |
| Peregrine Falcon          | <i>Falco peregrinus</i>       | E             |                        |                              | palustrine, lacustrine, riverine     |
| Sandhill Crane            | <i>Grus canadensis</i>        | T             |                        |                              | marshes, grasslands                  |
| Sharp-shinned hawk        | <i>Accipiter striatus</i>     | SC            | ✓ (YR)                 | Likely                       | mixed woodlands                      |
| Short-eared Owl           | <i>Asio flammeus</i>          | E             | ✓ (M)                  | Likely                       | marshes, weedy fields                |
| Virginia Rail             | <i>Rallus limicola</i>        | SC            | ✓ (M)                  |                              | marshes, wetlands                    |
| Worm-eating warbler       | <i>Helmitheros vermivorus</i> | SC            | ✓ (B)                  |                              | mature forest                        |
| Yellow-crowned Night-     | <i>Nyctanassa violacea</i>    | E             |                        | Likely                       | moist woods, swamps                  |

**Table E-2. Rare State Listed Species with the Potential to Occur at Big Oaks NWR and Jefferson Range**

| Common Name                        | Scientific Name               | State Status* | Known on Big Oaks NWR* | Potential on Jefferson Range | Habitat                                      |
|------------------------------------|-------------------------------|---------------|------------------------|------------------------------|--|
| Heron                              |                               |               |                        |                              |  |
| <b>Butterflies</b>                 |                               |               |                        |                              |  |
| Dusted Skipper                     | <i>Atrytonopsis hianna</i>    | T             |                        | Likely                       | prairies, old fields                         |
| Mottled Duskywing                  | <i>Erynnis martialis</i>      | E             |                        | Likely                       | open brushy fields                           |
| Regal Fritillary                   | <i>Speyeria idalia</i>        | E             |                        | Likely                       | tall grass prairie                           |
| West Virginia white                | <i>Artogeia virginiensis</i>  | R             |                        | Likely                       | moist deciduous or mixed woodlands           |
| <b>Crustaceans</b>                 |                               |               |                        |                              |  |
| Anomalous Spring Amphipod          | <i>Crangonyx anomalus</i>     | T             |                        | Unlikely                     | caves  |
| Indiana Groundwater Copepod        | <i>Diacyclops indianensis</i> | E             |                        | Unlikely                     | caves  |
| Lewis' Groundwater Copepod         | <i>Diacyclops lewisi</i>      | E             |                        | Unlikely                     | caves  |
| Northeastern Cave Isopod           | <i>Caecidotea rotunda</i>     | R             |                        | Unlikely                     | caves  |
| Packard's Cave Amphipod            | <i>Crangonyx packardii</i>    | WL            |                        | Unlikely                     | caves  |
| Salisa's Groundwater Copepod       | <i>Diacyclops salisae</i>     | E             |                        | Unlikely                     | caves  |
| <b>Dragonflies and Damselflies</b> |                               |               |                        |                              |  |
| Dragonhunter                       | <i>Hagenius brevistylus</i>   | R             |                        |                              | bark and leaf litter at the edges of streams |
| Great spreadwing                   | <i>Archilestes grandis</i>    | R             |                        |                              | ponds, slow moving streams                   |
| <b>Flatworms</b>                   |                               |               |                        |                              |  |



**Table E-2. Rare State Listed Species with the Potential to Occur at Big Oaks NWR and Jefferson Range**

| Common Name                 | Scientific Name                  | State Status* | Known on Big Oaks NWR* | Potential on Jefferson Range | Habitat  |
|-----------------------------|----------------------------------|---------------|------------------------|------------------------------|--|
| Weingartner's cave flatworm | <i>Sphalloplana weingartneri</i> | WL            |                        | Unlikely                     | caves  |
| <b>Mammals</b>              |                                  |               |                        |                              |  |
| American badger             | <i>Taxidea taxus</i>             | SC            |                        |                              | does not hibernate but is inactive in the winter; dens in forests    |
| Bobcat                      | <i>Lynx rufus</i>                | SC            | ✓                      | Likely                       | mixed woodland   |
| Evening bat                 | <i>Nycticeius humeralis</i>      | E             |                        | Likely                       | forested areas   |
| Northern river otter        | <i>Lutra canadensis</i>          | SC            | ✓                      | Unlikely                     | marshes, rivers, lakes   |
| Least weasel                | <i>Mustela nivalis</i>           | SC            |                        | Likely                       | forests, farmlands, meadows, prairies                                |
| Smoky shrew                 | <i>Sorex fumeus</i>              | SC            |                        | Likely                       | moist woods  |
| <b>Millipedes</b>           |                                  |               |                        |                              |  |
| Bollman's cave millipede    | <i>Conotyla bollmani</i>         | WL            |                        | Unlikely                     | caves  |
| N/A                         | <i>Pseudopolydesmus collinus</i> | E             |                        | Unlikely                     | caves  |
| <b>Mussels</b>              |                                  |               |                        |                              |  |
| Clubshell                   | <i>Pleurobema clava</i>          | E             |                        | Unlikely                     | medium to large rivers in gravel or mixed gravel and sand            |
| Kidneyshell                 | <i>Ptychobranhus fasciolaris</i> |               |                        | Unlikely                     | medium to large rivers in gravel                                     |
| Little spectacle case       | <i>Villosa lienosa</i>           | SC            | ✓ (YR)                 | Unlikely                     | small to medium streams in sand or gravel                            |
| Ohio pigtoe                 | <i>Pleurobema cordatum</i>       | SC            |                        | Unlikely                     | medium to large rivers in sand or gravel in areas with moderate flow |
| Purple lilliput             | <i>Toxolasma lividus</i>         | SC            |                        | Unlikely                     | lakes and small to medium streams in                                 |

**Table E-2. Rare State Listed Species with the Potential to Occur at Big Oaks NWR and Jefferson Range**

| Common Name              | Scientific Name                       | State Status* | Known on Big Oaks NWR* | Potential on Jefferson Range | Habitat   |
|--------------------------|---------------------------------------|---------------|------------------------|------------------------------|---|
|                          |                                       |               |                        |                              | gravel  |
| Round hickorynut         | <i>Obovaria subrotunda</i>            | SC            |                        | Unlikely                     | medium-sized streams in sand and gravel in areas with moderate flow |
| Salamander mussel        | <i>Simpsonaias ambigua</i>            | SC            | ✓ (YR)                 | Unlikely                     | medium to large rivers on mud and gravel bars                       |
| Sheepnose                | <i>Plethobasus cyphus</i>             | SC            |                        | Unlikely                     | medium to large rivers in gravel or mixed sand and gravel           |
| Snuffbox                 | <i>Epioblasma triquetra</i>           | E             |                        | Unlikely                     | medium to large rivers in clear, gravel riffles                     |
| <b>Reptiles</b>          |                                       |               |                        |                              |   |
| Copperbelly water snake  | <i>Nerodia erythrogaster neglecta</i> | E             |                        |                              | marshes, canals, rivers, edges of streams, ponds, lakes             |
| Kirtland's snake         | <i>Clonophis kirtlandii</i>           | E             | ✓                      | Likely                       | marshy meadows, woodland ponds, open swamplands                     |
| <b>Springtails</b>       |                                       |               |                        |                              |   |
| Fountain cave springtail | <i>Pseudosinella fonsa</i>            | T             |                        | Unlikely                     | caves   |
| NA                       | <i>Sminthurides hypogramme</i>        | WL            |                        | Unlikely                     | caves   |
| NA                       | <i>Sinella alata</i>                  | WL            |                        | Unlikely                     | caves   |
| NA                       | <i>Sinella cavernarum</i>             | WL            |                        | Unlikely                     | caves   |
| <b>Vascular Plants</b>   |                                       |               |                        |                              |   |
| American Ginseng         | <i>Panax quinquefolium</i>            | SC            | ✓                      | Likely                       | rich woods  |
| American Pinesap         | <i>Monotropa hypopithes</i>           | SC            | ✓                      | Likely                       | woods   |
| American Water-pennywort | <i>Hydrocotyle americana</i>          | E             |                        |                              | fields, roadsides, wood edges, shores                               |

**Table E-2. Rare State Listed Species with the Potential to Occur at Big Oaks NWR and Jefferson Range**

| Common Name                    | Scientific Name                       | State Status* | Known on Big Oaks NWR* | Potential on Jefferson Range | Habitat  |
|--------------------------------|---------------------------------------|---------------|------------------------|------------------------------|--|
| American Wild Basil            | <i>Satureja vulgaris var. neogaea</i> | WL            |                        |                              | bogs, marshes, seepages, cliffs and ledges where wet by seepage or spray from waterfalls |
| Angle Pod                      | <i>Gonolobus obliquus</i>             | R             |                        |                              | open woodlands, woodland borders, rocky slopes and thickets                              |
| Aromatic Aster                 | <i>Aster oblongifolius</i>            | R             |                        |                              | prairies, rock outcrops  |
| Barren Strawberry              | <i>Waldsteinia fragarioides</i>       | SC            | ✓                      |                              | woods, clearings   |
| Black Bugbane                  | <i>Cimicifuga racemosa</i>            | SC            | ✓                      |                              | woods  |
| Black-fruit Mountain-ricegrass | <i>Oryzopsis racemosa</i>             | R             |                        |                              | wooded slopes  |
| Blunt-lobe Grape-fern          | <i>Botrychium oneidense</i>           | SC            | ✓                      | Likely                       | mature flatwoods   |
| Bottomland Broomrape           | <i>Orobanche riparia</i>              | E             |                        | Unlikely                     | riverbank, sand bars, floodplains  |
| Broom Panic-grass              | <i>Panicum scoparium</i>              | E             | ✓                      | Likely                       | moist soil   |
| Butternut                      | <i>Juglans cinerea</i>                | WL            |                        | Likely                       | forests, stream banks  |
| Canada Lily                    | <i>Lilium canadense</i>               | R             |                        |                              | moist wet meadows  |
| Carolina Willow                | <i>Salix caroliniana</i>              | SC            | ✓                      | Unlikely                     | streams, exposed gravel bars   |
| Clasping St. John's Wort       | <i>Hypericum gymnanthum</i>           | E             | ✓                      | Likely                       | eroded areas   |
| Climbing Fern                  | <i>Lygodium palmatum</i>              | E             | ✓                      | Likely                       | early successional flat woods  |
| Clingman Hedge-nettle          | <i>Stachys clingmanii</i>             | E             |                        |                              | rocky woods  |
| Clustered Foxglove             | <i>Agalinis fasciculata</i>           | SC            | ✓                      | Likely                       | moist fields, young flatwoods  |
| Crinkleroot                    | <i>Dentaria diphylla</i>              | SC            | ✓                      | Likely                       | moist woods  |
| Divided Toothwort              | <i>Dentaria multifida</i>             | E             |                        |                              | woods  |
| Dwarf Ginseng                  | <i>Panax trifolius</i>                | WL            | ✓                      | Likely                       | flatwoods, moist upland forest   |

**Table E-2. Rare State Listed Species with the Potential to Occur at Big Oaks NWR and Jefferson Range**

| Common Name               | Scientific Name                     | State Status* | Known on Big Oaks NWR* | Potential on Jefferson Range | Habitat   |
|---------------------------|-------------------------------------|---------------|------------------------|------------------------------|---|
| Ebony Sedge               | <i>Carex eburnea</i>                | R             |                        |                              | woods, calcareous soils                                 |
| Elliptical Rushfoil       | <i>Crotonopsis elliptica</i>        | E             | ✓                      | Likely                       | eroded banks, bladed roadbanks                          |
| False Hellebore           | <i>Veratrum woodii</i>              | SC            | ✓                      |                              | forested ravines and narrow stream valleys              |
| Fewflower Nutrush         | <i>Scleria pauciflora</i>           | SC            | ✓                      | Likely                       | grassy fields   |
| Golden St. John's-wort    | <i>Hypericum frondosum</i>          | E             |                        |                              | dry to moist woods, rock outcrops                       |
| Goldenseal                | <i>Hydrastis canadensis</i>         | SC            | ✓                      | Likely                       | moist ravine forests                                    |
| Goose-foot Corn-salad     | <i>Valerianella chenopodiifolia</i> | E             |                        |                              | forested floodplains                                    |
| Grassleaf Ladies'-tresses | <i>Spiranthes vernalis</i>          | WL            |                        |                              | mesic to dry upland prairies                            |
| Gray Beardtongue          | <i>Penstemon canescens</i>          | E             |                        |                              | rocky slopes, woodlands, thickets, roadsides            |
| Green Flatsedge           | <i>Cyperus pseudovegetus</i>        | R             |                        |                              | bottomland prairies, stream margins, open mesic forests |
| Ground Juniper            | <i>Juniperus communis</i>           | R             |                        |                              | dry, open, rocky, wooded hillsides                      |
| Grove Meadow Grass        | <i>Poa alsodes</i>                  | R             |                        |                              | moist woods   |
| Heart-leaved Noseburn     | <i>Tragia cordata</i>               | WL            |                        |                              | rocky open woods, thickets                              |
| Illinois Blackberry       | <i>Rubus centralis</i>              | E             |                        |                              | open woods  |
| Illinois Woodsorrel       | <i>Oxalis illinoensis</i>           | SC            | ✓                      | Likely                       | floodplain forest                                       |
| Kentucky Wisteria         | <i>Wisteria macrostachya</i>        | R             |                        |                              | most wet woods, river banks, thickets                   |
| Large-leaved Phlox        | <i>Phlox amplifolia</i>             | R             |                        |                              | mesic woods, along stream slopes                        |
| Lesser Ladies'-tresses    | <i>Spiranthes ovalis</i>            | SC            | ✓                      | Likely                       | forest, floodplain forest                               |
| Little Ladies'-tresses    | <i>Spiranthes tuberosa</i>          | SC            | ✓                      | Likely                       | eroded old fields, dry upland forest                    |
| Longbeak Arrowhead        | <i>Sagittaria australis</i>         | R             | ✓                      | Likely                       | wetland, flatwoods, stream banks                        |

**Table E-2. Rare State Listed Species with the Potential to Occur at Big Oaks NWR and Jefferson Range**

| Common Name                | Scientific Name                           | State Status* | Known on Big Oaks NWR* | Potential on Jefferson Range | Habitat                              |
|----------------------------|---|---------------|------------------------|------------------------------|--------------------------------------|
| Longstalk Sedge            | <i>Carex pedunculata</i>                  | R             |                        |                              | wooded ravines, slopes               |
| Louisiana Sedge            | <i>Carex louisianica</i>                  | SC            | ✓                      |                              | floodplain forest                    |
| Maryland Meadow-beauty     | <i>Rhexia mariana</i> var. <i>mariana</i> | E             | ✓                      | Likely                       | moist, acidic grasslands             |
| Narrow-leaved Sunflower    | <i>Helianthus angustifolius</i>           | E             | ✓                      | Likely                       | moist, acidic grasslands             |
| Netted Chainfern           | <i>Woodwardia areolata</i>                | R             | ✓                      | Likely                       | regrowth flatwoods                   |
| Northern bog Clubmoss      | <i>Lycopodiella inundata</i>              | E             | ✓                      | Likely                       | shallow ditches                      |
| Pretty Sedge               | <i>Carex woodii</i>                       | SC            | ✓                      | Likely                       | moist woodlands                      |
| Primrose Willow            | <i>Ludwigia decurrens</i>                 | WL            |                        |                              | wetlands, moist soils                |
| Purple Flowering Raspberry | <i>Rubus odoratus</i>                     | T             |                        |                              | forests                              |
| Purple Fringeless Orchid   | <i>Platanthera peramoena</i>              | SC            | ✓                      | Likely                       | moist meadows, open swampy woods     |
| Pursh Buttercup            | <i>Ranunculus pusillus</i>                | E             |                        |                              | wet habitat, swamps, shallow pools   |
| Ragged-fringed Orchid      | <i>Platanthera lacera</i>                 | SC            | ✓                      | Likely                       | wet, open fields, young flatwoods    |
| Ridged Yellow Flax         | <i>Linum striatum</i>                     | WL            | ✓                      | Likely                       | flatwoods                            |
| Round-leaved Boneset       | <i>Eupatorium rotundifolium</i>           | SC            | ✓                      | Likely                       | grassy fields, open flatwoods        |
| Running Pine               | <i>Lycopodium clavatum</i>                | SC            | ✓                      | Likely                       | regrowth flatwoods                   |
| Schreber Aster             | <i>Aster schreberi</i>                    | E             |                        |                              | sandy, moist, wooded slopes          |
| Shining Ladies'-tresses    | <i>Spiranthes lucida</i>                  | R             |                        |                              | streams, rivers, floodplains         |
| Silky Dogwood              | <i>Cornus amomum</i> ssp. <i>amomum</i>   | E             |                        |                              | swamps, damp thickets, along streams |
| Silver Bluestem            | <i>Andropogon ternarius</i>               | SC            | ✓                      | Likely                       | old fields, grassy barrens           |
| Single-head Pussetoes      | <i>Antennaria solitaria</i>               | SC            | ✓                      | Likely                       | woods, clearings                     |
| Slick Seed Wild-bean       | <i>Strophostyles leiosperma</i>           | T             | ✓                      | Likely                       | eroded areas                         |
| Small Sundrops             | <i>Oenothera perennis</i>                 | R             | ✓                      | Likely                       | meadows, fields                      |

**Table E-2. Rare State Listed Species with the Potential to Occur at Big Oaks NWR and Jefferson Range**

| Common Name            | Scientific Name                                     | State Status* | Known on Big Oaks NWR* | Potential on Jefferson Range | Habitat  |
|------------------------|---|---------------|------------------------|------------------------------|--|
| Smooth White Violet    | <i>Viola blanda</i>                                 | SC            | ✓                      | Likely                       | mature flatwoods   |
| Softleaf Arrow-wood    | <i>Viburnum molle</i>                               | R             |                        |                              | dry rocky woods, floodplains                                       |
| Sparse-lobe Grape-fern | <i>Botrychium biternatum</i>                        | SC            | ✓                      | Likely                       | old fields   |
| Spotted Wintergreen    | <i>Chimaphila maculata</i>                          | SC            | ✓                      |                              | upland woods   |
| Straw Sedge            | <i>Carex straminea</i>                              | T             |                        |                              | wetlands, swamp margins  |
| Sullivantia            | <i>Sullivantia sullivantii</i>                      | T             |                        |                              | forests  |
| Tall Meadowrue         | <i>Thalictrum pubescens</i>                         | T             |                        |                              | open swamps, moist meadows   |
| Thicket Sedge          | <i>Carex abscondita</i>                             | SC            | ✓                      | Likely                       | moist forest, stream valleys                                       |
| Thread-like Naiad      | <i>Najas gracillima</i>                             | E             | ✓                      | Likely                       | shallow water  |
| Tree Clubmoss          | <i>Lycopodium obscurum</i>                          | R             | ✓                      | Likely                       | regrowth flatwoods   |
| Twining Bartonian      | <i>Bartonia paniculata</i>                          | SC            | ✓                      | Likely                       | open flatwoods   |
| Virginia Mallow        | <i>Sida hermaphrodita</i>                           | E             |                        |                              | scoured floodplains, disturbed areas along roadsides and railroads |
| Wall-rue Spleenwort    | <i>Asplenium ruta-muraria</i>                       | R             | ✓                      |                              | limestone cliffs   |
| Weakstalk Bulrush      | <i>Scirpus purshianus</i>                           | R             | ✓                      |                              | edge of bodies of water  |
| Weak Stellate Sedge    | <i>Carex seorsa</i>                                 | R             |                        |                              | wooded swamps  |
| Wild Chervil           | <i>Chaerophyllum procumbens</i> var. <i>shortii</i> | T             |                        |                              | moist woods  |
| Wild False Indigo      | <i>Baptisia australis</i>                           | R             |                        |                              | rocky open woodlands, mesic and gravel prairies                    |
| Wolf Bluegrass         | <i>Poa wolfii</i>                                   | R             | ✓                      |                              | limestone boulders, moist woods                                    |
| Wolf Spikerush         | <i>Eleocharis wolfii</i>                            | R             |                        |                              | wetlands   |
| Yellow Buckeye         | <i>Aesculus octandra</i>                            | SC            | ✓                      |                              | ravine forest  |

**Table E-2. Rare State Listed Species with the Potential to Occur at Big Oaks NWR and Jefferson Range**

| Common Name  | Scientific Name      | State Status* | Known on Big Oaks NWR* | Potential on Jefferson Range | Habitat   |
|--|----------------------|---------------|------------------------|------------------------------|---|
| Yellow Gentian   | <i>Gentiana alba</i> | R             |                        |                              | mesic prairies, savannas, grassy meadows and damp woods |
| <p><b>STATE STATUS</b><br/> <b>ANIMAL CLASSIFICATIONS</b><br/> E = Endangered – Any animal species whose prospects for survival or recruitment within the state are in immediate jeopardy and are in danger of disappearing from the state. This includes all species classified as endangered by the federal government which occur in Indiana.<br/> T = Threatened – An animal species whose survival in Indiana is not in immediate jeopardy, but to which a threat exists. Continued or increased stress will result in its becoming endangered.<br/> SC = Special Concern – Any animal species about which some problems of limited abundance or distribution in Indiana are known or suspected and should be closely monitored.</p> <p><b>PLANT CLASSIFICATIONS</b><br/> E = Endangered – Any plant species whose prospects for survival or recruitment within the state are in immediate jeopardy and are in danger of disappearing from the state. This includes all species classified as endangered by the federal government which occur in Indiana. One to five extant populations in the state.<br/> T = Threatened – Any species that is likely to become endangered within the state in the foreseeable future throughout all or a significant portion of its range. Six to ten extant populations within the state.<br/> R = Rare – Eleven to twenty extant populations within the state.<br/> WL = Watch List – Greater than (&gt;) 20 extant populations, but populations are still considered at risk.</p> <p><b>PRESENCE CLASSIFICATIONS</b><br/> B = breeds on site, M = found on site during migratory periods, YR = found on site year round</p> <p>Unlikely = Species is unlikely on Jefferson Range due to lack of habitat (e.g., no perennial streams, no caves)<br/> Likely = Species is likely on Jefferson Range based on habitat and known locations on Big Oaks NWR</p> |                      |               |                        |                              |   |
| <p><i>Source:</i> IDNR 2011, USFWS 2011a</p>   |                      |               |                        |                              |   |



### E.3 Priority Special Status Species

Seven of the rare species identified above are considered priority species at Jefferson Range. These species include one mammal, one plant, one frog and four birds:

- federally and state endangered Indiana bat
- federally and state endangered running buffalo clover
- federal species of concern dickcissel
- federal species of concern grasshopper sparrow
- federal species of concern and state endangered Henslow's sparrow
- federal species of concern and state endangered cerulean warbler
- state endangered northern crawfish frog

These rare wildlife and plant species are discussed in greater detail in **Sections E.3.1** and **E.3.2**, respectively. With the exception of the running buffalo clover, the remaining six species have been previously documented at Big Oaks NWR and are likely to occur on Jefferson Range. Management recommendations for all priority species are presented in **Section 4.7**.

#### E.3.1 Rare Wildlife

##### Indiana bat

**Species:** The Indiana bat is a medium sized bat that closely resembles the little brown bat (*Myotis lucifugus*) and the northern long-eared bat (*M. septentrionalis*). They can be distinguished by differences in their foot structure and fur color. Indiana bats are small bats with an average weight of approximately 0.25 ounce and a wingspan of 9 to 11 inches (Pruitt and TeWinkel 2007).

**Habitat:** The Indiana bat has two distinct habitats: winter hibernacula and summer roosting/foraging sites. Indiana bats roost in the winter in caves or mines with configurations that provide a suitable temperature and humidity microclimate. Although the Big Oaks NWR contains approximately 32 caves, they do not have large numbers of hibernating bats likely due to their small size and the lack of a suitable temperature and humidity microclimate (USFWS 2010). No caves occur within the Jefferson Range; therefore, no winter habitat for the Indiana bat is present at Jefferson Range.

Indiana bat maternity colonies typically occupy multiple roost trees in riparian, bottomland, and upland forests during the summer. Roost trees generally have exfoliating bark which allows the bat to roost between the bark and bole of the tree and have a southeast or south-southwest solar exposure and an open canopy. Cavities and



**Figure E-1.** Indiana Bat  
(Courtesy of Adam Mann  
USFWS)

crevices in trees also may be used for roosting. Roost tree structure is probably more important than the tree species in determining whether a tree is a suitable roost site; tree species which develop loose, exfoliating bark as they age and die are likely to provide roost sites (Pruitt and TeWinkel 2007). Potential summer habitat for the Indiana bat occurs throughout the Big Oaks NWR, as well as on Jefferson Range (USFWS 2010). Indiana bats have been documented throughout Big Oaks NWR (USFWS 2010). Although surveys and assessment of potential roosting habitat on Jefferson Range are difficult due to unexploded ordinance (UXO) limitations, there is a high likelihood that the Indiana bat is present within the forested portions of Jefferson Range from 1 April to 30 September.

**Distribution:** The species range includes much of the eastern half of the United States, from Oklahoma, Iowa, and Wisconsin east to Vermont, and south to northwestern Florida. The Indiana bat is migratory, and this range includes both winter and summer habitat. The winter range is associated with regions of well-developed limestone caverns. Based on 2005 population estimates, over 90 percent of this species hibernated in Indiana (45.2%), Missouri (14.2%), Kentucky (13.6%), Illinois (9.7%), and New York (9.1%) (Pruitt and TeWinkel 2007).

Mist net surveys were conducted within the Big Oaks NWR property during 1993-2000 and in 2007. The former Jefferson Proving Grounds (JPG) Cantonment Area, now primarily owned by private landowners, was surveyed in 2002. Indiana bat were captured during all these efforts. The Big Oaks NWR estimates that at least six maternity roost colonies are present within the property. Due to UXO and depleted uranium (DU) contamination, some areas have not been adequately surveyed. However, capture rates and distribution indicate suitable habitat for the Indiana bat is found throughout the Big Oaks NWR and likely on Jefferson Range (USFWS 2010).

## **Dickcissel**

**Species and Habitat:** The dickcissel is a small sparrow-like songbird with a yellow or yellowish chest, rusty patch on its shoulders, and a stout pointed bill. Males have a large black V-mark on their chest when breeding. This species inhabits tall grasslands, including prairie, hayfields, lightly grazed pastures, and roadsides (Erickson et al. 2011, Temple 2002).

**Distribution:** Dickcissels breed from northern North Dakota south through western South Dakota, eastern Colorado, and northeastern New Mexico to southern Texas and Louisiana, and east to northern Alabama, western Tennessee, western Kentucky, western Ohio, and southern Michigan and Wisconsin (Dechant et al. 2002, Price et al. 1995). The dickcissel is known to breed on the Big Oaks NWR and likely occurs within the grassland areas on Jefferson Range (USFWS 2011b).



**Figure E-2.** Dickcissel

### **Grasshopper Sparrow**

*Species and Habitat:* The grasshopper sparrow is a small songbird that has a short tail and large head; it is mostly brown with an unmarked buffy breast and has a dark crown with a pale middle stripe (Erickson et al. 2011, Dechant et al. 2002). The grasshopper sparrow inhabits open grasslands and prairies of intermediate height with patches of bare ground and clumped vegetation interspersed throughout (Erickson et al. 2011, Dechant et al. 2002, Vickery 1996).



**Figure E-3.** Grasshopper Sparrow (Courtesy of Mike McDowell USGS)

*Distribution:* The grasshopper sparrow is found throughout the most of the eastern United States (US) and Great Plains during the breeding season. The main population is in the Great Plains, from North Dakota south to northern Texas, and east to Illinois (Erickson et al. 2011, Dechant et al. 2002, Price et al. 1995). The grasshopper sparrow is known to breed on the Big Oaks NWR, and likely occurs within the grassland areas on Jefferson Range (USFWS 2011b).

### **Henslow's sparrow**

*Species and Habitat:* Henslow's sparrow is a small, brownish songbird with a sparsely streaked breast, short tail, and large head (Erickson et al. 2011, Herkert 2002). This species' breeding habitat consists of tall, dense grasslands that contain limited to no woody vegetation and a dense leaf litter. Winter habitat is similar, but can include pine forests or open prairies with dense groundcover (Erickson et al. 2011, Herkert 2002, Dechant et al. 2002).



**Figure E-4.** Henslow's Sparrow

*Distribution:* The grasshopper sparrow is found within grasslands in the east-central US. However, population numbers have been declining due to habitat loss, fragmentation and degradation (Erickson et al. 2011, Herkert 2002, Dechant et al. 2002). Henslow's sparrow is known to breed on the Big Oaks NWR and populations have been surveyed annually since 1995. A decline in Henslow's sparrow density has occurred over the years due a loss of grassland areas from woody encroachment and forest habitat management (e.g., small grassland areas converted to forested areas to manage declining forest bird species) (USFWS 2011a). This species is likely to occur within the grassland areas on Jefferson Range (USFWS 2011b).

**Management Recommendations:** Woody invasion and habitat area are limiting factors for the Henslow's sparrow. The primary strategies to managing this species include maintaining large areas of suitable habitat, avoiding habitat disturbances during the breeding season, and controlling woody encroachment. Habitat management for Henslow's sparrow is similar to the other grassland birds discussed above. Refer to dickcissel and grasshopper sparrow management recommendations and **Section 4.5.2** of the Integrated Natural Resource Management Plan (INRMP) for more information on grassland habitat management recommendations.

### **Cerulean Warbler**

**Species and Habitat:** The cerulean warbler is a small bird with two broad white wingbars; it is solidly colored with stripes of the same color down the sides of its white chest. Females are blue-green in color, while males are sky-blue. The cerulean warbler's breeding habitat consists of forests with tall deciduous trees and an open understory (e.g., wet bottomlands and dry slopes). Wintering habitat consists of broad-leaved evergreen forests (Erickson et al. 2011, Hamel 2000).



**Figure E-5.** Cerulean Warbler

**Distribution:** The cerulean warbler has been experiencing long-term population decline the past 40 years. Although this species is thought to have been fairly common throughout eastern North America particularly in the Mississippi River and Ohio River valleys, it is now only common in the central Appalachian regions (USFWS 2007, Hamel 2000).

The cerulean warbler is known to breed on the Big Oaks NWR (USFWS 2011b). A four year research study (2002-2005) was completed on Big Oaks NWR by Ball State University, University of Tennessee and Big Oaks NWR staff to analyze cerulean warbler distribution and abundance, habitat selection, nest tree parameters and reproductive success of these birds on Big Oaks NWR. Several publications are available from this research on Dr. Kamal Islam's website for Cerulean Warbler Research at Ball State University, Indiana:

<http://kislam.iweb.bsu.edu/Cerulean%20Warbler%20Research.htm>

Large forested tracts are rare in Indiana. However, the area north of K road on Big Oaks NWR contains one of the largest contiguous blocks (approximately 14,000 acres) of forest in Indiana and provides breeding habitat for a variety of declining populations of neotropical migrant birds (IDNR 2011, USFWS 2011b). Due to the close proximity of the Jefferson Range to K Road, it is likely cerulean warblers could be present within the forested areas on Jefferson Range.



### **Northern Crawfish Frog**

*Species:* The Northern crawfish frog is a large and heavy frog (2 to 4.5 inches) with a distinct humped lower back when resting; it has irregular dark spots surrounded by light borders and a white belly. This frog inhabits low wet areas including moist meadows, prairies, brushy fields and woodlands; it spends most of its adult life in crayfish burrows. The breeding season occurs in March and April. Breeding habitat consists of fish-free ponds, small lakes and flooded fields (IDNR 2011).



**Figure E-6.** Crawfish Frog

*Distribution:* Crawfish frogs are mainly distributed southwest of Indiana and Illinois. However, populations within Indiana, which have declined over the past few decades, were historically abundant in the southwestern portion of State (Minton 2001). An isolated population also occurs in southeastern Indiana within the Big Oaks NWR (USFWS 2011b). Although crawfish frogs are found in a variety of habitats, the northern subspecies found in Indiana seems to prefer tallgrass prairies and other native grassland habitat (IDNR 2011, Engbrecht 2010).

*Management Recommendations:* The reasons for the decline of northern crawfish frog populations are not well understood in Indiana. A crawfish frog study within Indiana is currently being conducted by numerous entities, including Indiana University, USFWS, US Army Corps of Engineers (USACE), San Diego Zoo, Hanover College, Eastern Kentucky University, and US Geological Survey (USGS) Earth Resources Observation and Science (EROS) Data Center, to better understand northern crawfish frog populations, distribution, and the limiting factors to this species' survival in Indiana. One of the objectives of this study is to develop management recommendations for IDNR and USFWS to better maintain and enhance crawfish frog populations in the State (IDNR 2009). Until additional information is available, it is recommended that known breeding areas and suitable habitat (moist prairies and wetland areas) within the Jefferson Range be protected, particularly during March and April.

### **E.3.2 Rare Plants**

#### **Running Buffalo Clover**

*Species:* Running buffalo clover is a perennial species, appearing each spring at the same site and dying off in late summer/early fall. This plant gets its name because of the stolons, or runners, that extend from the base of erect flowering stems. The flower of this clover, which is on a stem with a pair of leaflets (unlike other clovers), is white tinged with purple. Running buffalo clover flowers from mid-April to June; fruiting occurs from May to July (Brooks 1983). Because of the stoloniferous growth form, individual plants can be difficult to distinguish (Selbo 2007).

**Habitat:** Running buffalo clover is found in two fairly distinct habitat types: shaded lawn and mesic forest. Lawn populations include cemeteries, parks, and old home sites. Mesic forest populations require areas with partial to filtered sunlight, where there is a prolonged pattern of moderate, periodic disturbance, such as mowing, trampling, or grazing, such as near streams or trails. It is most often found in regions underlain with limestone or other calcareous bedrock, but not exclusively (Selbo 2007).

**Distribution:** Running buffalo clover has been collected historically from Arkansas, Illinois, Indiana, Kansas, Kentucky, Missouri, Ohio, and West Virginia. Currently, the running buffalo clover occurs in three geographical regions: Appalachian (West Virginia and southeastern Ohio), Bluegrass (southwestern Ohio, central Kentucky, and Indiana), and the Ozarks (Missouri) (Selbo 2007). All of the extant populations in Indiana occur in the southeastern corner. To date, this species has not been observed on the Big Oaks NWR.

**Management Recommendations:** Because the running buffalo clover has not been observed on Jefferson Range or Big Oaks NWR to date, no management strategies are recommended, but should be revisited if this species is found in the future. Surveys for this species are recommended in conjunction with other spring floristic and vegetation community surveys.



**Figure E-7.** Running Buffalo Clover (Courtesy of Sarena Selbo USFWS)

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## BFO Forest Management Guidelines for Informal Section 7 Consultations on Indiana Bats (*Myotis sodalis*) within the State of Indiana

These guidelines were developed by the Bloomington Field Office (BFO) of the U.S. Fish and Wildlife Service (FWS) to conserve the federally endangered Indiana bat (*Myotis sodalis*) and its summer habitat within the State of Indiana. Adherence to these guidelines will result in forest habitat that is suitable for Indiana bat use, but may not represent optimal habitat. Maintaining or creating optimal Indiana bat maternal habitat typically would require more intensive management practices than provided here. This is a working document and periodically will be revised as new data warrant.

Because the risk of incidental take of Indiana bats in forest stands managed in accordance with these guidelines is discountable or insignificant, the BFO typically will provide written concurrence letters to managers seeking Section 7 compliance (i.e., informal consultation will suffice). However, if these management guidelines cannot be followed or conflict with other management goals or directives, then forest managers are strongly encouraged to contact the BFO to discuss all of their options (e.g., greater management flexibility may be achieved via formal Section 7 consultation).

### FOREST MANAGEMENT GUIDELINES

1. At least 60% canopy cover (on a stand-by-stand basis, depending on size of stands) shall be maintained after any timber harvest activities.
2. Shagbark hickory (*Carya ovata*) or shellbark hickory (*C. laciniosa*) trees shall not be harvested or manipulated during timber stand improvement (TSI) activities, unless the combined density of these species exceeds 16 trees/acre. If present, at least 16 live shagbark and shellbark hickory (combined) >11" dbh must be maintained per acre.
3. Standing snags shall not be felled/removed, except where they pose a serious human safety hazard (a tree with <10% live canopy should be considered a snag). Snags that have no remaining bark and no visible cracks, splits, or hollows may be felled as well as any snags leaning more than 45° from vertical.
4. The following species of trees have been identified as having relatively high value as potential Indiana bat maternity roost trees:

|  |   |
|--|---|
| shagbark hickory ( <i>Carya ovata</i> )        | eastern cottonwood ( <i>Populus deltoides</i> ) |
| shellbark hickory ( <i>Carya laciniosa</i> )   | northern red oak ( <i>Quercus rubra</i> )       |
| bitternut hickory ( <i>Carya cordiformis</i> ) | post oak ( <i>Quercus stallata</i> )            |
| silver maple ( <i>Acer saccharinum</i> )       | white oak ( <i>Quercus alba</i> )               |
| sugar maple ( <i>Acer saccharum</i> )          | slippery elm ( <i>Ulmus rubra</i> )             |
| green ash ( <i>Fraxinus pennsylvanica</i> )    | American elm ( <i>Ulmus americana</i> )         |
| white ash ( <i>Fraxinus americana</i> )        | black locust ( <i>Robinia pseudoacacia</i> )    |

(Tree species based on literature and unpublished roosting data).



On average, at least 3 live trees per acre >20" dbh (of the high-value species listed above) shall always be maintained in the stand (a tree with <10% live canopy should be considered a snag). These "leave trees" must be the largest trees of the listed species remaining in the stand. An additional 6 live trees per acre >11" dbh (of the species listed above) must also be maintained. The "per acre" requirement can be expressed as the average per acre on a stand-wide basis, depending on the definition of a stand.

If there are no trees >20" dbh to leave, then 16 live trees per acre must be left, and these must include the largest specimens of the listed species remaining in the stand.

5. No timber harvest or TSI activities shall occur within 100 feet of a perennial stream or within 50 feet of an intermittent stream.
6. No felling of trees >3" dbh while Indiana bats may be present from 1 April through 30 September (i.e., trees may be felled from 1 October through 31 March).

### **PRESCRIBED FIRE GUIDELINES**

1. Prescribed burns shall not be conducted from 15 April through 15 September in burn areas containing potential bat roost trees/snags >3" dbh.
2. Temporary fire breaks shall be created/maintained around any known Indiana bat primary maternal roost trees that fall within a proposed burn area prior to the burn.

**NOTE:** If any of these guidelines cannot be followed or additional clarification is needed, then please contact the BFO.

**NOTE:** If proposed forest/timber management actions or prescribed burns will occur within a 5-mile radius of a known Indiana bat hibernaculum, then please contact the BFO for additional guidance. Indiana bat hibernacula in Indiana are known to occur in Crawford, Greene, Harrison, Lawrence, Martin, Monroe, Orange, and Washington counties.

## **APPENDIX F: SPECIES KNOWN TO OCCUR AND/OR WITH THE POTENTIAL TO OCCUR AT BIG OAKS NATIONAL WILDLIFE REFUGE AND JEFFERSON RANGE**

|  |           |
|--|-----------|
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Species lists compiled by Big Oaks National Wildlife Refuge, with likelihood on Jefferson Range estimated based on reports and personal communication from USFWS personnel at Big Oaks NWR.

**Table F-1. Amphibian Species Known to Occur and/or with the Potential to Occur at Big Oaks NWR and Jefferson Range**

| Common Name   | Scientific Name                         | Federal Status | State Status | Status on Big Oaks NWR | Potential on Jefferson Range |
|---|---|----------------|--------------|------------------------|------------------------------|
| W. Cricket Frog   | <i>Acris crepitans blanchardi</i>       |                |              | Present                |                              |
| Streamside Salamander   | <i>Ambystoma barbouri</i>               |                |              | Present                |                              |
| Jefferson Salamander  | <i>Ambystoma jeffersonianum</i>         |                |              | Present                |                              |
| Spotted Salamander  | <i>Ambystoma maculatum</i>              |                |              | Present                |                              |
| Marbled Salamander  | <i>Ambystoma opacum</i>                 |                |              | Present                |                              |
| E. American Toad  | <i>Bufo a. americanus</i>               |                |              | Present                |                              |
| Fowler's Toad   | <i>Bufo woodhousii fowleri</i>          |                |              | Present                |                              |
| N. Dusky Salamander   | <i>Desmognathus f. fuscus</i>           |                |              | Present                |                              |
| S. two-lined Salamander   | <i>Eurycea cirrigera</i>                |                |              | Present                |                              |
| Longtail Salamander   | <i>Eurycea longicauda</i>               |                |              | Present                |                              |
| Cave Salamander   | <i>Eurycea lucifuga</i>                 |                |              | Present                |                              |
| Four-toed Salamander  | <i>Hemidactylium scutatum</i>           |                | E            | Present                | Likely                       |
| Cope's Gray Treefrog  | <i>Hyla chrysocelis</i>                 |                |              | Present                |                              |
| Common Mudpuppy   | <i>Necturus maculosus</i>               |                | SC           | Present                | Unlikely                     |
| Eastern Newt  | <i>Notophthalmus viridescens</i>        |                |              | Present                |                              |
| Redback Salamander  | <i>Plethodon cinereus</i>               |                |              | Present                |                              |
| N. Slimy Salamander   | <i>Plethodon glutinosus</i>             |                |              | Present                |                              |
| Ravine Salamander   | <i>Plethodon richmondi</i>              |                |              | Potential              |                              |
| N. Spring Peeper  | <i>Pseudacris c. crucifer</i>           |                |              | Present                |                              |
| W. Chorus Frog  | <i>Pseudacris triseriata</i>            |                |              | Present                |                              |
| N. Crawfish Frog  | <i>Rana areolata circulosa</i>          |                | E            | Present                | Likely                       |
| Bullfrog  | <i>Rana catesbeiana</i>                 |                |              | Present                |                              |
| Green Frog  | <i>Rana clamitans melanota</i>          |                |              | Present                |                              |
| Pickerel Frog   | <i>Rana palustris</i>                   |                |              | Present                |                              |
| Wood Frog   | <i>Rana sylvatica</i>                   |                |              | Present                |                              |
| S. Leopard Frog   | <i>Rana utricularia</i>                 |                |              | Present                |                              |
| Eastern Spadefoot   | <i>Scaphiopus holbrookii holbrookii</i> |                | SC           | Potential              |                              |
| <b>STATE STATUS</b><br>E = Endangered – Any animal species whose prospects for survival or recruitment within Indiana are in immediate jeopardy and are in danger of disappearing from the state. This includes all species classified as endangered by the federal government which occur in Indiana.<br>SC = Special Concern – Any animal species about which some problems of limited abundance or distribution in Indiana are known or suspected and should be closely monitored. |   |                |              |                        |                              |
| <b>PRESENCE CLASSIFICATIONS</b><br>Present = known to occur, Potential = potentially within the species range<br>Unlikely = Species is unlikely on Jefferson Range due to lack of habitat<br>Likely = Species is likely on Jefferson Range based on habitat and known locations on Big Oaks NWR   |   |                |              |                        |                              |

**Table F-2. Bird Species Known to Occur and/or with the Potential to Occur at Big Oaks NWR and Jefferson Range**

| Common Name               | Scientific Name              | Federal Status* | State Status* | Status on Big Oaks NWR* | Potential on Jefferson Range |
|---------------------------|------------------------------|-----------------|---------------|-------------------------|------------------------------|
| Cooper's Hawk             | <i>Accipiter cooperii</i>    |                 |               | Present-B               |                              |
| Northern Goshawk          | <i>Accipiter gentilis</i>    |                 |               | Present-M               |                              |
| Sharp-shinned hawk        | <i>Accipiter striatus</i>    |                 | SC            | Present-YR              | Likely                       |
| Spotted Sandpiper         | <i>Actitis macularia</i>     |                 |               | Present-M               |                              |
| Northern Saw-whet Owl     | <i>Aegolius acadicus</i>     |                 |               | Present-M               |                              |
| Red-winged Blackbird      | <i>Agelaius phoeniceus</i>   |                 |               | Present-B               |                              |
| Bachman's Sparrow         | <i>Aimophila aestivalis</i>  |                 | E             | Potential-B             | Unlikely                     |
| Wood Duck                 | <i>Aix sponsa</i>            | FSC (REC)       |               | Present-B               |                              |
| Henslow's Sparrow         | <i>Ammodramus henslowii</i>  | FSC (R/D)       | E             | Present-B               | Likely                       |
| Le Conte's Sparrow        | <i>Ammodramus leconteii</i>  |                 |               | Present-M               |                              |
| Grasshopper Sparrow       | <i>Ammodramus savannarum</i> | FSC (R/D)       |               | Present-B               |                              |
| American Wigeon           | <i>Anas americana</i>        |                 |               | Present-M               |                              |
| Northern Shoveler         | <i>Anas clypeata</i>         |                 |               | Present-M               |                              |
| Green-winged Teal         | <i>Anas crecca</i>           |                 |               | Present-M               |                              |
| Blue-winged Teal          | <i>Anas discors</i>          | FSC (REC)       |               | Potential-B             |                              |
| Mallard                   | <i>Anas platyrhynchos</i>    | FSC (REC)       |               | Present-B               |                              |
| American Black Duck       | <i>Anas rubripes</i>         | FSC (REC)       |               | Present-M               |                              |
| Gadwall                   | <i>Anas strepera</i>         |                 |               | Present-M               |                              |
| Northern Pintail          | <i>Anas strepera</i>         |                 |               | Present-M               |                              |
| American Pipit            | <i>Anthus rubescens</i>      |                 |               | Present-M               |                              |
| Ring-necked Duck          | <i>Anythya collaris</i>      |                 |               | Present-M               |                              |
| Golden Eagle              | <i>Aquila chrysaetos</i>     |                 |               | Present-M               |                              |
| Ruby-throated Hummingbird | <i>Archilochus colubris</i>  |                 |               | Present-B               |                              |
| Great Egret               | <i>Ardea alba</i>            |                 | SC            | Present-M               |                              |
| Great Blue Heron          | <i>Ardea herodias</i>        |                 | SC            | Present-B               |                              |
| Short-eared Owl           | <i>Asio flammeus</i>         |                 | E             | Present-M               | Likely                       |
| Long-eared Owl            | <i>Asio otus</i>             |                 |               | Present-M               |                              |
| Lesser Scaup              | <i>Aythya affinis</i>        |                 |               | Present-M               |                              |
| Greater Scaup             | <i>Aythya marila</i>         |                 |               | Present-M               |                              |
| Tufted Titmouse           | <i>Baeolophus bicolor</i>    |                 |               | Present-YR              |                              |
| Cedar Waxwing             | <i>Bombycilla cedrorum</i>   |                 |               | Present-B               |                              |
| Ruffed Grouse             | <i>Bonasa umbellus</i>       |                 |               | Present-YR              |                              |
| American Bittern          | <i>Botaurus lentiginosus</i> |                 | E             | Present-M               | Likely                       |
| Canada Goose              | <i>Branta canadensis</i>     |                 |               | Present-B               |                              |
| Great Horned Owl          | <i>Bubo virginianus</i>      |                 |               | Present-YR              |                              |
| Cattle Egret              | <i>Bubulcus ibis</i>         |                 |               | Present-M               |                              |

**Table F-2. Bird Species Known to Occur and/or with the Potential to Occur at Big Oaks NWR and Jefferson Range**

| Common Name          | Scientific Name                   | Federal Status* | State Status* | Status on Big Oaks NWR* | Potential on Jefferson Range |
|----------------------|-----------------------------------|-----------------|---------------|-------------------------|------------------------------|
| Bufflehead           | <i>Bucephala albeola</i>          |                 |               | Present-M               |                              |
| Common Goldeneye     | <i>Bucephala clangula</i>         |                 |               | Present-M               |                              |
| Red-tailed Hawk      | <i>Buteo jamaicensis</i>          |                 |               | Present-YR              |                              |
| Rough-legged Hawk    | <i>Buteo lagopus</i>              |                 |               | Present-M               |                              |
| Red-shouldered Hawk  | <i>Buteo lineatus</i>             | FSC (R/D)       | SC            | Present-YR              |                              |
| Broad-winged Hawk    | <i>Buteo platypterus</i>          |                 | SC            | Present-M               | Likely                       |
| Green Heron          | <i>Butorides virescens</i>        |                 |               | Present-B               |                              |
| Dunlin               | <i>Calidris alpina</i>            |                 |               | Present-M               |                              |
| Chuck-will's-widow   | <i>Caprimulgus carolinensis</i>   |                 |               | Potential-B             |                              |
| Whip-poor-will       | <i>Caprimulgus vociferus</i>      |                 |               | Present-B               |                              |
| Northern Cardinal    | <i>Cardinalis cardinalis</i>      |                 |               | Present-B               |                              |
| Pine Siskin          | <i>Carduelis pinus</i>            |                 |               | Present-M               |                              |
| American Goldfinch   | <i>Carduelis tristis</i>          |                 |               | Present-YR              |                              |
| House Finch          | <i>Carpodacus mexicanus</i>       |                 |               | Present-YR              |                              |
| Purple Finch         | <i>Carpodacus purpureus</i>       |                 |               | Present-M               |                              |
| Turkey Vulture       | <i>Cathartes aura</i>             |                 |               | Present-B               |                              |
| Veery                | <i>Catharus fuscescens</i>        |                 |               | Present-M               |                              |
| Hermit Thrush        | <i>Catharus guttatus</i>          |                 |               | Present-M               |                              |
| Gray-cheeked Thrush  | <i>Catharus minimus</i>           |                 |               | Present-M               |                              |
| Swainson's Thrush    | <i>Catharus ustulatus</i>         |                 |               | Present-M               |                              |
| Brown Creeper        | <i>Certhia americana</i>          |                 |               | Present-M (B?)          |                              |
| Belted Kingfisher    | <i>Ceryle alcyon</i>              |                 |               | Present-YR              |                              |
| Chimney Swift        | <i>Chaetura pelagica</i>          |                 |               | Present-B               |                              |
| Killdeer             | <i>Charadrius vociferus</i>       |                 |               | Present-B               |                              |
| Snow Goose           | <i>Chen caulescens</i>            |                 |               | Present-M               |                              |
| Ross's Goose         | <i>Chen rossii</i>                |                 |               | Present-M               |                              |
| Common Nighthawk     | <i>Chordeiles minor</i>           |                 |               | Present-B               |                              |
| Northern Harrier     | <i>Circus cyaneus</i>             |                 | E             | Present-YR              | Likely                       |
| Marsh Wren           | <i>Cistothorus palustris</i>      |                 | E             | Present-M               |                              |
| Sedge Wren           | <i>Cistothorus platensis</i>      | FSC (R/D)       | E             | Present-B               |                              |
| Long-tailed Duck     | <i>Clangula hyemalis</i>          |                 |               | Present-M               |                              |
| Evening Grosbeak     | <i>Coccothraustes vespertinus</i> |                 |               | Suspected-M             |                              |
| Yellow-billed Cuckoo | <i>Coccyzus americanus</i>        |                 |               | Present-B               |                              |
| Black-billed Cuckoo  | <i>Coccyzus erythrophthalmus</i>  |                 |               | Present-B               |                              |

**Table F-2. Bird Species Known to Occur and/or with the Potential to Occur at Big Oaks NWR and Jefferson Range**

| Common Name                  | Scientific Name                   | Federal Status* | State Status* | Status on Big Oaks NWR* | Potential on Jefferson Range |
|------------------------------|-----------------------------------|-----------------|---------------|-------------------------|------------------------------|
| Northern Flicker             | <i>Colaptes auratus</i>           |                 |               | Present-YR              |                              |
| Northern Bobwhite            | <i>Colinus virginianus</i>        |                 |               | Present-YR              |                              |
| Rock Dove                    | <i>Columba livia</i>              |                 |               | Present-YR              |                              |
| Olive-sided Flycatcher       | <i>Contopus cooperi</i>           |                 |               | Present-M               |                              |
| Eastern Wood-Pewee           | <i>Contopus virens</i>            |                 |               | Present-B               |                              |
| Black Vulture                | <i>Coragyps atratus</i>           |                 |               | Present-B               |                              |
| American Crow                | <i>Corvus brachyrhynchos</i>      |                 |               | Present-YR              |                              |
| Yellow Rail                  | <i>Coturnicops noveboracensis</i> |                 |               | Potential-M             |                              |
| Blue Jay                     | <i>Cyanocitta cristata</i>        |                 |               | Present-YR              |                              |
| Trumpeter Swan               | <i>Cygnus buccinator</i>          |                 |               | Present-M               |                              |
| Tundra Swan                  | <i>Cygnus columbianus</i>         |                 |               | Present-M               |                              |
| Mute Swan                    | <i>Cygnus olor</i>                |                 |               | Present-M               |                              |
| Black-throated Warbler       | <i>Dendroica caerulescens</i>     |                 |               | Present-M               |                              |
| Bay-breasted Warbler         | <i>Dendroica castanea</i>         |                 |               | Present-M               |                              |
| Cerulean Warbler             | <i>Dendroica cerulea</i>          | FSC (R/D)       | E             | Present-B               | Likely                       |
| Yellow-rumped Warbler        | <i>Dendroica coronata</i>         |                 |               | Present-M               |                              |
| Prairie Warbler              | <i>Dendroica discolor</i>         |                 |               | Present-B               |                              |
| Yellow-throated Warbler      | <i>Dendroica dominica</i>         |                 |               | Present-B               |                              |
| Blackburnian Warbler         | <i>Dendroica fusca</i>            |                 |               | Present-M               |                              |
| Kirtland's Warbler           | <i>Dendroica kirtlandii</i>       | E               | E             | Potential-M             |                              |
| Magnolia Warbler             | <i>Dendroica magnolia</i>         |                 |               | Present-M               |                              |
| Palm Warbler                 | <i>Dendroica palmarum</i>         |                 |               | Present-M               |                              |
| Chestnut-sided Warbler       | <i>Dendroica pensylvanica</i>     |                 |               | Present-B?              |                              |
| Yellow Warbler               | <i>Dendroica petechia</i>         |                 |               | Present-B               |                              |
| Pine Warbler                 | <i>Dendroica pinus</i>            |                 |               | Present-M               |                              |
| Blackpoll Warbler            | <i>Dendroica striata</i>          |                 |               | Present-M               |                              |
| Cape May Warbler             | <i>Dendroica tigrina</i>          |                 |               | Present-M               |                              |
| Black-throated Green Warbler | <i>Dendroica virens</i>           |                 |               | Present-M(B?)           |                              |
| Bobolink                     | <i>Dolichonyx oryzivorus</i>      | FSC (R/D)       |               | Present-M               |                              |
| Pileated Woodpecker          | <i>Dryocopus pileatus</i>         |                 |               | Present-YR              |                              |
| Gray Catbird                 | <i>Dumetella carolinensis</i>     |                 |               | Present-B               |                              |
| Little Blue Heron            | <i>Egretta caerulea</i>           |                 |               | Present-M               |                              |
| Snowy Egret                  | <i>Egretta thula</i>              |                 |               | Present-M               |                              |
| Alder Flycatcher             | <i>Empidonax alnorum</i>          |                 |               | Present-M               |                              |
| Yellow-bellied Flycatcher    | <i>Empidonax flaviventris</i>     |                 |               | Present-M               |                              |

**Table F-2. Bird Species Known to Occur and/or with the Potential to Occur at Big Oaks NWR and Jefferson Range**

| Common Name            | Scientific Name                   | Federal Status* | State Status* | Status on Big Oaks NWR* | Potential on Jefferson Range |
|------------------------|-----------------------------------|-----------------|---------------|-------------------------|------------------------------|
| Least Flycatcher       | <i>Empidonax minimus</i>          |                 |               | Present-M               |                              |
| Willow Flycatcher      | <i>Empidonax traillii</i>         |                 |               | Present-B               |                              |
| Acadian Flycatcher     | <i>Empidonax virescens</i>        |                 |               | Present-B               |                              |
| Horned Lark            | <i>Eremophila alpestris</i>       |                 |               | Present-YR              |                              |
| Rusty Blackbird        | <i>Euphagus carolinus</i>         |                 |               | Present-M               |                              |
| Brewer's Blackbird     | <i>Euphagus cyanocephalus</i>     |                 |               | Present-M               |                              |
| Merlin                 | <i>Falco columbarius</i>          |                 |               | Present-M               |                              |
| Peregrine Falcon       | <i>Falco peregrinus</i>           |                 | E             | Suspect-M               |                              |
| American Kestrel       | <i>Falco sparverius</i>           |                 |               | Present-YR              |                              |
| American Coot          | <i>Fulica americana</i>           |                 |               | Present-M               |                              |
| Common Snipe           | <i>Gallinago gallinago</i>        |                 |               | Present-M               |                              |
| Common Loon            | <i>Gavia immer</i>                |                 |               | Present-M               |                              |
| Common Yellowthroat    | <i>Geothlypis trichas</i>         |                 |               | Present-B               |                              |
| Sandhill Crane         | <i>Grus canadensis</i>            |                 | T             | Present-M               |                              |
| Blue Grosbeak          | <i>Guiraca caerulea</i>           |                 |               | Present-B               |                              |
| Bald Eagle             | <i>Haliaeetus leucocephalus</i>   | DL              | E             | Present-M               | Likely                       |
| Worm-eating warbler    | <i>Helmitheros vermivorus</i>     |                 | SC            | Present-B               |                              |
| Barn Swallow           | <i>Hirundo rustica</i>            |                 |               | Present-B               |                              |
| Wood Thrush            | <i>Hylocichla mustelina</i>       |                 |               | Present-B               |                              |
| Yellow-breasted Chat   | <i>Icteria virens</i>             |                 |               | Present-B               |                              |
| Baltimore Oriole       | <i>Icterus galbula</i>            |                 |               | Present-B               |                              |
| Orchard Oriole         | <i>Icterus spurius</i>            |                 |               | Present-B               |                              |
| Least Bittern          | <i>Ixobrychus exilis</i>          |                 | E             | Potential-B             |                              |
| Dark-eyed Junco        | <i>Junco hyemalis</i>             |                 |               | Present-M               |                              |
| Loggerhead Shrike      | <i>Lanius ludovicianus</i>        | FSC (R/D)       | SC            | Present-B               |                              |
| Ring-billed Gull       | <i>Larus delawarensis</i>         |                 |               | Present-M               |                              |
| Black Rail             | <i>Laterallus jamaicensis</i>     |                 |               | Present-M               |                              |
| Swainson's Warbler     | <i>Limnothlypis swainsonii</i>    |                 |               | Present-B               |                              |
| Marbled Godwit         | <i>Limosa fedoa</i>               |                 |               | Present-M               |                              |
| Hooded Merganser       | <i>Lophodytes cucullatus</i>      |                 |               | Present-M               |                              |
| Red Crossbill          | <i>Loxia curvirostra</i>          |                 |               | Potential-M             |                              |
| Red-bellied Woodpecker | <i>Melanerpes carolinus</i>       |                 |               | Present-YR              |                              |
| Red-headed Woodpecker  | <i>Melanerpes erythrocephalus</i> |                 |               | Present-YR              |                              |
| Wild Turkey            | <i>Meleagris gallopavo</i>        |                 |               | Present-YR              |                              |
| Swamp Sparrow          | <i>Melospiza georgiana</i>        |                 |               | Present-M               |                              |

**Table F-2. Bird Species Known to Occur and/or with the Potential to Occur at Big Oaks NWR and Jefferson Range**

| Common Name                | Scientific Name                  | Federal Status* | State Status* | Status on Big Oaks NWR* | Potential on Jefferson Range |
|----------------------------|----------------------------------|-----------------|---------------|-------------------------|------------------------------|
| Lincoln's Sparrow          | <i>Melospiza lincolnii</i>       |                 |               | Present-M               |                              |
| Song Sparrow               | <i>Melospiza melodia</i>         |                 |               | Present-B               |                              |
| Red-breasted Merganser     | <i>Mergus serrator</i>           |                 |               | Present-M               |                              |
| Northern Mockingbird       | <i>Mimus polyglottos</i>         |                 |               | Present-B               |                              |
| Black-and-White Warbler    | <i>Mniotilta varia</i>           |                 | SC            | Present-B               | Likely                       |
| Brown-headed Cowbird       | <i>Molothrus ater</i>            |                 |               | Present-B               |                              |
| Great Crested Flycatcher   | <i>Myiarchus crinitus</i>        |                 |               | Present-B               |                              |
| Yellow-crowned Night-Heron | <i>Nyctanassa violacea</i>       |                 | E             | Potential-B             | Likely                       |
| Black-crowned Night-Heron  | <i>Nycticorax nycticorax</i>     |                 | E             | Present-M               |                              |
| Connecticut Warbler        | <i>Oporornis agilis</i>          |                 |               | Present-M               |                              |
| Kentucky Warbler           | <i>Oporornis formosus</i>        |                 |               | Present-B               |                              |
| Mourning Warbler           | <i>Oporornis philadelphia</i>    |                 |               | Present-M               |                              |
| Eastern Screech Owl        | <i>Otus asio</i>                 |                 |               | Present-YR              |                              |
| Ruddy Duck                 | <i>Oxyura jamaicensis</i>        |                 |               | Present-M               |                              |
| Osprey                     | <i>Pandion haliaetus</i>         |                 | E             | Present-M               |                              |
| Northern Parula            | <i>Parula pitaiyumi</i>          |                 |               | Present-B               |                              |
| House Sparrow              | <i>Passer domesticus</i>         |                 |               | Present-YR              |                              |
| Savannah Sparrow           | <i>Passerculus sandwichensis</i> |                 |               | Present-B               |                              |
| Fox Sparrow                | <i>Passerella iliaca</i>         |                 |               | Present-M               |                              |
| Indigo Bunting             | <i>Passerina cyanea</i>          |                 |               | Present-B               |                              |
| Cliff Swallow              | <i>Petrochelidon pyrrhonota</i>  |                 |               | Potential-B             |                              |
| Double-crested Cormorant   | <i>Phalacrocorax auritus</i>     | FSC (N)         |               | Present-M               |                              |
| Ring-necked Pheasant       | <i>Phasianus colchicus</i>       |                 |               | Present-YR              |                              |
| Rose-breasted Grosbeak     | <i>Pheucticus ludovicianus</i>   |                 |               | Present-M               |                              |
| Downy Woodpecker           | <i>Picoides pubescens</i>        |                 |               | Present-YR              |                              |
| Hairy Woodpecker           | <i>Picoides villosus</i>         |                 |               | Present-YR              |                              |
| Eastern Towhee             | <i>Pipilo erythrophthalmus</i>   |                 |               | Present-B               |                              |
| Scarlet Tanager            | <i>Piranga olivacea</i>          |                 |               | Present-B               |                              |
| Summer Tanager             | <i>Piranga rubra</i>             |                 |               | Present-B               |                              |
| Snow Bunting               | <i>Plectrophenax nivalis</i>     |                 |               | Present-M               |                              |
| Horned Grebe               | <i>Podiceps auritus</i>          |                 |               | Present-M               |                              |
| Pied-billed Grebe          | <i>Podilymbus podiceps</i>       |                 |               | Present-M               |                              |
| Black-capped Chickadee     | <i>Poecile atricapilla</i>       |                 |               | Present-M               |                              |
| Carolina Chickadee         | <i>Poecile carolinensis</i>      |                 |               | Present-YR              |                              |
| Blue-gray Gnatcatcher      | <i>Polioptila caerulea</i>       |                 |               | Present-B               |                              |



**Table F-2. Bird Species Known to Occur and/or with the Potential to Occur at Big Oaks NWR and Jefferson Range**

| Common Name                   | Scientific Name                   | Federal Status* | State Status* | Status on Big Oaks NWR* | Potential on Jefferson Range |
|-------------------------------|-----------------------------------|-----------------|---------------|-------------------------|------------------------------|
| Vesper Sparrow                | <i>Pooecetes gramineus</i>        |                 |               | Present-M               |                              |
| Sora                          | <i>Porzana carolina</i>           |                 |               | Present-B               |                              |
| Purple Martin                 | <i>Progne subis</i>               |                 |               | Present-B               |                              |
| Prothonotary Warbler          | <i>Protonotaria citrea</i>        |                 |               | Present-B               |                              |
| Common Grackle                | <i>Quiscalus quiscula</i>         |                 |               | Present-B               |                              |
| King Rail                     | <i>Rallus elegans</i>             |                 | E             | Potential-B             | Likely                       |
| Virginia Rail                 | <i>Rallus limicola</i>            |                 | SC            | Present-M               |                              |
| Golden-crowned Kinglet        | <i>Regulus satrapa</i>            |                 |               | Present-M               |                              |
| Bank Swallow                  | <i>Riparia riparia</i>            |                 |               | Present-B               |                              |
| Ruby-crowned Kinglet          | <i>Rugulus calendula</i>          |                 |               | Present-M               |                              |
| Eastern Phoebe                | <i>Sayornis phoebe</i>            |                 |               | Present-B               |                              |
| American Woodcock             | <i>Scolopax minor</i>             | FSC (R/D)       |               | Present-B               |                              |
| Ovenbird                      | <i>Seiurus aurocapillus</i>       |                 |               | Present-B               |                              |
| Louisiana Waterthrush         | <i>Seiurus motacilla</i>          |                 |               | Present-B               |                              |
| Northern Waterthrush          | <i>Seiurus noveboracensis</i>     |                 |               | Present-M               |                              |
| American Redstart             | <i>Setophaga ruticilla</i>        |                 |               | Present-B?              |                              |
| Eastern Bluebird              | <i>Sialia sialis</i>              |                 |               | Present-B               |                              |
| Red-breasted Nuthatch         | <i>Sitta canadensis</i>           |                 |               | Present-M               |                              |
| White-breasted Nuthatch       | <i>Sitta carolinensis</i>         |                 |               | Present-YR              |                              |
| Yellow-bellied Sapsucker      | <i>Sphyrapicus varius</i>         |                 |               | Present-M               |                              |
| Dickcissel                    | <i>Spiza americana</i>            | FSC (R/D)       |               | Present-B               |                              |
| American Tree Sparrow         | <i>Spizella arborea</i>           |                 |               | Present-M               |                              |
| Clay-colored Sparrow          | <i>Spizella pallida</i>           |                 |               | Potential-M             |                              |
| Chipping Sparrow              | <i>Spizella passerina</i>         |                 |               | Present-B               |                              |
| Field Sparrow                 | <i>Spizella pusilla</i>           |                 |               | Present-B               |                              |
| Northern Rough-winged Swallow | <i>Stelgidopteryx serripennis</i> |                 |               | Present-B               |                              |
| Barred Owl                    | <i>Strix varia</i>                |                 |               | Present-YR              |                              |
| Eastern Meadowlark            | <i>Sturnella magna</i>            | FSC (R/D)       |               | Present-B               |                              |
| European Starling             | <i>Sturnus vulgaris</i>           |                 |               | Present-YR              |                              |
| Tree Swallow                  | <i>Tachycineta bicolor</i>        |                 |               | Present-B               |                              |
| Carolina Wren                 | <i>Thryothorus ludovicianus</i>   |                 |               | Present-B               |                              |
| Brown Thrasher                | <i>Toxostoma rufum</i>            |                 |               | Present-B               |                              |
| Lesser Yellowlegs             | <i>Tringa flavipes</i>            |                 |               | Present-M               |                              |
| Greater Yellowlegs            | <i>Tringa melanoleuca</i>         |                 |               | Present-M               |                              |
| Solitary Sandpiper            | <i>Tringa solitaria</i>           |                 |               | Present-M               |                              |

**Table F-2. Bird Species Known to Occur and/or with the Potential to Occur at Big Oaks NWR and Jefferson Range**

| Common Name            | Scientific Name                | Federal Status* | State Status* | Status on Big Oaks NWR* | Potential on Jefferson Range |
|------------------------|--------------------------------|-----------------|---------------|-------------------------|------------------------------|
| House Wren             | <i>Troglodytes aedon</i>       |                 |               | Present-B               |                              |
| Winter Wren            | <i>Troglodytes troglodytes</i> |                 |               | Present-M               |                              |
| American Robin         | <i>turdus migratorius</i>      |                 |               | Present-B               |                              |
| Eastern Kingbird       | <i>Tyrannus tyrannus</i>       |                 |               | Present-B               |                              |
| Barn Owl               | <i>Tyto alba</i>               |                 | E             | Potential-YR            | Likely                       |
| Orange-crowned Warbler | <i>Vermivora celata</i>        |                 |               | Present-M               |                              |
| Golden-winged Warbler  | <i>Vermivora chrysoptera</i>   |                 | E             | Present-M               | Likely                       |
| Tennessee Warbler      | <i>Vermivora peregrina</i>     |                 |               | Present-M               |                              |
| Blue-winged Warbler    | <i>Vermivora pinus</i>         |                 |               | Present-B               |                              |
| Nashville Warbler      | <i>Vermivora ruficapilla</i>   |                 |               | Present-M               |                              |
| Bell's Vireo           | <i>Vireo bellii</i>            |                 |               | Present-B               |                              |
| Yellow-throated Vireo  | <i>Vireo flavifrons</i>        |                 |               | Present-B               |                              |
| Warbling Vireo         | <i>Vireo gilvus</i>            |                 |               | Present-B               |                              |
| White-eyed Vireo       | <i>Vireo griseus</i>           |                 |               | Present-B               |                              |
| Red-eyed Vireo         | <i>Vireo olivaceus</i>         |                 |               | Present-B               |                              |
| Philadelphia Vireo     | <i>Vireo philadelphicus</i>    |                 |               | Present-M               |                              |
| Blue-headed Vireo      | <i>Vireo solitarius</i>        |                 |               | Present-M               |                              |
| Canada Warbler         | <i>Wilsonia canadensis</i>     |                 | SC            | Present-M               | Likely                       |
| Hooded Warbler         | <i>Wilsonia citrina</i>        |                 | SC            | Present-B               | Likely                       |
| Wilson's Warbler       | <i>Wilsonia pusilla</i>        |                 |               | Present-M               |                              |
| Mourning Dove          | <i>Zenaida macroura</i>        |                 |               | Present-YR              |                              |
| White-throated Sparrow | <i>Zonotrichia albicollis</i>  |                 |               | Present-M               |                              |
| White-crowned Sparrow  | <i>Zonotrichia leucophrys</i>  |                 |               | Present-M               |                              |

**FEDERAL STATUS**

E = Endangered = Danger of extinction throughout range

FSC = Federal Species of Concern = This is not a legal designation; species may need concentrated conservation actions.

R/D = rare/declining; REC = recreational/economic value; N = nuisance species

**STATE STATUS**

E = Endangered – Any animal species whose prospects for survival or recruitment within the state are in immediate jeopardy and are in danger of disappearing from the state. This includes all species classified as endangered by the federal government which occur in Indiana.

SC = Special Concern – Any animal species about which some problems of limited abundance or distribution in Indiana are known or suspected and should be closely monitored.

**PRESENCE CLASSIFICATIONS**

Present = known to occur, Suspected = some evidence that it occurs; Potential = potentially within the species range

B = breeds on site, M = found on site during migratory periods, YR = found on site year round

Unlikely = Species is unlikely on Jefferson Range due to lack of habitat

Likely = Species is likely on Jefferson Range based on habitat and known locations on Big Oaks NWR

**Table F-3. Butterfly Species Known to Occur and/or with the Potential to Occur at Big Oaks NWR and Jefferson Range**

| Common Name              | Scientific Name                    | Federal Status | State Status | Status on Big Oaks NWR | Potential on Jefferson Range |
|--------------------------|------------------------------------|----------------|--------------|------------------------|------------------------------|
| Hoary Edge               | <i>Achalarus lyciades</i>          |                |              | Present                |                              |
| Delaware Skipper         | <i>Anatrytone logan</i>            |                |              | Present                |                              |
| Least Skipper            | <i>Ancyloxypha numitor</i>         |                |              | Present                |                              |
| West Virginia White      | <i>Artogeia virginiensis</i>       |                | R            | Potential              | Likely                       |
| Hackberry Emperor        | <i>Asterocampa celtis</i>          |                |              | Present                |                              |
| Sachem                   | <i>Atalopedes campestris</i>       |                |              | Present                |                              |
| Dusted Skipper           | <i>Atrytonopsis hianna</i>         |                | T            | Potential              | Likely                       |
| Pipevine Swallowtail     | <i>Battus philenor</i>             |                |              | Present                |                              |
| Olive-Juniper Hairstreak | <i>Callophrys gryneus</i>          |                |              | Present                |                              |
| Red-banded Hairstreak    | <i>Calycopis cecrops</i>           |                |              | Present                |                              |
| Summer Azure             | <i>Celastrina ladon neglecta</i>   |                |              | Present                |                              |
| Common Wood-Nymph        | <i>Cercyonis pegala</i>            |                |              | Present                |                              |
| Orange Sulphur           | <i>Colias eurytheme</i>            |                |              | Present                |                              |
| Clouded Sulphur          | <i>Colias philodice</i>            |                |              | Present                |                              |
| Monarch                  | <i>Danaus plexippus</i>            |                |              | Present                |                              |
| Northern Pearly-Eye      | <i>Enodia anthedon</i>             |                |              | Present                |                              |
| Silver-spotted Skipper   | <i>Epargyreus clarus</i>           |                |              | Present                |                              |
| Wild Indigo Duskywing    | <i>Erynnis babbisiae</i>           |                |              | Present                |                              |
| Horace's Duskywing       | <i>Erynnis horatius</i>            |                |              | Present                |                              |
| Dreamy Duskywing         | <i>Erynnis icelus</i>              |                |              | Present                |                              |
| Mottled Duskywing        | <i>Erynnis martialis</i>           |                | E            | Potential              | Likely                       |
| Dion Skipper             | <i>Euphyes dion</i>                |                |              | Present                |                              |
| Dun Skipper              | <i>Euphyes vestris</i>             |                |              | Present                |                              |
| Variegated Fritillary    | <i>Euptoieta claudia</i>           |                |              | Present                |                              |
| Little Yellow            | <i>Eurema lisa</i>                 |                |              | Present                |                              |
| Zebra Swallowtail        | <i>Eurytides marcellus</i>         |                |              | Present                |                              |
| Eastern Tailed-Blue      | <i>Everes comyntas</i>             |                |              | Present                |                              |
| Fiery Skipper            | <i>Hylephila phyleus</i>           |                |              | Present                |                              |
| Common Buckeye           | <i>Junonia coenia</i>              |                |              | Present                |                              |
| American Snout           | <i>Libytheana carinenta</i>        |                |              | Present                |                              |
| Viceroy                  | <i>Limenitis archippus</i>         |                |              | Present                |                              |
| Red-spotted Purple       | <i>Limenitis arthemis astyanax</i> |                |              | Present                |                              |
| Little Wood-Satyr        | <i>Megisto cymela</i>              |                |              | Present                |                              |
| Swarthy Skipper          | <i>Nastra lherminier</i>           |                |              | Present                |                              |
| Morning Cloak            | <i>Nymphalis antiopa</i>           |                |              | Present                |                              |
| Giant Swallowtail        | <i>Papilio cressphontes</i>        |                |              | Present                |                              |

**Table F-3. Butterfly Species Known to Occur and/or with the Potential to Occur at Big Oaks NWR and Jefferson Range**

| Common Name               | Scientific Name                  | Federal Status | State Status | Status on Big Oaks NWR | Potential on Jefferson Range |
|---------------------------|----------------------------------|----------------|--------------|------------------------|------------------------------|
| Eastern Tiger Swallowtail | <i>Papilio glaucus</i>           |                |              | Present                |                              |
| Black Swallowtail         | <i>Papilio polyxenes</i>         |                |              | Present                |                              |
| Spicebush Swallowtail     | <i>Papilio troilus</i>           |                |              | Present                |                              |
| Cloudless Sulphur         | <i>Phoebis sennae</i>            |                |              | Present                |                              |
| Common Sootywing          | <i>Pholisora catullus</i>        |                |              | Present                |                              |
| Pearl Crescent            | <i>Phyciodes tharos</i>          |                |              | Present                |                              |
| Cabbage White             | <i>Pieris rapae</i>              |                |              | Present                |                              |
| Hobomok Skipper           | <i>Poanes hobomok</i>            |                |              | Present                |                              |
| Zabulon Skipper           | <i>Poanes zabulon</i>            |                |              | Present                |                              |
| Crossline Skipper         | <i>Polites origenes</i>          |                |              | Present                |                              |
| Tawny-edged Skipper       | <i>Polites themistocles</i>      |                |              | Present                |                              |
| Eastern Comma             | <i>Polygonia comma</i>           |                |              | Present                |                              |
| Question Mark             | <i>Polygonia interrogationis</i> |                |              | Present                |                              |
| Little Glassywing         | <i>Pompeius verna</i>            |                |              | Present                |                              |
| Banded Hairstreak         | <i>Satyrrium caalanus</i>        |                |              | Present                |                              |
| Great Spangled Fritillary | <i>Speyeria cybele</i>           |                |              | Present                |                              |
| Regal Fritillary          | <i>Speyeria idalia</i>           |                | E            | Potential              | Likely                       |
| Gray Hairstreak           | <i>Strymon melinus</i>           |                |              | Present                |                              |
| Southern Cloudywing       | <i>Thorybes bathyllus</i>        |                |              | Present                |                              |
| Red Admiral               | <i>Vanessa atalanta</i>          |                |              | Present                |                              |
| Painted Lady              | <i>Vanessa cardui</i>            |                |              | Present                |                              |
| American Lady             | <i>Vanessa virginiensis</i>      |                |              | Present                |                              |
| Northern Broken-Dash      | <i>Wallengrenia egeremet</i>     |                |              | Present                |                              |

**STATE STATUS**

E = Endangered – Any animal species whose prospects for survival or recruitment within the state are in immediate jeopardy and are in danger of disappearing from the state. This includes all species classified as endangered by the federal government which occur in Indiana.

**PRESENCE CLASSIFICATIONS**

Present = known to occur, Potential = potentially within the species range

Unlikely = Species is unlikely on Jefferson Range due to lack of habitat

Likely = Species is likely on Jefferson Range based on habitat and known locations on Big Oaks NWR

**Table F-4. Crustacean and Mussel Species Known to Occur and/or with the Potential to Occur at Big Oaks NWR and Jefferson Range**

| Common Name  | Scientific Name                     | Federal Status* | State Status* | Status on Big Oaks NWR* | Potential on Jefferson Range |
|--|-------------------------------------|-----------------|---------------|-------------------------|------------------------------|
| <b>Crustaceans</b>   |                                     |                 |               |                         |                              |
| Rusty Crayfish   | <i>Orconectes rusticus</i>          | FSC (N)         |               | Present                 | Unlikely                     |
| <b>Mussels</b>   |                                     |                 |               |                         |                              |
| Cyclinder Papershells  | <i>Anodontooides ferrussacianus</i> |                 |               | Present                 | Unlikely                     |
| Wabash Pigtoe  | <i>Fusconaia flava</i>              |                 |               | Present                 | Unlikely                     |
| Pocketbook   | <i>Lampsilis cardium</i>            |                 |               | Present                 | Unlikely                     |
| Fat Mucket   | <i>Lampsilis siliquoidea</i>        |                 |               | Present                 | Unlikely                     |
| White heelsplitter   | <i>Lasmigona complanata</i>         |                 |               | Present                 | Unlikely                     |
| Floater  | <i>Pyganodon (Anodonta) grandis</i> |                 |               | Present                 | Unlikely                     |
| Salamander mussel  | <i>Simpsonaias ambigua</i>          |                 | SC            | Present                 | Unlikely                     |
| Rainbow Creekshell   | <i>Villosa iris</i>                 |                 |               | Present                 | Unlikely                     |
| Little Spectacle Case  | <i>Villosa lienosa</i>              |                 | SC            | Present                 | Unlikely                     |
| <p><b>FEDERAL STATUS</b><br/> FSC = Federal Species of Concern = This is not a legal designation; species may need concentrated conservation actions.<br/> N = nuisance species</p> <p><b>STATE STATUS</b><br/> SC = Special Concern – Any animal species about which some problems of limited abundance or distribution in Indiana are known or suspected and should be closely monitored.</p> <p><b>PRESENCE CLASSIFICATIONS</b><br/> Present = known to occur, Suspected = some evidence that it occurs<br/> Potential = potentially within the species range<br/> Unlikely = Species is unlikely on Jefferson Range due to lack of habitat<br/> Likely = Species is likely on Jefferson Range based on habitat and known locations on Big Oaks NWR</p> |                                     |                 |               |                         |                              |

**Table F-5. Mammal Species Known to Occur and/or with the Potential to Occur at Big Oaks NWR and Jefferson Range**

| Common Name                 | Scientific Name                  | Federal Status | State Status | Status on Big Oaks NWR | Potential on Jefferson Range |
|-----------------------------|----------------------------------|----------------|--------------|------------------------|------------------------------|
| Northern Short-tailed Shrew | <i>Blarina brevicauda</i>        |                |              | Present                |                              |
| Coyote                      | <i>Canis latrans</i>             |                |              | Present                |                              |
| American Beaver             | <i>Castor canadensis</i>         |                |              | Present                |                              |
| Least Shrew                 | <i>Cryptotis parva</i>           |                |              | Present                |                              |
| Virginia Opossum            | <i>Didelphis virginiana</i>      |                |              | Present                |                              |
| Big Brown Bat               | <i>Eptesicus fuscus</i>          |                |              | Present                |                              |
| Southern Flying Squirrel    | <i>Glaucomys volans</i>          |                |              | Present                |                              |
| Silver-haired Bat           | <i>Lasionycteris noctivagans</i> |                |              | Suspected-M            |                              |
| Eastern Red Bat             | <i>Lasiurus borealis</i>         |                |              | Present                |                              |
| Hoary Bat                   | <i>Lasiurus cinereus</i>         |                |              | Present                |                              |
| Seminole Bat                | <i>Lasiurus seminolus</i>        |                |              | Present                |                              |
| Northern River Otter        | <i>Lutra canadensis</i>          |                | SC           | Present                | Likely                       |
| Bobcat                      | <i>Lynx rufus</i>                |                | SC           | Present                |                              |
| Woodchuck                   | <i>Marmota monax</i>             |                |              | Present                |                              |
| Striped Skunk               | <i>Mephitis mephitis</i>         |                |              | Present                |                              |
| Prairie Vole                | <i>Microtus ochrogaster</i>      |                |              | Present                |                              |
| Meadow Vole                 | <i>Microtus pennsylvanicus</i>   |                |              | Present                |                              |
| Woodland Vole               | <i>Microtus pinetorum</i>        |                |              | Present                |                              |
| Long-tailed Weasel          | <i>Mustela frenata</i>           |                |              | Present                |                              |
| Least weasel                | <i>Mustel nivalis</i>            |                | SC           | Potential              | Likely                       |
| Mink                        | <i>Mustela vison</i>             |                |              | Present                |                              |
| Gray Bat                    | <i>Myotis grisescens</i>         | E              | E            | Potential-M            |                              |
| Little Brown Myotis         | <i>Myotis lucifugus</i>          |                |              | Present                |                              |
| Northern Myotis             | <i>Myotis septentrionalis</i>    |                |              | Present                |                              |
| Indiana Bat                 | <i>Myotis sodalis</i>            | E              | E            | Present-B              | Likely                       |
| Evening Bat                 | <i>Nycticeius humeralis</i>      |                | E            | Potential              | Likely                       |
| White-tailed Deer           | <i>Odocoileus virginianus</i>    |                |              | Present                |                              |
| Common Muskrat              | <i>Ondatra zibethicus</i>        |                |              | Present                |                              |
| White-footed Mouse          | <i>Peromyscus leucopus</i>       |                |              | Present                |                              |
| Deer Mouse                  | <i>Peromyscus maniculatus</i>    |                |              | Present                |                              |
| Eastern Pipistrelle         | <i>Pipistrellus subflavus</i>    |                |              | Present                |                              |
| Common Raccoon              | <i>Procyon lotor</i>             |                |              | Present                |                              |
| Eastern Mole                | <i>Scalopus aquaticus</i>        |                |              | Present                |                              |
| Eastern Gray Squirrel       | <i>Sciurus carolinensis</i>      |                |              | Present                |                              |
| Fox Squirrel                | <i>Sciurus niger</i>             |                |              | Present                |                              |
| Masked Shrew                | <i>Sorex cinereus</i>            |                |              | Present                |                              |

**Table F-5. Mammal Species Known to Occur and/or with the Potential to Occur at Big Oaks NWR and Jefferson Range**

| Common Name          | Scientific Name                 | Federal Status | State Status | Status on Big Oaks NWR | Potential on Jefferson Range |
|----------------------|---------------------------------|----------------|--------------|------------------------|------------------------------|
| Smoky Shrew          | <i>Sorex fumeus</i>             |                | SC           | Potential              |                              |
| Southeastern Shrew   | <i>Sorex longirostris</i>       |                |              | Potential              |                              |
| Eastern Cottontail   | <i>Sylvilagus floridanus</i>    |                |              | Present                |                              |
| Southern Bog Lemming | <i>Synaptomys cooperi</i>       |                |              | Potential              |                              |
| Eastern Chipmunk     | <i>Tamias striatus</i>          |                |              | Present                |                              |
| American Badger      | <i>Taxidea taxus</i>            |                | SC           | Potential              |                              |
| Gray Fox             | <i>Urocyon cinereoargenteus</i> |                |              | Present                |                              |
| Red Fox              | <i>Vulpes vulpes</i>            |                |              | Present                |                              |
| Meadow Jumping Mouse | <i>Zapus hudsonius</i>          |                |              | Potential              |                              |

**FEDERAL STATUS**

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SC = Special Concern – Any animal species about which some problems of limited abundance or distribution in Indiana are known or suspected and should be closely monitored.

**PRESENCE CLASSIFICATIONS**

Present = known to occur; Suspected = some evidence that it occurs

Potential = potentially within the species range

B = breeds on site, M = found on site during migratory periods, YR = found on site year round

Unlikely = Species is unlikely on Jefferson Range due to lack of habitat

Likely = Species is likely on Jefferson Range based on habitat and known locations on Big Oaks NWR

**Table F-6. Reptile Species Known to Occur and/or with the Potential to Occur at Big Oaks NWR and Jefferson Range**

| Common Name  | Scientific Name                          | Federal Status | State Status | Status on Big Oaks NWR | Potential on Jefferson Range |
|--|--|----------------|--------------|------------------------|------------------------------|
| Northern Copperhead  | <i>Agkistrodon contortrix mokasen</i>    |                |              | Present                |                              |
| Eastern Spiny Softshell  | <i>Apalone s. spinifera</i>              |                |              | Present                |                              |
| Midwest Worm Snake   | <i>Carphophis amoenus helenae</i>        |                |              | Suspected              |                              |
| Common Snapping Turtle   | <i>Chelydra s. serpentina</i>            |                |              | Present                |                              |
| Midland Painted Turtle   | <i>Chrysemys picta marginata</i>         |                | E            | Present                | Likely                       |
| Kirtland's Snake   | <i>Clonophis kirtlandii</i>              |                |              | Present                |                              |
| Southern Black Racer   | <i>Coluber constrictor priapus</i>       |                |              | Present                |                              |
| Northern Ringneck Snake  | <i>Diadophis punctatus edwardsii</i>     |                |              | Present                |                              |
| Black Rat Snake  | <i>Elaphe o. obsoleta</i>                |                |              | Present                |                              |
| Five-lined Skink   | <i>Eumeces fasciatus</i>                 |                |              | Present                |                              |
| Broadhead Skink  | <i>Eumeces laticeps</i>                  |                |              | Suspected              |                              |
| Common Map Turtle  | <i>Graptemys geographica</i>             |                |              | Present                |                              |
| E. Hognose Snake   | <i>Heterodon platirhinos</i>             |                |              | Present                |                              |
| Milk Snake   | <i>Lampropeltis triangulum</i>           |                |              | Present                |                              |
| N. Copperbelly Watersnake  | <i>Nerodia erythrogaster neglecta</i>    |                | E            | Potential              |                              |
| Midland Water Snake  | <i>Nerodia sipedon pleuralis</i>         |                |              | Present                |                              |
| Rough Green Snake  | <i>Opheodrys aestivus</i>                |                |              | Suspected              |                              |
| Queen Snake  | <i>Regina septemvittata</i>              |                |              | Present                |                              |
| Northern Fence Lizard  | <i>Sceloporus undulatus hyacinthinus</i> |                |              | Suspected              |                              |
| Common Musk Turtle   | <i>Sternotherus odoratus</i>             |                |              | Present                |                              |
| Midland Brown Snake  | <i>Storeria dekayi wrightorum</i>        |                |              | Present                |                              |
| Eastern Box Turtle   | <i>Terrapene c. carolina</i>             |                |              | Present                |                              |
| E. Garter Snake  | <i>Thamnophis s. sirtalis</i>            |                |              | Present                |                              |
| Red-eared Slider   | <i>Trachemys scripta elegans</i>         |                |              | Suspected              |                              |
| <p><b>STATE STATUS</b><br/> E = Endangered – Any animal species whose prospects for survival or recruitment within the state are in immediate jeopardy and are in danger of disappearing from the state. This includes all species classified as endangered by the federal government which occur in Indiana.</p> <p><b>PRESENCE CLASSIFICATIONS</b></p> |  |                |              |                        |                              |



**Table F-6. Reptile Species Known to Occur and/or with the Potential to Occur at Big Oaks NWR and Jefferson Range**

| <b>Common Name</b>   | <b>Scientific Name</b> | <b>Federal Status</b> | <b>State Status</b> | <b>Status on Big Oaks NWR</b> | <b>Potential on Jefferson Range</b> |
|--|------------------------|-----------------------|---------------------|-------------------------------|-------------------------------------|
| Present = known to occur; Suspected = some evidence that it occurs<br>Potential = potentially within species range<br>Unlikely = Species is unlikely on Jefferson Range due to lack of habitat<br>Likely = Species is likely on Jefferson Range based on habitat and known locations on Big Oaks NWR |                        |                       |                     |                               |                                     |

**Table F-7. Rare Vascular Plant Species Known to Occur and/or with the Potential to Occur at Big Oaks NWR and Jefferson Range**

| Common Name              | Scientific Name                  | Federal Status | State Status | Status on Big Oaks NWR | Potential on Jefferson Range |
|--------------------------|----------------------------------|----------------|--------------|------------------------|------------------------------|
| Yellow Buckeye           | <i>Aesculus octandra</i>         |                | SC           | Present                |                              |
| Clustered Foxglove       | <i>Agalinis fasciculata</i>      |                | SC           | Present                | Likely                       |
| Silver Bluestem          | <i>Andropogon ternarius</i>      |                | SC           | Present                | Likely                       |
| Single-head Pussytoes    | <i>Antennaria solitaria</i>      |                | SC           | Present                | Likely                       |
| Wall-rue Spleenwort      | <i>Asplenium ruta-muraria</i>    |                | R            | Present                |                              |
| Twining Bartonian        | <i>Bartonia paniculata</i>       |                | SC           | Present                | Likely                       |
| Sparse-lobed Grape-fern  | <i>Botrychium biterminalatum</i> |                | SC           | Present                | Likely                       |
| Blunt-lobed Grape-fern   | <i>Botrychium oneidense</i>      |                | SC           | Present                | Likely                       |
| Thicket Sedge            | <i>Carex abscondita</i>          |                | SC           | Present                | Likely                       |
| Louisiana Sedge          | <i>Carex louisianica</i>         |                | SC           | Present                |                              |
| Pretty Sedge             | <i>Carex woodii</i>              |                | SC           | Present                | Likely                       |
| Spotted Wintergreen      | <i>Chimaphila maculata</i>       |                | SC           | Present                |                              |
| Black Bugbane            | <i>Cimicifuga racemosa</i>       |                | SC           | Present                |                              |
| Elliptical Rushfoil      | <i>Crotonopsis elliptica</i>     |                | E            | Present                | Likely                       |
| Crinkleroot              | <i>Dentaria diphylla</i>         |                | SC           | Present                | Likely                       |
| Round-leaved Boneset     | <i>Eupatorium rotundifolium</i>  |                | SC           | Present                | Likely                       |
| Narrow-leaved Sunflower  | <i>Helianthus angustifolius</i>  |                | E            | Present                | Likely                       |
| Goldenseal               | <i>Hydrastis canadensis</i>      |                | SC           | Present                | Likely                       |
| Clasping St. John's Wort | <i>Hypericum gymnanthum</i>      |                | E            | Present                | Likely                       |
| Ridged Yellow Flax       | <i>Linum striatum</i>            |                | WL           | Present                | Likely                       |
| Northern bog Clubmoss    | <i>Lycopodiella inundata</i>     |                | E            | Present                | Likely                       |
| Running Pine             | <i>Lycopodium clavatum</i>       |                | SC           | Present                | Likely                       |
| Tree Clubmoss            | <i>Lycopodium obscurum</i>       |                | R            | Present                | Likely                       |
| Climbing Fern            | <i>Lygodium palmatum</i>         |                | E            | Present                | Likely                       |
| American Pinesap         | <i>Monotropa hypopithes</i>      |                | SC           | Present                | Likely                       |
| Thread-like Naiad        | <i>Najas gracillima</i>          |                | E            | Present                | Likely                       |
| Small Sundrops           | <i>Oenothera perennis</i>        |                | R            | Present                | Likely                       |
| Illinois Woodsorrel      | <i>Oxalis illinoensis</i>        |                | SC           | Present                | Likely                       |
| American Ginseng         | <i>Panax quinquefolium</i>       |                | SC           | Present                | Likely                       |
| Dwarf Ginseng            | <i>Panax trifolius</i>           |                | WL           | Present                | Likely                       |
| Broom Panic-grass        | <i>Panicum scoparium</i>         |                | E            | Present                | Likely                       |
| Ragged-fringed Orchis    | <i>Platanthera lacera</i>        |                | SC           | Present                | Likely                       |
| Purple Fringeless Orchis | <i>Platanthera peramoena</i>     |                | SC           | Present                | Likely                       |
| Wolf Bluegrass           | <i>Poa wolfii</i>                |                | R            | Present                |                              |

**Table F-7. Rare Vascular Plant Species Known to Occur and/or with the Potential to Occur at Big Oaks NWR and Jefferson Range**

| Common Name            | Scientific Name                           | Federal Status | State Status | Status on Big Oaks NWR | Potential on Jefferson Range |
|------------------------|---|----------------|--------------|------------------------|------------------------------|
| Maryland Meadow-beauty | <i>Rhexia mariana</i> var. <i>mariana</i> |                | E            | Present                | Likely                       |
| Longbeak Arrowhead     | <i>Sagittaria australis</i>               |                | SC           | Present                | Likely                       |
| Carolina Willow        | <i>Salix caroliniana</i>                  |                | SC           | Present                | Unlikely                     |
| Weakstalk Bulrush      | <i>Scirpus purshianus</i>                 |                | R            | Present                |                              |
| Fewflower Nutrush      | <i>Scleria pauciflora</i>                 |                | SC           | Present                | Likely                       |
| Lesser Ladies'-tresses | <i>Spiranthes ovalis</i>                  |                | SC           | Present                | Likely                       |
| Little Ladies'-tresses | <i>Spiranthes tuberosa</i>                |                | SC           | Present                | Likely                       |
| Slick Seed Wild-bean   | <i>Strophostyles leiosperma</i>           |                | T            | Present                | Likely                       |
| Running Buffalo Clover | <i>Trifolium stoloniferum</i>             | E              | E            | Potential              |                              |
| False Hellebore        | <i>Veratrum woodii</i>                    |                | SC           | Present                |                              |
| Smooth White Violet    | <i>Viola blanda</i>                       |                | SC           | Present                | Likely                       |
| Barren Strawberry      | <i>Waldsteinia fragarioides</i>           |                | SC           | Present                |                              |
| Netted Chain-fern      | <i>Woodwardia areolata</i>                |                | R            | Present                | Likely                       |

**FEDERAL STATUS**

E = Endangered = Danger of extinction throughout range

**STATE STATUS**

E = Endangered – Any plant species whose prospects for survival or recruitment within the state are in immediate jeopardy and are in danger of disappearing from the state. This includes all species classified as endangered by the federal government which occur in Indiana. One to five extant populations in the state.

T = Threatened – Any species that is likely to become endangered within the state in the foreseeable future throughout all or a significant portion of its range. Six to ten extant populations within the state.

SC = Special Concern – Any species about which some problems of limited abundance or distribution in Indiana are known or suspected and should be closely monitored.

**PLANT CLASSIFICATIONS**

R = Rare – Eleven to twenty extant populations within the state

WL = Watch List – Greater than (>) 20 extant populations but populations are still considered at risk

**PRESENCE CLASSIFICATIONS**

Present = known to occur, Suspected = some evidence that it occurs, Potential = potentially within species range

Unlikely = Species is unlikely on Jefferson Range due to lack of habitat

Likely = Species is likely on Jefferson Range based on habitat and known locations on Big Oaks NWR

## APPENDIX G: NATURAL RESOURCES AND ENVIRONMENTAL REPORTS FROM JEFFERSON PROVING GROUND, JEFFERSON RANGE AND BIG OAKS NATIONAL WILDLIFE REFUGE

### Jefferson Range Reports

- ANG.** 1992. *Final Environmental Baseline Review, Air National Guard Range, Jefferson Proving Ground, Indiana*. Andrews Air Force Base, MD: Air National Guard Readiness Center.
- . 2001. *Final Environmental Assessment, Proposed Air National Guard Actions in Ohio and Indiana*. Andrews Air Force Base, MD: Air National Guard Readiness Center.
- INANG.** 2010. *Jefferson Range Comprehensive Range Plan*. Jefferson Range: Indiana Air National Guard.
- . 2011a. *Draft Integrated Pest Management Plan*. Jefferson Range: Indiana Air National Guard.
- . 2011b. *Integrated Cultural Resource Management Plan for the Jefferson Proving Ground/ Jefferson Range*. Jefferson Range: Indiana Air National Guard.

### Big Oak National Wildlife Refuge Reports

Some of these reports refer to JPG, but during the time USFWS had taken over natural resources management and before Big Oaks NWR was formed.

- Hedge, C.L., M.A. Homoya, P. Scott, and C. Baker.** 1999. *An Inventory of Special Plants within the US Army Jefferson Proving Ground, Phase II*. Indianapolis, Indiana: Indiana Department of Natural Resources.
- Lewis, J.J., and S.T. Rafail.** 2002. *The Subterranean Fauna of the Big Oaks National Wildlife Refuge*. Clarksville, Indiana: J. Lewis & Associates.
- Mallarach, J.M., and E. Schools.** 1998. *Jefferson Proving Ground Vegetation Mapping Final Report*. Indiana University.
- Miller, S., J.R. Robb, J. Lewis, and T. Vanosdol-Lewis.** 1999. *Endangered Species Subpermit Annual Report (Myotis sodalis & Myotis grisescens) Jefferson Proving Ground 1998-1999*. Madison, Indiana: US Fish & Wildlife Service.
- Robb, J.R., S.A. Miller, T. Vanosdol-Lewis, and J.P. Lewis.** 1999. *Production of Interior Forest and Grassland Birds on Jefferson Proving Ground*. Madison, Indiana: US Fish & Wildlife Service.
- Sheldon, R.** 1998. *Jefferson Proving Ground Karst Study*.

- USFWS.** 2001. *Finding of No Significant Impact for Fire Management Plan Environmental Assessment*. Big Oaks National Wildlife Refuge: US Fish & Wildlife Service.
- . 2010. *Biological Assessment for Modification of Prescribed Fire Dates for Big Oaks National Wildlife Refuge*. Madison, Indiana: US Fish & Wildlife Service.
- . *Revised Interim Comprehensive Conservation Plan for Big Oaks National Wildlife Refuge*. US Fish & Wildlife Service.
- . *Public Information Packet for Proposed Big Oaks National Wildlife Refuge*. US Fish & Wildlife Service.
- Winters, B., and J. Robb.** 2006. *Wildland Fire Management Plan Big Oaks National Wildlife Refuge*. Madison, Indiana: US Fish & Wildlife Service.

### **Jefferson Proving Ground Reports**

- Ebinger, M.H., and W.R. Hansen.** 1996. *Jefferson Proving Ground Data Summary and Risk Assessment*. Los Alamos National Laboratory.
- Engel, B.** 1994. *Jefferson Proving Grounds AMC Visit*. West Lafayette, Indiana: Purdue University.
- Harmon, J.L.** 1992. *Survey of the Freshwater Mussels (Bivalvia: Unionidae) of Big Creek and Quantitative Evaluation of State Listed Mussel Species in Big and Graham Creeks*. Indianapolis, Indiana: Indiana Department of Natural Resources.
- Hedge, C.L., M.A. Homoya, R.L. Hedge, and C. Baker.** 1993. *An Inventory of Special Plants and Natural Areas within the US Army Jefferson Proving Ground in Southeastern Indiana*. Indianapolis, Indiana: Indiana Department of Natural Resources.
- Moore, R.E., and K.D. Puckett.** 1994. *Natural Resources Management Plan Part III - Forest Management, Jefferson Proving Ground, Madison, Indiana, 1986-1996*. Louisville, Kentucky: US Army Corps of Engineers.
- Pruitt, L., S. Pruitt, and M. Litwin.** 1994. *Jefferson Proving Ground Fish and Wildlife Management Plan September 1994*. US Fish & Wildlife Service.
- US Army.** 1995. *Disposal and Reuse of the Jefferson Proving Ground, Madison, Indiana - Final Environmental Impact Statement*. Jefferson Proving Ground: US Army.

**APPENDIX H: JEFFERSON PROVING GROUND FIRING RANGE MEMORANDUM OF AGREEMENT (MOA) AND ASSOCIATED PERMITS AND MAPS**

Master MOA Between US Army, US Air Force, & USFWS .....Page H-1

Enclosure 1: Jefferson Proving Ground Site Map .....Page H-13

Enclosure 2: US Army Permit to USFWS .....Page H-14

Interim Public Use Plan by USFWS .....Page H-18

Enclosure 3: US Army Permit to US Air Force .....Page H-25

Jefferson Range Access Plan .....Page H-39

Air National Guard Road & Bridge Maintenance Map .....Page H-48

Standards of Treatment for Significant Archeological Resources .....Page H-49

Groundwater Monitoring Wells Map .....Page H-51

## JEFFERSON PROVING GROUND FIRING RANGE MEMORANDUM OF AGREEMENT (MOA)

This is a Memorandum of Agreement (MOA) among the Department of the Army (Army), the Department of Air Force (Air Force), and the Department of the Interior-United States Fish and Wildlife Service (FWS), all hereafter collectively referred to as the "parties".

### **I. BACKGROUND AND PURPOSE**

1. As a result of the Base Closure and Realignment Act (BRAC) of 1988, the Army's mission at Jefferson Proving Ground (JPG) terminated in September 1995. The JPG property consists of about 55,000 acres located in southeastern Indiana. It is composed of an approximate 4000-acre cantonment area and an approximate 51,000-acre firing range area (Firing Range). The purpose of this MOA is to establish the framework for authorizing the future use of the Firing Range by the U.S. Fish and Wildlife Service (FWS) and continued use by the Air Force. The cantonment area of JPG is being transferred under the BRAC process and is outside the scope of this agreement.

2. Due to unexploded ordnance (UXO), depleted uranium (DU) and other environmental contamination from past Army activities, the Firing Range area is not suitable for commercial or residential development. Despite the UXO and DU contamination, the Firing Range provides wildlife habitat of regional and national significance. In addition, portions of the Firing Range are being used by the Air Force as a bombing range (Bombing Range). The Bombing Range consists of an approximate 983-acre conventional bombing range and an approximate 50-acre laser bombing range, as well as large safety fans, when in use, for each range and associated air space (see map at Enclosure 1). These safety fans overlay significant portions of the Firing Range and are off limits to unauthorized personnel during flight operations involving training munitions or laser energy. The Air Force Bombing Range activities involve training munitions (i.e. an inert munition with a spotting charge) and laser energy, which have had no known significant adverse impact on the wildlife at the Firing Range. As a result of the unique property conditions associated with the Firing Range, the FWS is interested in establishing a National Wildlife

Refuge (Refuge) to preserve significant wildlife habitat values, and the Air Force requires continued use of the Bombing Range as a mission-essential training facility.

3. In order to support the establishment of the Refuge and the continued use of the Bombing Range, the Army agrees to the following:

a. The Army will grant the FWS a real estate permit for the entire Firing Range except for the Bombing Range and the Old Timbers Lodge and associated acreage (See Enclosure 2).

b. The Army will grant the Air Force a real estate permit for the Bombing Range and the Old Timbers Lodge and associated acreage (See Enclosure 3).

The FWS and the Air Force real estate permits will be subject to the terms and conditions set forth in this MOA.

4. The restoration requirements of this MOA and the permits issued under it are authorized by 10 U.S.C. § 2691.

## **II. OVER-ARCHING PRINCIPLES**

The parties recognize the importance of having periodic meetings/conference calls, at least quarterly, among the Jefferson Proving Ground Commander, the Refuge Manager, and the Bombing Range Commander. The relationships between the parties will be governed by the following overarching principles:

1. The Army will consult and coordinate with the other parties to ensure that all Army activities (e.g., remediation activities, UXO demonstration projects, or other future activities) are consistent with Refuge and Bombing Range activities.

2. The FWS will consult and coordinate with the other parties to ensure that all Refuge activities (e.g., development of the interim public access plan, the comprehensive public access plan, the Comprehensive Conservation Plan, any modifications to a public access plan, reviews of requests to conduct non-FWS activities, refuge management activities, etc.) are consistent with Army and Bombing Range activities. The FWS specifically agrees that Refuge activities will be consistent with existing environmental conditions and will not otherwise increase the Army's environmental remediation costs.

3. The Air Force will consult and coordinate with the other parties to ensure that all Bombing Range activities (e.g., development of the site access plan (including any modifications to the site access plan), reviews of requests to conduct non-Air Force activities, training operations, etc.) are consistent with Army and FWS activities. The Air Force specifically agrees that Bombing Range activities will be consistent with existing environmental conditions and will not increase the Army's environmental remediation costs.



4. Except as otherwise provided in this MOA, all disputes between the parties relating to the terms and conditions of this MOA will be subject to the dispute resolution procedure set forth in Section VI.

### III. ARMY RESPONSIBILITIES

#### 1. Environmental Remediation.

a. The Army will provide the FWS and Air Force with baseline information concerning the environmental condition of the Firing Range utilizing such reports as The Final Study Cleanup and Reuse Options (Mason and Hanger Report 1992), the Environmental Sampling Plan for the Open Detonation Unit (1994), The Resource Conservation and Recovery Act Facility Assessment (1992), The Community Environmental Response Facilitation Act Report (1994), The Depleted Uranium Decommissioning Plan (Draft 1999), The Archives Search Report for Ordnance and Explosive Waste Chemical Warfare Materials (1995) and the Environmental Impact Statement for Disposal and Reuse (1995).

b. The Army will retain all authority, responsibility, and liability for remediation of all contamination resulting from past Army activities or present on the Firing Range on the date of this MOA, including UXO, DU, and other contamination. In addition, the Army is responsible for all remediation resulting from present and future site activities as set forth in paragraph III(3). Except as otherwise provided in this MOA, the FWS and Air Force shall not have authority, responsibility, or liability for remediation of UXO, DU, and other contamination (see paragraphs IV(3)(a) and (b), V(6) (a) and (b), and V(8)(b)). The Army shall not be responsible for any environmental requirements resulting from operation of the Refuge or the Bombing Range.

c. For purposes of the regulation proposed as 32 CFR 178, *Closed, Transferred, and Transferring Ranges Containing Military Munitions* (Range Rule), should it become a final rule, and any Department of Defense (DoD) Directive or Instruction relating to closed, transferred, or transferring ranges, to the extent any of them apply to the Firing Range, the Army will remain the "responsible DoD component". Unless otherwise required by the Range Rule or DoD Directive or Instruction, the designation of the Army as the "responsible DoD component" will not alter the parties' liabilities under this MOA.

d. The Army is pursuing a license termination under restricted release conditions for the current license issued by the U.S. Nuclear Regulatory Agency (NRC) for its possession of DU for decommissioning at the Firing Range. This license indicates the licensed material (*i.e.*, DU) is onsite in the area known as the "DU Impact Area", located in the southern portion of the Firing Range. The parties recognize the Army will be solely responsible for finalizing the NRC license termination and conducting any actions required by the License Termination Plan at the Firing Range.

#### 2. UXO.

a. UXO Training Materials. The Army will provide training materials and initial UXO and DU safety training for FWS and Air Force personnel. The training materials will include general information regarding the types of munitions used at the Firing Range but are not intended to be an exhaustive/all inclusive listing. After the training, and based on training materials provided by the Army, the FWS and Air Force will be responsible for providing UXO and DU safety training to all of their respective personnel and visitors based on such training materials and knowledge of the FWS and the Air Force of local site conditions.

b. Emergency UXO Removal. If the FWS or Air Force discovers UXO which poses an imminent and substantial hazard to Refuge or Bombing Range operations (e.g., UXO has migrated to the surface of a roadway), the FWS or Air Force will immediately restrict access to the UXO site and notify the Army. The Army will provide for timely removal of UXO found which it determines to be an imminent and substantial hazard to Refuge or Bombing Range operations. The Army will not be required to remove UXO it determines does not pose an imminent and substantial hazard to Refuge or Bombing Range operations (See Enclosure 4 -UXO Response Standing Operating Procedures [SOP]).

c. Non-Emergency UXO Removal. The FWS and Air Force accept that there is no Army plan or budget authority to remove UXO in the Firing Range. However, the Army will make a good faith effort to request non-emergency UXO removal in connection with Army Reserve and/or Army National Guard training exercises to support Refuge or Bombing Range operations. Any type of non-emergency UXO removal in the Firing Range will be subject to the License Termination Plan as approved by the NRC. The FWS and Air Force recognize that any such Army support is contingent on the availability and timing of Army Reserve or Army National Guard exercises. To obtain Army non-emergency UXO removal support, the FWS and Air Force will follow these procedures:

(1) FWS Non-Emergency UXO Removal Support. The FWS will request non-emergency UXO removal support from the Army. To facilitate the support process, the FWS will incorporate building designs that minimize ground disturbance and will provide the Army a minimum 2-year advance notice of their request to complete non-emergency UXO removal. The Army will make a good faith effort to request UXO removal in connection with Army Reserve and/or Army National Guard Training exercises to support Refuge operations. If the Army is not able to obtain non-emergency UXO removal support as part of a training exercise, the FWS agrees to withdraw its request and terminate any plans/operations requiring non-emergency UXO support.

(2) Air Force Non-Emergency UXO Removal Support. The Air Force may request non-emergency UXO removal support from the Army in accordance with paragraph III 2. c. above or it may conduct its own non-emergency UXO removals. Any Air Force non-emergency UXO removals must be conducted by properly certified personnel and in accordance with Department of Defense Explosive Safety Board (DDESB) and all other applicable requirements. If the Air Force elects to conduct its own non-emergency UXO

removal action, the Army and FWS will have no responsibility for any costs resulting from the UXO removal action.

### **3. Future Site Activity.**

The Army is specifically authorized to conduct the following activities on the Firing Range:

a. Army Environmental Restoration Activities. The Army is authorized to conduct environmental restoration and remediation activities to the extent required by law. For purposes of this MOA, environmental restoration and remediation include NRC license termination activities. The Army assumes no liability should its restoration and remediation activities interfere with FWS or Air Force operations.

b. UXO Removal Technology Demonstration Projects. The Army reserves the right to authorize UXO Removal Technology Demonstration Projects and other similar UXO related projects on the Firing Range.

c. Property Administration. The Army reserves the right to enter the property to conduct property administration activities (e.g., site inspections, etc.).

Any Army proposals to conduct other activities on the Refuge or Bombing Range will be processed in accordance with the terms and conditions of this MOA (see paragraph IV(4) or paragraph V(4)).

### **4. Future Property Transfer.**

The Army will not transfer fee title or other property interests in the Firing Range without consulting with the FWS and Air Force. If in the future the Firing Range is determined suitable for transfer, the Army shall, to the extent legally authorized, provide the FWS and Air Force the right of first refusal on their respective property interests before conveying any property interests. If the Air Force no longer requires use of the Bombing Range and the property is no longer needed for other military purposes, the Army will offer the FWS a real estate permit for the Bombing Range subject to the same terms of this agreement or any other mutually agreeable terms.

### **5. Tort Claims.**

The Army will be responsible for accepting and processing any tort claims for incidents arising out of UXO, DU, or any other conditions related to the Army's past, present, or future use of the Firing Range. The FWS and Air Force will cooperate in providing information relating to any such tort claims. Any liability on the part of parties will be determined in accordance with the Federal Torts Claim Act and other applicable laws.

## **IV. FWS RESPONSIBILITIES**

### **1. National Wildlife Refuge.**

a. The Refuge will be called Big Oaks National Wildlife Refuge. It will be managed as a unit of the National Wildlife Refuge System in accordance with the National Wildlife Refuge Administration Act of 1966 as amended (16 U.S.C. 668 et. seq.) and other applicable laws, regulations, and policies. Following the issuance of the real estate permit, the FWS will be responsible for all natural resource management decisions on the Refuge. As the Refuge includes the DU Impact Area, management of the Refuge will be subject to the License Termination Plan as approved by the NRC.

b. The FWS will develop a Comprehensive Conservation Plan (CCP) outlining its management plan for the Refuge. The CCP will provide natural resource management at a level typical of units of the National Wildlife Refuge System.

c. The FWS will conduct any National Environmental Policy Act (NEPA) analysis required to support establishment of the Refuge.

d. The FWS will be responsible for infrastructure maintenance and repairs as outlined in Enclosure 5 (FWS/Air Force Infrastructure Maintenance Responsibilities).

### **2. Site Security.**

a. The FWS will be responsible for providing UXO, DU and environmental contamination Safety/Awareness Training to all Refuge personnel and visitors (see paragraph III.2.a. above). The FWS will develop an interim public access plan prior to the Army executing a real estate permit. After the interim public access plan, the FWS will develop a comprehensive public access plan that identifies appropriate public uses of the property and ensures that all visitors are provided UXO, DU and environmental contamination Safety/Awareness Training. The public access plan will include: (a) types of public use, (b) UXO, DU and environmental contamination Safety Training protocols (e.g., training materials, training rosters, and waivers), and (c) annual public use reporting requirements. The interim public access plan and the comprehensive public access plan and any revisions will be subject to Army approval.

b. The FWS will provide staffing at a level consistent with the safe operation of the Refuge. With the expectation of limited or no UXO cleanup in the future, public use levels will be low and may be limited to hunting, gathering, fishing, and guided tours as determined by the interim or comprehensive public access plan. All visitors will be escorted or receive a safety briefing on the hazards found on the property. If the FWS fails to maintain adequate public access control, the Army reserves the right to suspend the FWS's right of access to the Firing Range until such time as the FWS takes appropriate corrective action.

### **3. Environmental Remediation.**

a. The FWS shall not be responsible for any environmental requirements related to the Army's past, present, or future activities at the Firing Range or the Air Force activities at the Bombing Range. However, the FWS will be responsible for all environmental compliance and remediation requirements resulting from operation of the Refuge. ,

b. The FWS shall not be responsible for remediation of UXO, DU, and other environmental contamination related to past, present, or future Army activities, or present on the Firing Range on the date of this MOA, or resulting from Air Force Bombing Range activities. If a FWS Refuge activity will result in increased remediation costs for the Army (e.g. UXO removal, fencing, or site remediation), the FWS shall terminate the activity.

c. The FWS will not undertake any Refuge activities that interfere with the Army environmental remediation program at the Firing Range.

### **4. Other Activities on the Refuge.**

The FWS will be responsible for reviewing all requests to conduct non-FWS activities on the Refuge (i.e. requests from other organizations to conduct activities not otherwise authorized by the CCP), not otherwise allowed by this MOA. All requests for non-FWS activities on the Refuge will be reviewed in accordance with the National Wildlife Refuge Administration Act and other applicable laws, regulations, or policies. The interim or comprehensive public access plan will be revised as necessary to ensure that any approved non-FWS operations on the Refuge are conducted in a safe manner.

### **5. Tort Claims.**

The FWS will be responsible for accepting and processing any tort claims for incidents arising out of its operation of the Refuge. The Army and Air Force will cooperate in providing information relating to any such tort claims. Any liability on the part of the parties will be determined in accordance with the Federal Torts Claim Act and other applicable laws.

## **V. AIR FORCE RESPONSIBILITIES**

### **1. Air Force Bombing Range.**

a. The Air Force will operate a Bombing Range which includes an approximate 50-acre laser bombing range, an approximate 983-acre conventional bombing range, and the Old Timbers Lodge with associated acreage of approximately 5 acres, which shall be excluded from the real estate permit for the Refuge. The bombing ranges, when in use, will have large safety fans that will be off limits for FWS personnel and visitors during flight operations involving training, munitions or laser energy. While the safety fans overlay significant portions of the Firing Range,

their land area is included in the real estate permit for the Refuge. As the laser bombing range safety fan includes the DU Impact Area, management of the Bombing Range will be subject to the License Termination Plan as approved by the NRC. The Air Force will comply with Air Force Instruction 13-212, Test and Training Ranges, concerning range maintenance, ammunition, explosives, and dangerous articles (AEDA), and range residue cleanup/decontamination on the Bombing Range.

b. The Air Force will conduct any NEPA analysis required to support operation of the Bombing Range.

c. The Air Force will take the following actions to ensure that its operation of the Bombing Range is not inconsistent with the establishment of the Refuge:

(1) The Air Force will limit its total annual bombing sorties to 3000 sorties per year (including non- Air Force sorties). The Air Force is authorized to conduct 4000 sorties in any one-year period provided the additional sorties are conducted in accordance with applicable laws and regulations. The Air Force may only exceed the 3000 sorties per year cap once every three years. Any increase in sorties above these levels will be negotiated in good faith by the parties.

(2) The Air Force will provide wildfire suppression support on the Refuge for situations arising from Air Force actions or activities, as to be determined by the Bombing Range Commander and the FWS Refuge Manager.

## **2. Perimeter Fence/Road and Warning Signs.**

a. The Air Force will be responsible for patrolling and maintaining the perimeter fence and related infrastructure to ensure the overall security of the Firing Range. The perimeter fence infrastructure includes warning signs, the road system associated with the perimeter fence, and mowing the perimeter fence area. The Army and FWS staff will report to the Air Force in a timely manner any damage to the perimeter fence that they observe in the course of performing their respective activities on the Firing Range.

b. The Air Force will maintain warning signs around the entire perimeter, the submunitions area west of Machine Gun Road, the DU area and the former Open Detonation area. If additional fencing, cleanup, or site security improvements are required due to past, present, or future Army activities, the Army will be responsible for the additional requirement. The Air Force agrees to negotiate in good faith regarding appropriate arrangements to assist the Army in meeting the new requirements.

## **3. Maintenance of Firing Range Infrastructure.**

The FWS/Air Force infrastructure maintenance responsibilities are provided in Enclosure 5. The properties permitted to the Air Force (i.e., the Old Timbers Lodge and the four stone

arch bridges) shall be preserved in accordance with the Jefferson Proving Ground Cultural Resource Management Plan dated August 1996. The Army and Air Force will prepare an Interservice Support Agreement to cover the Army's historic preservation responsibilities for the Oakdale School House. If other infrastructure maintenance requirements are subsequently identified, the Air Force agrees to negotiate in good faith regarding appropriate arrangements to assist the Army in meeting the new requirements.

#### **4. Other Bombing Range Activities.**

The Air Force will be responsible for reviewing all requests to conduct non-Air Force operations (including Army and FWS requests) on the Bombing Range. All requests for non-Air Force operations on the Bombing Range will be reviewed in accordance with the provisions of Air Force Instruction 13-212 and the License Termination Plan as approved by the NRC. The comprehensive site access plan will be revised as necessary to ensure that any approved non-Air Force operations on the Bombing Range are conducted in a safe manner.

#### **5. Site Security.**

a. The Air Force will be responsible for providing UXO, DU and environmental contamination Safety/Awareness Training to all Bombing Range personnel and visitors. Prior to the Army executing a new real estate permit, the Air Force will develop a comprehensive site access plan that includes: (a) types of official use, (b) UXO, DU and environmental contamination Safety Training protocols (e.g., training materials, training rosters, and waivers), and (c) annual official use reporting requirements. The comprehensive site access plan and any revisions will be subject to Army approval.

b. The Air Force will provide staffing at a level consistent with the safe operation of the Bombing Range. It is anticipated that the Air Force access will consist primarily of Bombing Range personnel, support personnel, and official visitors. If the Air Force fails to maintain adequate access control, the Army reserves the right to suspend Air Force's right of access to the Firing Range until such time as the Air Force takes appropriate corrective action.

#### **6. Environmental Remediation.**

a. The Air Force shall not be responsible for any environmental requirements related to the Army's past, present, or future activities at the Firing Range or the FWS activities at the Refuge. However, the Air Force will be responsible for all environmental compliance and remediation requirements resulting from its operation of the Bombing Range.

b. The Air Force shall not be responsible for remediation of UXO, DU, and other environmental contamination related to past, present, or future Army activities, or present on the Firing Range on the date of this MOA (except as provided in paragraph V.8.b. below), or resulting from FWS Refuge activities. If an Air Force Bombing Range activity will result in increased environmental remediation costs for the Army (e.g. UXO removal, fencing, or site

remediation), the Air Force will be solely responsible for these increased costs or shall terminate the activity.

c. The Air Force will not conduct any Bombing Range activities that interfere with Army environmental remediation activities at the Firing Range.

## **7. Tort Claims.**

The Air Force will be responsible for accepting and processing any tort claims for incidents arising out of its operation of the Bombing Range. The Army and FWS will cooperate in providing information relating to any such tort claims. Any liability on the part of the parties will be determined in accordance with the Federal Torts Claim Act and other applicable laws.

## **8. Existing Permit to the Air Force**

a. Pending issuance of the new real estate permit (Enclosure 3), the existing permit between the Department of the Army and the Department of the Air Force, DACA 27-4-83-03, dated 23 July 1982, to use property on JPG will continue in effect without change. Upon the effective date of the new permit, the existing permit will terminate.

b. Nothing in this MOA will be construed to affect any liability or responsibility of the Air Force or Army established by the existing permit between the Department of the Army and the Department of the Air Force, DACA 27-4-83-03, dated 23 July 1982, or any prior permits between the Air Force and Army relating to the Firing Range.

## **9. Licensing to Indiana Air National Guard**

The Air Force may grant a license to the Indiana Air National Guard to assume its rights and responsibilities under the real estate permit. Any such license may include and apply all the responsibilities of the Air Force under this MOA and the permit to the Indiana Air National Guard, excluding only the authority to amend this MOA or the real estate permit.

## **VI. DISPUTE RESOLUTION PROCEDURE**

1. Except as otherwise provided in this MOA, all disputes between the parties relating to the terms and conditions of this MOA will be subject to the following dispute resolution procedures:

a. Informal - All parties to this agreement shall make reasonable efforts to informally resolve disputes at the Installation Commander, the Bombing Range Commander, and the Refuge Manager Level. If the parties can not resolve a dispute informally, any party may invoke dispute resolution procedures by requesting a Level I meeting. The request to invoke dispute resolution shall include a written summary of the dispute, the party's position, and any other information necessary to the resolution of the dispute. In the event that a dispute involves a matter of national significance, the parties may mutually agree to elevate the dispute directly to the Level II dispute



resolution process.

b. Level I - The Level I dispute resolution shall consist of a meeting/conference call among the Army Materiel Command (AMC) Point of Contact (POC), the FWS's Regional Office POC, and Air National Guard Readiness Center POC. Any agreed resolution shall be in writing and signed by all the parties. If agreement cannot be reached within 30 days, AMC shall state its position in writing and provide it to the other parties. Within 30 days of receipt of the AMC statement of position, the other parties may submit a written notice to AMC elevating this matter to Level II for resolution. If the matter is not elevated to Level II dispute resolution within 30 days, the other parties will be deemed to have agreed with the AMC statement of position.

c. Level II - The Level II dispute resolution shall consist of a meeting/conference among the Department of the Army (DA), HQ FWS POC, and HQ Air Force POC. The agreed resolution shall be in writing and signed by all the parties.

2. No resolution of a dispute under this provision shall result in a change to the MOA or to any permit issued pursuant to it unless the modification is executed in accordance with paragraph VIII below or the terms of the permit.

## **VII. FUNDING**

Unless otherwise agreed, all parties will be solely responsible for funding their respective responsibilities under this Memorandum of Agreement. Nothing in this agreement shall be interpreted to require obligation or payment of funds in violation of the Anti-Deficiency Act, 31 U.S.C. Section 1341.

## **VIII. EFFECTIVE DATE, MODIFICATION, AND TERMINATION**

1. This agreement may be executed in multiple copies, each of which shall be considered an original document. This agreement shall take effect upon the date last executed by the parties, and shall remain in effect for 25 (twenty five) years. This agreement may be renewed for additional 10 (ten) year periods upon mutual agreement.

2. Modifications to this agreement may be submitted in writing by any party at any time and shall become effective upon the written acceptance of all the parties. Such modifications must be signed by the signatories hereto or their successors in office.

3. This agreement may be terminated by any party by providing a written 180 (one hundred eighty) day notice to the other parties. A decision to terminate this agreement is not subject to the dispute resolution provision of this MOA. In the event of termination, any Air Force and FWS built improvements will be disposed of following applicable disposal regulations.

## **IX. ENTIRE AGREEMENT**

It is expressly understood and agreed that this written instrument and its enclosures when executed embody the entire agreement among the parties regarding the use of the Firing Range, and there are no understandings or agreements, verbal or otherwise, among the parties except as expressly set forth herein.

**APPROVED BY:**

[COPY SIGNED]

PAUL W. JOHNSON  
Deputy Assistant Secretary of the Army  
(Installations and Housing)

[COPY SIGNED]

JAMIE RAPPAPORT CLARK  
Director  
U.S. Fish and Wildlife Service

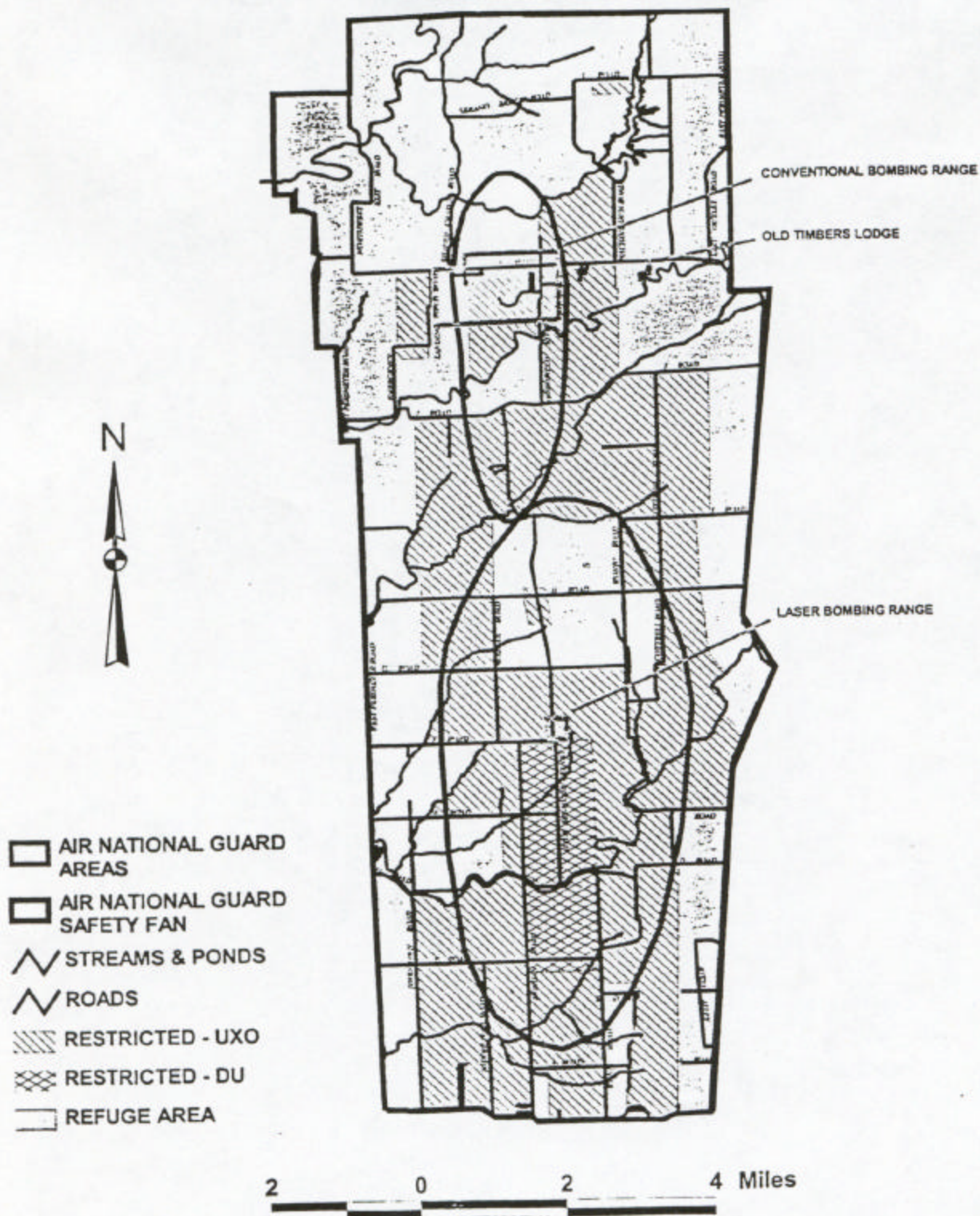
[COPY SIGNED]

JIMMY G. DISHNER  
Assistant Secretary  
Of the Air Force (Installations)

Enclosures

1. Site Map
2. FWS Real Estate Permit
3. Air Force Real Estate Permit
4. UXO Response Standing Operating Procedures
5. FWS/Air Force Infrastructure Maintenance Responsibilities

# JEFFERSON PROVING GROUND SITE MAP



Enclosure 1

ENCLOSURE 2

NO.

DEPARTMENT OF THE ARMY

PERMIT TO FISH AND WILDLIFE SERVICE

TO USE PROPERTY LOCATED ON JEFFERSON PROVING GROUND

THE SECRETARY OF THE ARMY, hereinafter referred to as the Secretary hereby grants to the United States Fish and Wildlife Service, hereinafter referred to as the grantee, a permit for the establishment of a National Wildlife Refuge at the Jefferson Proving Ground (JPG), over, across, in and upon the lands identified in Exhibit "A", attached hereto and made a part hereof, hereinafter referred to as the premises. The Secretary and the grantee are collectively hereinafter referred to as the "Parties".

THIS PERMIT is granted subject to the following conditions.

1. This permit is hereby granted for a term of twenty-five (25) years, with renewable ten (10) year periods upon mutual agreement of the Parties. This permit may be terminated earlier, by either the Secretary or grantee, by providing 180 days written notice.

2. The consideration given by the grantee is the management of the Property as a National Wildlife Refuge as well as the care and maintenance of the property as specified in the Memorandum of Agreement (MOA) attached hereto and made part of hereof.

3. All correspondence and notices to be given pursuant to this permit shall be addressed, if to the grantee, to \_\_\_\_\_, and if to the Secretary, to the District Engineer, Louisville District, \_\_\_\_\_ with a copy furnished to the JPG Commander, \_\_\_\_\_, or as may from time to time otherwise be directed by the parties. Notice shall be deemed to have been duly given if when enclosed in a properly sealed envelope or wrapper addressed as aforesaid, and deposited, postage prepaid, in a post office regularly maintained by the United States Postal Service.

4. The use and occupation of the premises shall be without cost or expense to the Department of the Army, and under the general supervision of the JPG Commander, and in accordance with the terms and conditions of the MOA, attached

hereto and made apart hereof. In the event of a conflict between the MOA and this permit, the MOA shall be the controlling instrument.

5. The grantee acknowledges that it has inspected the premises, knows its condition, and understands that same is granted without any representations or warranties whatsoever and without obligation on the part of the Department of the Army, except as provided in the MOA.

6. In accordance with the MOA, the grantee shall, at its own expense and without cost or expense to the Department of the Army, maintain and keep the premises at a level sufficient to support Refuge operations and in accordance with the tasks in Enclosure 5 of the MOA.

7. The Department of the Army shall not be responsible for providing utilities to the grantee and it shall be the grantee's responsibility for obtaining any utilities necessary for its use and occupation of the premises at no expense to the Department of the Army.

8. No additions or alterations of the premises shall be made without the prior written approval of the JPG commander.

9. On or before the expiration of this permit or the termination by either party, in accordance with paragraph one (1), the grantee shall vacate the premises, remove its property therefrom and restore the premises to a condition satisfactory to the JPG commander, ordinary wear and tear and damage beyond the control of the grantee excepted.

10. The grantee shall comply with all applicable Federal, state, interstate, and local laws and regulations wherein the premises are located..

11. The Army will provide the grantee with baseline information concerning the environmental condition of the premises in accordance with paragraph III 1 (a), of the MOA, documenting the known history of the property with regard to storage, release or disposal of hazardous substances on the property. Upon expiration or termination of this permit, the grantee shall, at its own expense and without cost or expense to the Department of the Army, document any storage, release or disposal of hazardous substances in excess of 40 CFR Part 373 reportable quantities and any petroleum products in excess of 55 gallons. A comparison of the two assessments will assist the Army in determining any environmental restoration requirements of the grantee. Any such requirements will be completed by the grantee in accordance with the Environmental Remediation provisions in the MOA and paragraph nine (9) of this permit.

12. It is understood that the requirements of this permit pertaining to maintenance, repair, protection, and restoration of the premises and providing utilities

and other services, shall be effective only insofar as they do not conflict with the MOA or any other agreement, pertaining to such matters made between local representatives of the Army and grantee in accordance with existing regulations.

13. Access to and use of JPG shall be controlled in accordance with the grantee's Site Access Plan that is attached hereto and is made apart hereof. The Army must first approve any variation from this Plan and a revised Site Access Plan shall be made part of this permit.

14. The grantee shall not use the Premises for the storage, treatment or disposal of non-Department of Defense owned hazardous or toxic materials, as defined in 10 U.S.C 2692, unless authorized under 10 U.S.C. and properly approved by the Government.

**15. NOTICE OF THE PRESENCE OF LEAD BASED PAINT AND COVENANT AGAINST THE USE OF THE PROPERTY FOR RESIDENTIAL PURPOSES.**

The grantee is hereby informed and does acknowledge that all buildings on the Property, which were constructed or rehabilitated prior to 1978, are presumed to contain lead-based paint. For those buildings the grantee uses and occupies it shall comply with all applicable federal, state, and local laws and regulations pertaining to lead-based paint and/or lead-based paint hazards. The grantee shall restrict access (e.g., secure buildings to the extent practical, post warning signs, etc.) to all unoccupied buildings except those buildings located in UXO Restricted Areas (See Site Map at MOA Enclosure 1). The grantee shall restrict access to the UXO Restricted Areas in accordance with the Site Access Plan. The grantee shall not permit the use of any of the buildings or structures on the Property for residential habitation. Residential habitation does not include use of the Old Timbers Lodge for conference purposes including overnight visits on a nonpermanent basis. The grantee assumes all lead based paint related liability arising from its use of the property.

**16. NOTICE OF THE PRESENCE OF ASBESTOS AND COVENANT:**

The grantee is hereby informed and does acknowledge that friable and nonfriable asbestos or asbestos containing materials (ACM) has been found on the Property. The grantee acknowledges that it will inspect any building it proposes to occupy as to its asbestos content and condition and any hazardous or environmental conditions relating thereto. The grantee shall restrict access (e.g., secure buildings to the extent practical, post warning signs, etc.) to all unoccupied buildings except those buildings located in UXO Restricted Areas (See Site Map at MOA Enclosure 1). The grantee shall restrict access to the UXO Restricted Areas in accordance with the Site Access Plan. The grantee shall be deemed to have relied on its own judgment in assessing the condition of the property with respect to any asbestos hazards or concerns. The grantee covenants

and agrees that its use and occupancy of a building will be in compliance with all applicable laws relating to asbestos. The grantee assumes all asbestos related liability arising from its use of the property.

17. Prior to the start date of this Permit the grantee will provide a map with clear identification of the buildings it shall occupy. This map will be updated annually by the grantee.

**THIS PERMIT** is not subject to Title 10, United States Code, Section 2662, as amended.

**IV WITNESS** whereof, I have hereunto set my hand by authority of the Secretary of the Army, this \_\_\_\_\_ day of \_\_\_\_\_, \_\_\_\_\_.

\_\_\_\_\_

This permit is also executed by the grantee this \_\_\_\_\_ day of \_\_\_\_\_, \_\_\_\_\_.

# Interim Public Access Plan for the Proposed Big Oaks National Wildlife Refuge

Prepared by:  
U. S. Fish and Wildlife Service

Reviewed by:  
Air National Guard

[COPY SIGNED]

[COPY SIGNED]

Lee Herzberger  
Refuge Manager  
Muscatatuck National Wildlife Refuge

Maj. William Nolen  
Commander  
Jefferson Range

Approved by:  
U. S. Army

[COPY SIGNED]

Maj. Mark A. Welch  
Commander  
Jefferson Proving Ground



## Introduction

Approximately 50,000 acres of the decommissioned military base known as Jefferson Proving Ground (JPG) is proposed for inclusion into the National Wildlife Refuge (NWR) System via a Memorandum of Agreement (MOA) with the U.S. Army (Army). The area will become Big Oaks NWR. The primary purposes for this overlay NWR are derived from 2 specific acts:

- 1) The Fish and Wildlife Act of 1956 [16 USC 742a-742j] as amended authorizes the Secretary of the Interior to acquire interests in property "...for the development, advancement, management, conservation, and protection of fish and wildlife resources..."
- 2) The Endangered Species Act authorizes the Secretary of Interior to acquire interests in lands "to conserve fish, wildlife, and plants, including those which are listed as endangered or threatened..." [16 USC 1534].

The mission of Big Oaks NWR derives from these two purposes and is "to preserve, conserve, and restore biodiversity and biological integrity for the benefit of present and future generations of Americans." There is also a potential for limited public use in areas designated for such activities. This Interim Public Access Plan (Plan) was developed to allow the Army to review and approve safety procedures prior to public use occurring on Big Oaks NWR. This Plan is in accordance with the terms and conditions of the MOA between the U. S. Fish and Wildlife Service (FWS), Army, and Air Force (AF), and in the event of a conflict between the MOA and this agreement, the MOA shall be the controlling document.

Much of the proposed Big Oaks NWR contains unexploded ordnance (UXO), depleted uranium (DU), and other contaminants. The existence of these contaminants causes safety, management and funding concerns specific to Big Oaks NWR. The FWS accepts that there is no Army plan or budget authority to remove UXO in the Fring Range. However, the Army has agreed to make a good faith effort to request UXO removal in connection with Army Reserve and/or Army National Guard training exercises to support refuge operations. To facilitate the support process, the FWS will incorporate building designs that minimize ground disturbance and will provide the Army a minimum 2-year advance notice of their request to complete UXO removal. If the Army is not able to obtain UXO removal support as part of a training exercise, the FWS agrees to withdraw its request and terminate any plans/operations requiring non-emergency UXO support.

In the central portion of JPG is an active 1,033-acre AF training area known as Jefferson Range. Jefferson Range is composed of a 983-acre air-to-ground bombing and strafing range and a 50-acre Precision Guided Munitions (PGM) range. Both the 983-acre range and the 50-acre range have associated safety fans that extend over a portion of the area proposed as Big Oaks NWR (Fig. 1). A composite footprint of approximately 5,100 acres supports the primary target area and a composite footprint of approximately 14,860 acres supports the PGM target area. During flight operations no personnel other than AF personnel will be allowed access inside the weapons footprints. The use of both footprints will be coordinated with the Refuge Manager through monthly scheduling or as necessary to meet mission requirements. When not in use, FWS personnel will have access to the safety footprints. Safety fans and other closed areas will be

barricaded as a precaution. The scheduling of public use on Big Oaks NWR that may conflict with AF activities will be coordinated through periodic meetings between the Refuge Manager and the AF Range Commander designed to eliminate conflicts and ensure safety.

In the event of an aircraft accident, the Jefferson Range Control Officer (RCO) will be the on-scene commander in charge until relieved by the appropriate military authority. Fire and medical support will be directed to the perimeter gate most advantageous to the crash site. Due to the dangers posed by military aircraft, no persons will be allowed access to a crash site until deemed appropriate by the on-scene official. The Jefferson Range Access Plan protocols concerning aircraft accidents will be adhered to by the FWS, and the Refuge Manager will coordinate and cooperatively work with the Jefferson RCO or other on-scene commander.

### **Safety Briefing Protocols**

To ensure visitor safety, the Army will provide safety briefing materials that contain basic information on site history, the hazards of UXO, and the appropriate action when UXO or DU is encountered. The FWS will require all staff and visitors to undergo a safety briefing and will provide safety pamphlets containing this information and a map of Big Oaks NWR. FWS will also brief visitors on other hazards based on local site conditions. All Public Access Permits will be tracked by a permit number. An annual database will be maintained that records individual permit information (e.g., name, address, date of birth, date of safety briefing, etc.). An annual fee or daily fee will be charged for recreational use at Big Oaks NWR. Entrance fees will be waived for official duties conducted by contractors, FWS staff, AF staff, Army staff, and others designated by the Refuge Manager, but everyone will receive a safety briefing (AF visitors will receive briefings in accordance with the AF site access plan).

### **Entry Procedures**

Visitors will check-in and undergo an appropriate safety briefing at the refuge office (presently in Building 125) and be issued a Public Access Permit. The visitor will then be given directions to the access gate controlled by a gate attendant. The gate location will be the sole access point for unescorted FWS visitors and is located adjacent to Gate 1a on the East Perimeter Road (Gate "1b"; Fig. 2). Visitor check-out will also occur at the refuge office. AF visitors, including Old Timbers Lodge guests, will be checked-in and out in accordance with the AF site access plan.

### **Types of Public Use**

The FWS will provide staffing at a level consistent with the safe operation of the refuge. With the expectation of limited or no UXO cleanup in the future, public use levels will be low and limited to hunting, fishing, wildlife observation and photography, and guided tours (Table 1). Activities not covered within the Plan will not be allowed unless first reviewed and approved by the Army and declared compatible by the FWS.

### **Access**

All public activities on the refuge will be controlled and limited within 2 zones identified in

consultation with the Army. These areas are 1) Limited Day Use Recreation and 2) Special Control Hunt Zones; a third zone would have no public access and would be considered closed to all types of entry except on established roads or under emergency conditions (Fig. 1). The Limited Day Use Zone will be used for hunting (deer and turkey), fishing (Old Timbers Lake), and limited opportunities for wildlife observation and photography, and guided (accompanied by FWS staff) environmental education and interpretation tours. The Special Control Hunt Zone will only have public access during a limited deer and turkey hunting season, and limited guided tours. All of these recreational units were previously used in the Army recreation program (Fig. 1).

Public use areas will be delineated by maps and by signs placed on their boundaries as required by NWR policies. Recreational opportunities during posted hours and periods will be available to the general public provided they have completed all necessary safety requirements, proper state licenses, appropriate permits for lottery seasons, and there are areas/staff available for the requested activity. Unescorted access will be limited to April through November (Table 1). Recreation units will have maximum capacity limits at any one time for all off-road visitor activities (Table 1, Fig. 1). Guided tours oriented toward environmental education, wildlife observation, interpretation, and the unique story of the property will be scheduled and completed without exposing the public participants to undue risk.

### **Protocols on How Public Use will be Monitored, Limited, and Controlled**

Public access will be limited to specific days of the week and by seasonal periods (e.g., fishing, deer, and turkey seasons) (Table 1). The Army and the FWS will periodically reevaluate public access to determine if different limits are more appropriate.

The standard protocol for public access will be a check-in/check-out procedure to specific areas (e.g., Area 1, see Fig. 1) for those members of the public that have undergone a safety briefing. They will be allowed in areas identified as suitable for that type of activity (e.g., deer hunting in a Special Control Hunt Area; fishing in Old Timbers Lake). A daily entrance log/database will be kept of all public use on Big Oaks NWR. Information on types and locations of public use will be compiled in an annual report that will be distributed to the Army, AF and the FWS Region 3 Office.

Prior to unescorted public access occurring (June 3, 2000), the AF will install road barricades on the East Perimeter Road and the FWS will place closed area signs on these barricades to limit public access into interior areas of the refuge (Fig. 2). A total of 19 barricades will be placed around the periphery of the southern Special Control Hunt Zone. These barricades will be located at the point where all interior roads leave the East and West Perimeter Roads. The barricades on the West Perimeter Road will be in place by deer season (November 1, 2000). Other than during the limited deer and turkey hunts, these barricade gates will remain closed and locked at all times. FWS will control access into these areas during the annual turkey and deer hunts with the previously described protocols. Besides these hunt periods, only AF and FWS personnel or required contractors will be allowed access to these interior areas and the safety fan footprints. Closed area signs will also be placed alternating with the warning signs placed by the Army for closed access areas, especially for those areas adjacent to recreation units. Signs will

be placed on existing structures (i.e., fence posts, buildings, etc.), live trees, or on posts with weighted bases to avoid ground intrusion of sign posts.

As described in the MOA, the FWS will work closely with the AF on controlling visitor access and monitoring refuge visitors. The AF will be responsible for maintaining the perimeter fence and overall site security at JPG. The FWS will notify the AF of any damage to the perimeter fence in a timely manner.

The FWS will not tolerate individuals who violate safety regulations. For this reason, anyone who does not comply with safety regulations will forfeit his/her refuge access privileges as determined by the Refuge Manager or by a court of law. The FWS will also continue access restrictions made by the Army to specific individuals because of documented safety violations.

Enforcement of refuge trespass and other public use violations will be the primary responsibility of commissioned Refuge Law Enforcement Officers and cooperatively by Indiana Conservation Officers and other law enforcement agencies. General trespass, poaching, and other violations will be cooperatively enforced by these agencies. The FWS will meet with local law enforcement agencies and develop coordinated law enforcement strategies (these strategies will be in place by June 3, 2000) that will be coordinated with the AF. Procedures for obtaining law enforcement assistance will be based on legal jurisdiction where the incident occurs (e.g., in Ripley County the Ripley County Communication Supervisor will be contacted, likewise, in Jefferson or Jennings Counties the appropriate Communication Radio Dispatch Centers will be contacted). For emergency response situations, the cooperating agency will coordinate activities with a 24 hr point of contact (POC) listed in Attachment 1.

Fire suppression capabilities will be negotiated with a local Volunteer Fire Department and will be in place by June 3, 2000. The agreement will include protocols on suppression of wild fires and on-call assistance during prescribed fires. Protocols will instruct fire fighters to not leave roadways and to follow other Army safety directives. For fire department response after hours, the local fire department will be instructed to coordinate with the POC and to cut the lock on the gate most advantageous to their response. In this case, the fire department response will only occur if it is apparent that the fire could cause loss of life or property damage outside the perimeter fence.

### **Key Control**

The AF will change all locks on the perimeter fence and will issue an appropriate number of perimeter and interior gate keys to the FWS for official use. These keys will be controlled in accordance with standard lock and key control protocols (Air National Guard 181<sup>st</sup> Fighter Wing Instruction 32-1003). All keys will be signed for on the Jefferson Range key control log. The FWS will inventory these keys quarterly in accordance with these key control protocols. The FWS will coordinate distribution of keys with law enforcement and emergency response agencies. The FWS will be responsible for the control of these keys. The party responsible for missing keys shall bear the cost for the re-coring of locks as applicable. The Jefferson Range Commander has the ultimate responsibility for lock and key control on the range and refuge. ,

## Use of Refuge by Old Timber's Lodge (AF) Guests

The FWS will schedule priority refuge events for Old Timbers Lodge with the Jefferson Range AF Commander; at all other times the Old Timbers Lodge area will be off limits for refuge visitors. The refuge will allow Old Timbers Lodge guests access to refuge recreational activities on days/times those activities are available to the general public. Old Timbers Lodge guests must obtain a valid Big Oaks NWR Public Access Permit to participate in these activities and these guests must participate in an AF safety briefing. While on the refuge, all rules and regulations of the refuge will apply to Old Timbers Lodge guests.

Old Timbers Lodge guests must check-in and check-out at the refuge office to participate in recreational opportunities (e.g., fishing at Old Timbers Lake). If guests do not check-in, especially for fishing at Old Timbers Lake, they cannot be guaranteed the opportunity to participate in the recreational activity. For permitted deer or turkey hunts, Old Timbers Lodge guests must either have a valid state lottery permit for the specific hunt or participate in a reserved hunt drawing during the hunting season at the refuge office.

Table 1. Public use limits (use-days) for activities on Big Oaks NWR<sup>a</sup>.

| Activity  | Description of where use will occur   | Maximum one-time capacity | When allowed                                 |
|---|---|---------------------------|--|
| Deer Hunting  | See Public Access Map   | 423                       | November (6 days archery and 9 days gun)     |
| Turkey Hunting  | 1/2 of the number hunters/area given on Public Access Map   | 212                       | April to Mid- May (15 Days)                  |
| Fishing   | Max. 10 boats and Max. 40 on shore at Old Timbers Lake. No fishing allowed on any other body of water | 60 <sup>b</sup>           | 5 - 10 days per month; April through October |
| Wildlife Observation and Photography                      | ½ of the number persons/area given on Public Access Map; only within Limited Day Use Zone             | 78 <sup>b</sup>           | 5 - 10 days per month; April through October |
| Guided tours (interpretation and environmental education) | Dependent on conveyances available and activity. By definition, accompanied by FWS Staff              | 12- 0                     | By reservation                               |

<sup>a</sup> Based on staff and funds available in FY 2000.

<sup>b</sup> Based on parking and trail availability

## Attachment 1

### 24 Hour Contact List

Joseph R. Robb  
Refuge Operations Specialist  
Office: 812-273-0783  
Home: 812-265-6633  
Cell Phone: 812-498-1154

Donna Stanley  
Refuge Law Enforcement Officer  
Office: 812-522-4352  
Home: 812-523-3414  
Cell Phone: 812-528-1998

Stephen A. Miller  
Refuge Operation Specialist  
Office: 812-273-0783  
Home: 812-358-4413  
Cell Phone: 812-498-1155

Jason Lewis  
Wildlife Biologist  
Office: 812-273-0783  
Home: 812-574-6015  
Cell Phone: 812-498-1156

Teresa Vanosdol-Lewis  
Wildlife Biologist  
Office: 812-273-0783  
Home: 812-574-6015  
Cell Phone: 812-498-1157

**DEPARTMENT OF THE ARMY  
PERMIT TO  
DEPARTMENT OF THE AIR FORCE  
TO USE PROPERTY LOCATED ON  
JEFFERSON PROVING GROUND  
MADISON, INDIANA**

**THE SECRETARY OF THE ARMY**, hereinafter referred to as the Secretary, hereby grants to the Department of the Air Force, hereinafter referred to as the Grantee, a permit for the continued use of a Bombing Range at Jefferson Proving Ground (JPG), Indiana, over, across, in and upon the lands and structures identified in Exhibit "A", attached hereto and made a part hereof, hereinafter referred to as the premises. The Secretary and the Grantee are collectively hereinafter referred to as the "Parties".

**THIS PERMIT** is granted subject to the following conditions.

1. This permit is hereby granted for a term of twenty-five (25) years, beginning 1 July 2000 and ending 30 June 2025, with renewable ten (10) year periods upon mutual agreement of the Parties. This permit may be terminated earlier, by either the Secretary or Grantee, by providing one hundred eighty (180) days' written notice.
2. The Grantee agrees to the care and maintenance of the premises as specified in the Memorandum of Agreement (MOA) attached hereto as Exhibit "B" and made a part hereof.
3. All correspondence and notices to be given pursuant to this permit shall be addressed, if to the Grantee, to Department of the Air Force, Director, Air Force Real Estate Agency, AFREA/DR, 112 Luke Avenue, Room 104, Bolling AFB, Washington, D.C. 20332-8020, and, if to the Secretary, to the District Engineer, Louisville District, P.O. Box 59, Louisville, Kentucky 40201

(Attn: CELRL-RE-C), with a copy furnished to the Jefferson Proving Ground (JPG) Commander, Newport Chemical Depot, P.O. Box 160, Newport, Indiana 47966-0160, or as may from time to time otherwise be directed by the parties. Notice shall be deemed to have been duly given if and when enclosed in a properly sealed envelope or wrapper addressed as aforesaid and deposited, postage prepaid, in a post office regularly maintained by the United States Postal Service.

4. The use and occupation of the premises shall be without cost or expense to the Department of the Army and under the general supervision of the JPG Commander and in accordance with the terms and conditions of the MOA. In the event of a conflict between the MOA and this permit, the MOA shall be the controlling instrument.

5. The Grantee acknowledges that it has inspected the premises, knows its condition, and understands that same is granted without any representations or warranties whatsoever and without obligation on the part of the Department of the Army, except as provided in the MOA.

6. In accordance with the MOA, the Grantee shall, at its own expense and without cost or expense to the Department of the Army, maintain and keep the premises at a level sufficient to support Bombing Range operations and in accordance with the tasks in Enclosure 5 of the MOA.

7. The Department of the Army shall not be responsible for providing utilities to the Grantee and it shall be the Grantee's responsibility for obtaining any utilities necessary for its use and occupation of the premises at no expense to the Department of the Army.

8. No additions or alterations of the premises shall be made without the prior written approval of the District Engineer.



9. On or before the expiration of this permit or the termination by either party, in accordance with paragraph one (1), the Grantee shall vacate the premises, remove its property therefrom and restore the premises to a condition satisfactory to the District Engineer, ordinary wear and tear and damage beyond the control of the Grantee excepted.

10. The Grantee shall comply with all applicable Federal, state, interstate, and local laws and regulations wherein the premises are located.

11. The Army will provide the Grantee with baseline information concerning the environmental condition of the premises in accordance with paragraph III 1(a) of the MOA documenting the known history of the property with regard to storage, release or disposal of hazardous substances on the property. Upon expiration or termination of this permit, the Grantee shall, at its own expense and without cost or expense to the Department of the Army, document any storage, release or disposal of hazardous substances in excess of 40 CFR Part 373 reportable quantities and any petroleum products in excess of 55 gallons. A comparison of the two assessments will assist the Army in determining any environmental restoration requirements of the Grantee. Any such requirements will be completed by the Grantee in accordance with the Environmental Remediation provisions in the MOA and paragraph nine (9) of this permit.

12. It is understood that the requirements of this permit pertaining to maintenance, repair, protection, and restoration of the premises and providing utilities and other services shall be effective only insofar as they do not conflict with the MOA.

13. Access to and use of JPG shall be controlled in accordance with the Grantee's Jefferson Range Access Plan included in the MOA and attached hereto as Exhibit "C". The Army must first approve any variation from this Plan and a revised Site Access Plan shall be made a part of this permit.

14. The Grantee shall not use the premises for the storage, treatment or disposal of non-Department of Defense owned hazardous or toxic materials as defined in 10 U.S.C. 2692, unless authorized under 10 U.S.C. and properly approved by the Government.

15. The Grantee may grant a license to the Indiana Air National Guard to exercise its rights to use the premises subject to the terms of this permit.

16. The Grantee is hereby informed and does acknowledge that all buildings on the property, which were constructed or rehabilitated prior to 1978, are presumed to contain lead-based paint. For those buildings the Grantee uses and occupies, it shall comply with all applicable Federal, state and local laws and regulations pertaining to lead-based paint and/or lead-based paint hazards. The Grantee shall restrict access (e.g., secure buildings to the extent practical, post warning signs, etc.) to all unoccupied buildings except those buildings located in UXO Restricted Areas (see Site Map at MOA Enclosure 1). The Grantee shall restrict access to the UXO Restricted Areas in accordance with the Site Access Plan. The Grantee shall not permit the use of any of the buildings or structures on the premises for residential habitation. Residential habitation does not include use of the Old Timbers Lodge for conference purposes including overnight visits on a non-permanent basis. The Grantee assumes all lead-based paint related liability arising from its use of the property.

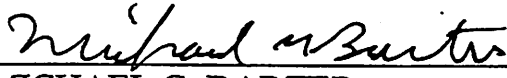
17. The Grantee is hereby informed and does acknowledge that friable and non-friable asbestos or asbestos containing materials (ACM) has been found on the property. The Grantee acknowledges that it will inspect any building it proposes to occupy as to its asbestos content and condition and any hazardous or environmental conditions relating thereto. The Grantee shall restrict access (e.g., secure buildings to the extent practical, post warning signs, etc.) to all unoccupied buildings except those buildings located in UXO Restricted Areas (see Site Map at MOA Enclosure 1). The Grantee shall restrict access to UXO Restricted Areas in accordance with the Site Access Plan. The Grantee shall be deemed to have relied on its own

judgment in assessing the condition of the premises with respect to any asbestos hazards or concerns. The Grantee covenants and agrees that its use and occupancy of a building will be in compliance with all applicable laws relating to asbestos. The Grantee assumes all asbestos related liability arising from its use of the premises.

18. This permit supersedes Permit No. DACA27-4-83-03 dated 23 July 1982, as amended. Said Permit No. DACA27-4-83-03 is hereby terminated, effective the date of execution of this permit.

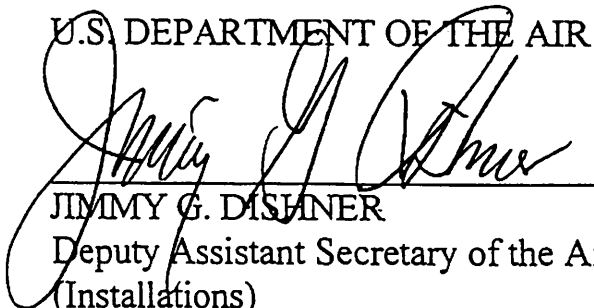
**THIS PERMIT** is not subject to Title 10, United States Code, Section 2662, as amended.

IN WITNESS whereof, I have hereunto set my hand by authority of the Secretary of the Army this 30th day of Nov 2000.

  
MICHAEL G. BARTER  
Chief, Real Estate Division  
Louisville District, Corps of Engineers  
Louisville, Kentucky

This permit is also executed by the Grantee this 22nd day of November 2000.

U.S. DEPARTMENT OF THE AIR FORCE

  
JIMMY G. DISNER  
Deputy Assistant Secretary of the Air Force  
(Installations)

The following list comprises the structures and/or buildings located at Jefferson Proving Ground, Indiana, for which the Air Force will retain responsibility:

Office Complex. Located on "K" Road. Constructed with concrete, flat tar roof, 12" thick walls. Formerly referred to as "M" building or No. 481.

Main Tower. Located on top of Office Complex. Approximately 45' tall and is 14' x 14'.

Flank Tower. Located on "K" Road. Approximately 50' tall and is 8' x 8'.

Maintenance Barn. Located next to Office Complex. Constructed of wood framing and sheet metal sides/roof with a concrete floor. An office is located in the southeast corner. The barn dimensions are 40' x 60' and the office is 12' x 15'.

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Equipment Storage Barn. Located next to Office Complex. Constructed of wood framing and sheet metal sides/roof with a gravel floor. The dimensions are 40' x 100'.

Chemical Containment Building. Located next to Office Complex. Constructed of steel and bolted on a concrete pad. The dimensions are 8' x 8'.

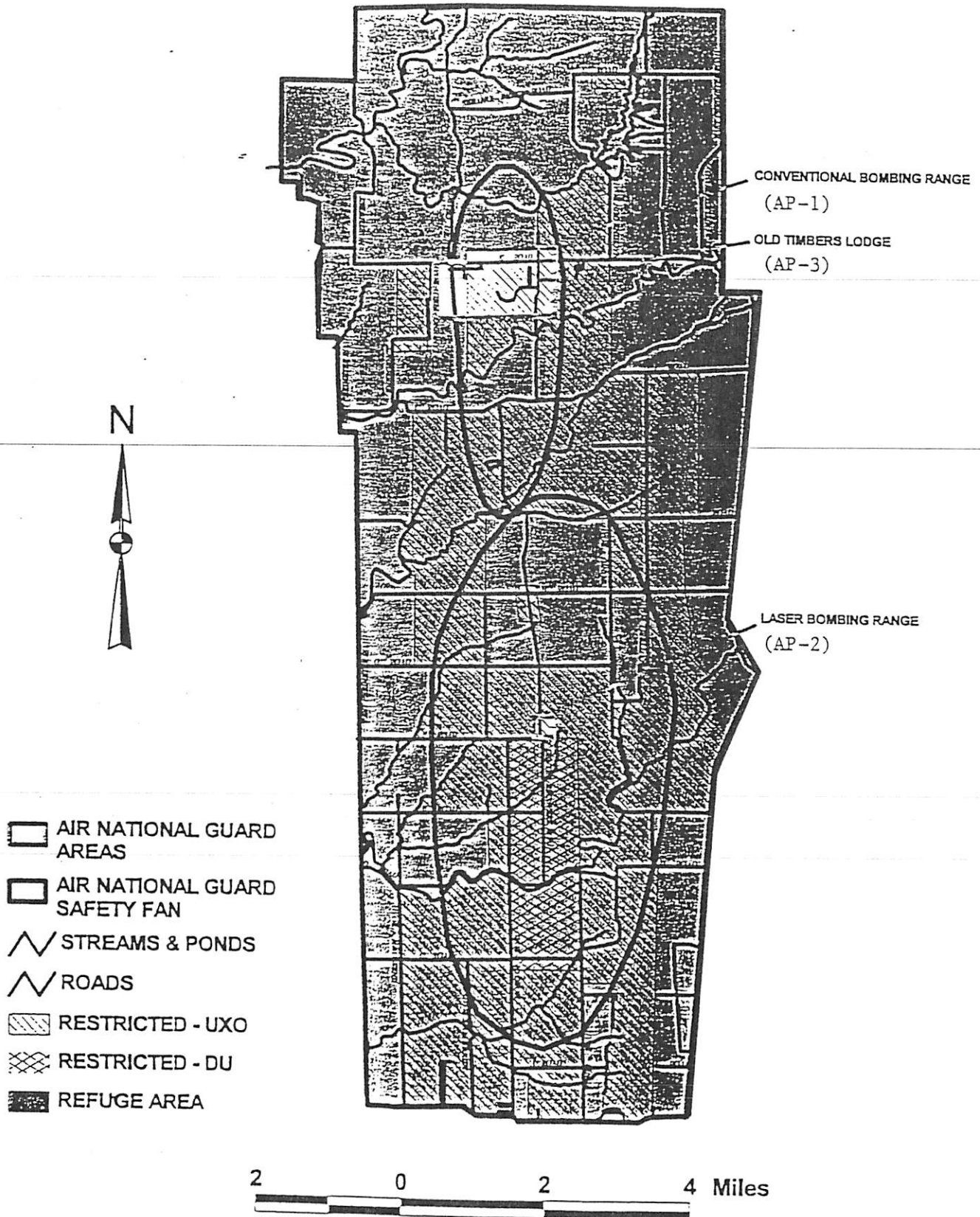
Old Timbers Lodge. Located off "K" Road.

Stone Arch Bridges (4). Considered historically significant. Identifying numbers are 17, 25, 27 and 28.

Ammunition Storage Bunkers (2). Located on "K" Road between Main and Flank Towers. These bunkers are primarily used for storage.

Building No. 488. Located off Bombfield Road. Primarily used as a storage facility.

# JEFFERSON PROVING GROUND SITE MAP



PERMIT AREA NO. AP-1  
FOR U.S. AIR FORCE

JEFFERSON PROVING GROUND  
MILITARY RESERVATION  
JEFFERSON COUNTY, INDIANA

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PERMIT DESCRIPTION

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Situate in the State of Indiana, County of Ripley, Township of Shelby, Township 6 North, Range 10 East, in parts of Sections 4 and 5, and Township 7 North, Range 10 East, in parts of Sections 32 and 33, in the Jefferson Proving Ground reservation, and more particularly described with referenced to the attached map showing coordinates based on the Universal Transverse Mercator (UTM) Metric Grid Coordinate System (NAD 27), Zone 16S, as follows:

Beginning at a point having an approximate UTM value of FU634749E/4318620N, said point being in the center of 'K' Road at the eastern boundary of the County of Ripley, and being at or near the west quarter corner of said Section 32; thence

North 88 degrees 13 minutes 20 seconds East 741.36 meters to a point having an approximate UTM value of FU635490E/4318643N; thence

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North 00 degrees 32 minutes 51 seconds West 314.01 meters to a point having an approximate UTM value of FU635487E/4318957N; thence

East 2,118.00 meters to a point having an approximate UTM value of FU637605E/4318957N; thence

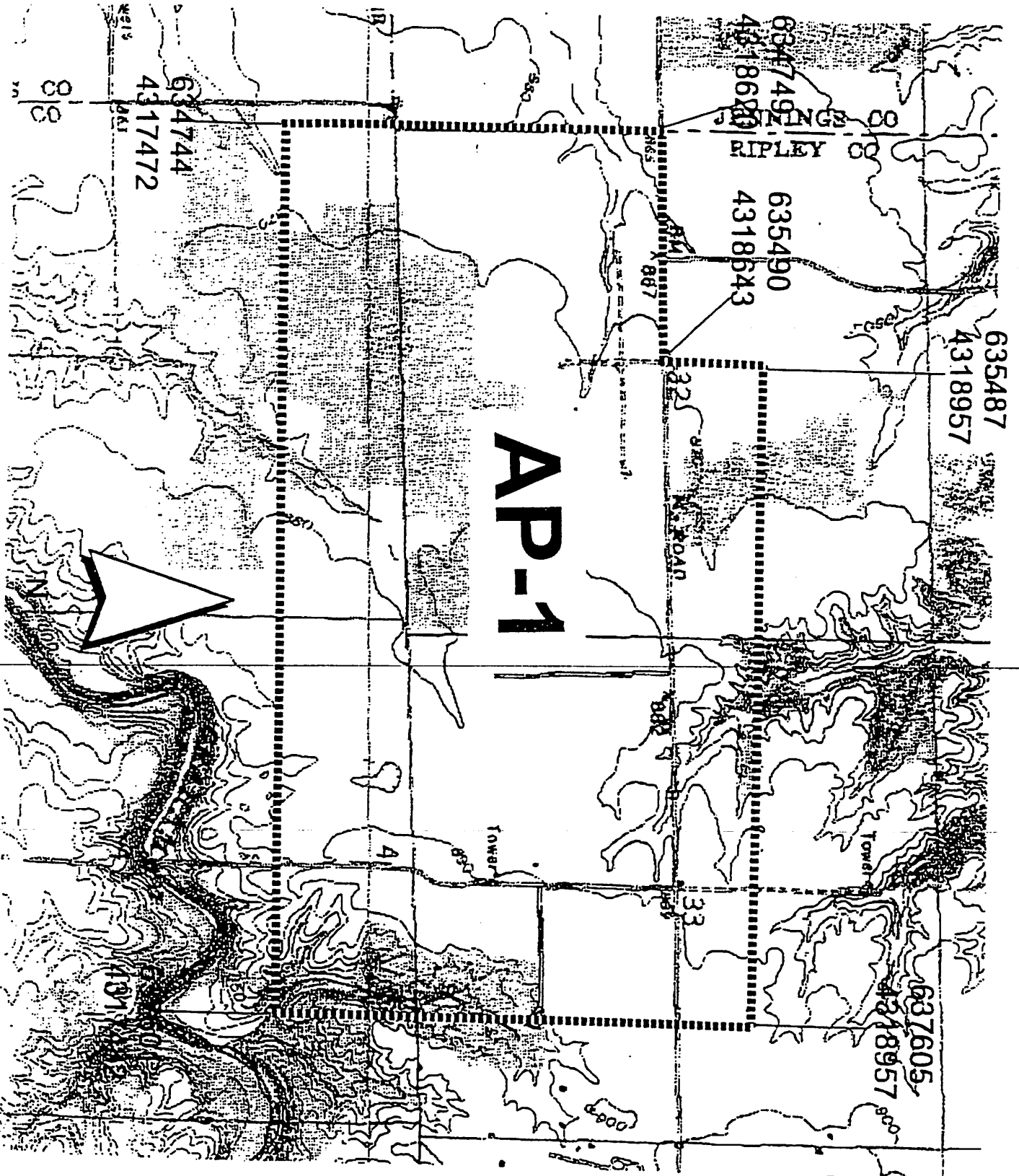
South 00 degrees 09 minutes 19 seconds West 1475.01 meters to a point having an approximate UTM value of FU637601E/4317482N; thence

South 89 degrees 47 minutes 58 seconds West 2,857.02 meters to a point having an approximate UTM value of FU634744E/4317472N; thence

North 00 degrees 14 minutes 58 seconds East 1,148.01 meters to the point of beginning, containing 398.611 hectares (984.967 acres), more or less.

15 June 2000, BLB; Rev 23 June 2000, BLB (3,4)

# ANG Jefferson Range Area



PERMIT AREA NO. AP-2  
FOR U.S. AIR FORCE

JEFFERSON PROVING GROUND  
MILITARY RESERVATION  
JEFFERSON COUNTY, INDIANA

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PERMIT DESCRIPTION

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Situate in the State of Indiana, County of Ripley, Township of Shelby, Township 6 North, Range 10 East, in part of Section 33, in the Jefferson Proving Ground reservation, and more particularly described with referenced to the attached map showing coordinates based on the Universal Transverse Mercator (UTM) Metric Grid Coordinate System(NAD 27), Zone 16S, as follows:

Beginning at a point having an approximate UTM value of FU637038E/4308284N, said point being 205 meters west of Center Recovery Road and 90 meters north of 'F' Road; thence

North 00 degrees 46 minutes 21 seconds West 445.04 meters to a point having an approximate UTM value of FU637032E/4308729N; thence

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East 448.00 meters to a point having an approximate UTM value of FU637480E/4308729N; thence

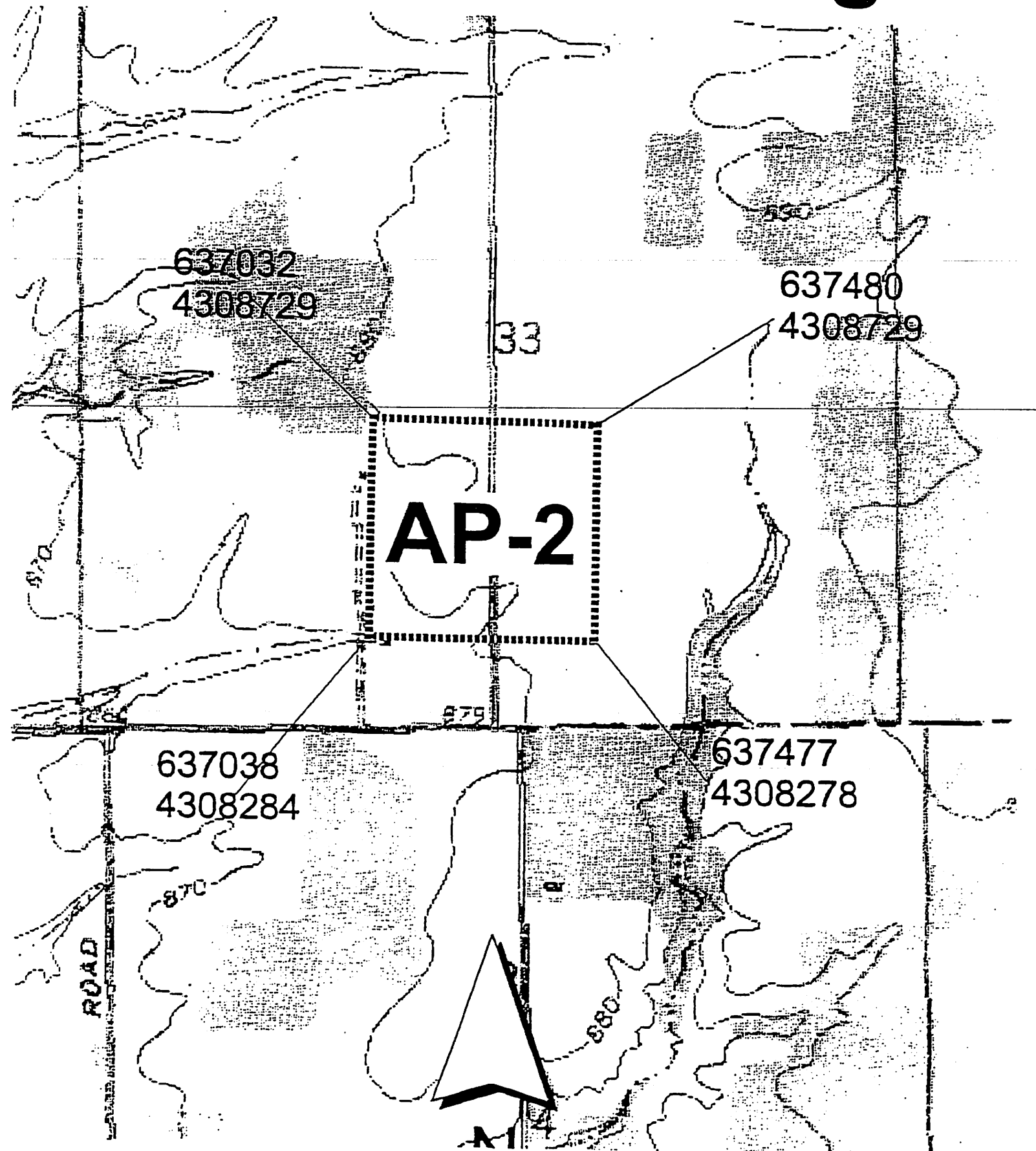
South 00 degrees 22 minutes 52 seconds East 451.01 meters to a point having an approximate UTM value of FU637477E/4308278N; thence

North 89 degrees 13 minutes 01 seconds West 439.04 meters to the point of beginning, containing 19.869 hectares (49.096 acres), more or less.

15 June 2000, BLB; Rev 23 June 2000, BLB (3,4)



# 50-acre PGM Target



PERMIT AREA NO. AP-3  
FOR U.S. AIR FORCE

JEFFERSON PROVING GROUND  
MILITARY RESERVATION  
JEFFERSON COUNTY, INDIANA

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PERMIT DESCRIPTION

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Situate in the State of Indiana, County of Ripley, Township of Shelby, Township 7 North, Range 10 East, in part of Section 34, in the Jefferson Proving Ground reservation, and more particularly described with referenced to the attached map showing coordinates based on the Universal Transverse Mercator (UTM) Metric Grid Coordinate System (NAD 27), Zone 16S, as follows:

Beginning at a point having an approximate UTM value of FU63947E/431876N, said point being 4731.5 meters east of the intersection of 'K' Road with the eastern boundary of the County of Ripley, and being at or near the west quarter corner of Section 32; thence

East 30.0 meters to a point having an approximate UTM value of FU63950E/431876N; thence

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South 250.0 meters to a point having an approximate UTM value of FU63950E/431851N; thence

South 84 degrees 17 minutes 22 seconds West 100.5 meters to a point having an approximate UTM value of FU63940E/431850N; thence

South 210 meters to a point having an approximate UTM value of FU63940E/431829N; thence

West 70 meters to a point having an approximate UTM value of FU63933E/431829N; thence

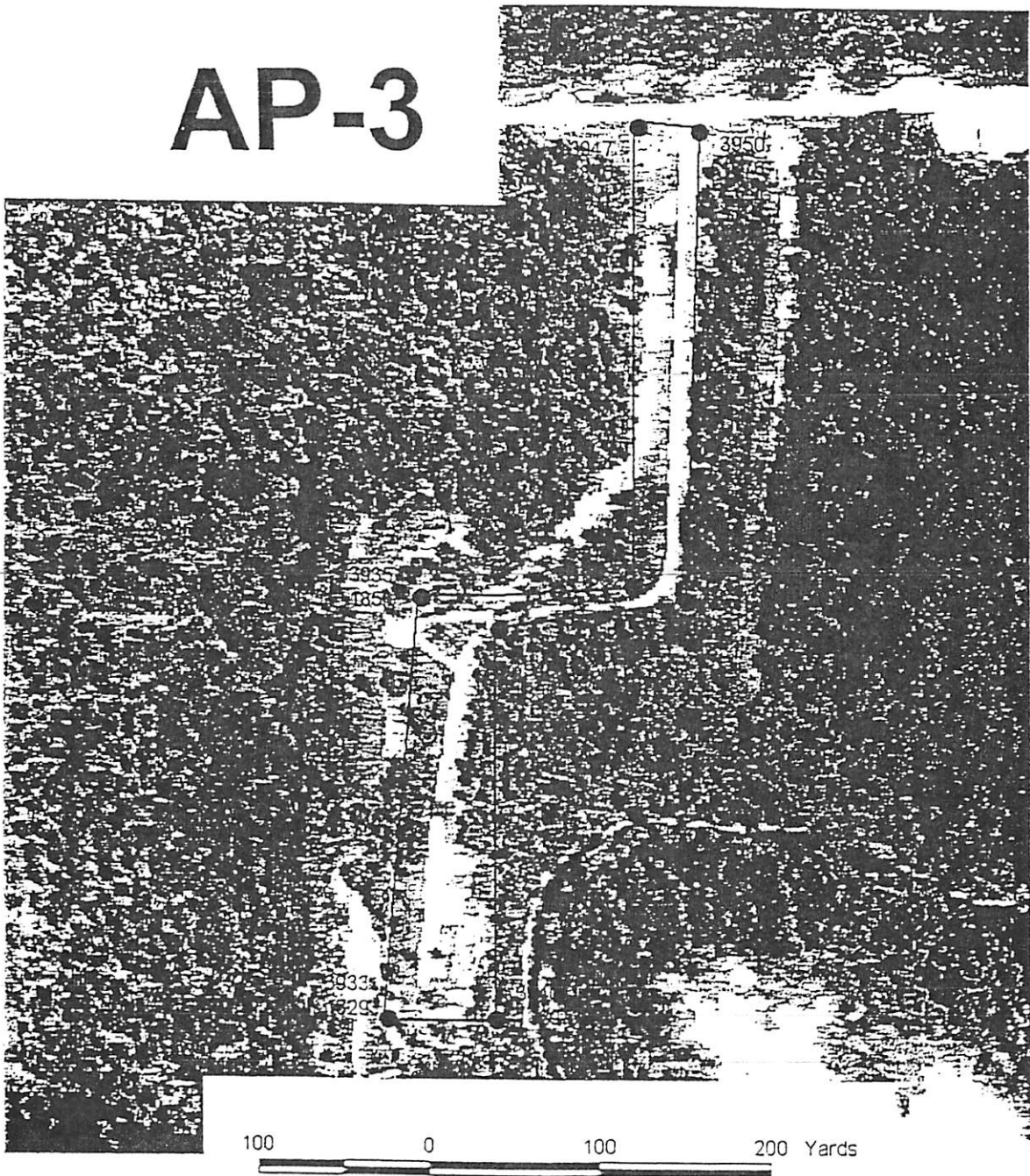
North 05 degrees 11 minutes 40 seconds East 220.9 meters to a point having an approximate UTM value of FU63935E/431851N; thence

North 85 degrees 14 minutes 11 seconds East 120.4 meters to a point having an approximate UTM value of FU63947E/431852N; thence

North 240.0 meters to the point of beginning, containing 2.18 hectares (5.388 acres), more or less.

15 June 2000, BLB

# AP-3



# JEFFERSON RANGE ACCESS PLAN

(Revised 12 Apr 00)

Prepared by:  
Air National Guard

[COPY SIGNED]

Major Bill Nolen  
Commander  
Jefferson Range

Reviewed by:  
U.S. Fish and Wildlife Service

[COPY SIGNED]

Lee Herzberger  
Refuge Manager  
Muscatatuck National Wildlife Refuge

Approved by:  
U.S. Army

[COPY SIGNED]

Major Mark Welch  
Commander  
Jefferson Proving Ground

# JEFFERSON RANGE ACCESS PLAN

This Operating Instruction will provide access procedures onto Jefferson Range. All access onto Jefferson Range and Old Timbers Lodge will be coordinated through Jefferson Range Operations Center (JROC).

Jefferson Range Operations Center (JROC) describes the range primary operations area. This area encompasses those buildings located at the intersection of Bomb Field and K roads. All access to the JROC is through Big Oaks National Wildlife Refuge.

Jefferson Range consists of 983 acres used as the primary training range. Geographical boundaries for this area illustrated in Attachment 1.

A 50 acre Precision Guided Munitions (PGM) target is located approximately 6nm south of the primary range. Geographical boundaries for this target are illustrated in Attachment 2.

Old Timbers Lodge and approximately 5 acres surrounding the lodge will be considered part of Jefferson Range for the purposes of this access plan.

Four gates allow access to the primary range. These gates are located as follows:

- Intersection of Machine Gun and K roads
- Intersection of Shape Charge and K roads .
- Intersection of Bethel Hole and J roads
- Intersection of Cottrell and J roads

**Range Personnel.** All assigned personnel will be issued one key for perimeter gates and one key for range gates. Entry/Exit will be made through the gate most advantageous to their needs. Upon entry/exit the perimeter gate will be closed and locked.

**Visitors.** All visitors will coordinate range visits through the JROC. Visitors will be met at the appropriate perimeter gate and escorted to the JROC. Upon completion of visit, visitors will be escorted to appropriate gate for departure. There will be no unescorted visitors to and from Jefferson Range.

**Contractors.** Prior to any contractor performing duties on JPG real estate, coordination will be made through JROC and FWS office on all planned activities. Those contractors scheduled per Air Force (AF) requirements will be assigned a specific key for the duration of their activity. This key will be to an exclusive use lock located on the perimeter gate/interior gate nearest the planned activity and will only be utilized during duty hours.

**Gate.** All locks presently on all perimeter gates will be replaced by AF to ensure access by FWS, Army and AF personnel only. All locks will be changed prior to the issuance of a real estate license.

**Fence.** AF personnel and/or contractors will maintain the perimeter. Range personnel/contractors will perform weekly inspections of entire perimeter fence. All discrepancies will be reported so that any necessary repair action may be taken. FWS personnel are required to report any fence discrepancies to Jefferson Range NCOIC so the appropriate action may be taken. AF personnel or the designated contractor will perform fence repairs. Inspection documentation will include 1) date of inspection, 2) name of inspector, 3) description of damage, and 4) the location of the damage. Holes in the fence large enough to permit human access, damaged gates and missing "windchimes" of the creek barriers will be repaired within 72 hours of being documented. For every incident of damage a record shall be maintained documenting the action taken to make repairs. If any repairs take more than 72 hours, the Army shall be notified and milestones shall be given for completion of the repair.

**Barricades.** To ensure no trespass of the PGM target safety footprint and the interior of JPG, gate style barricades will be placed on all access roads into the footprint and interior areas. These barricades will be located at the point where all interior roads leave the East and West Perimeter Roads. Other than during the limited deer and turkey hunt, these barricade gates will remain closed and locked at all times. Only AF, Army and FWS personnel or required contractors will be allowed access to the footprint and interior areas of JPG. During the annual turkey and deer hunt, FWS will control access into these areas.

**Key Control.** All range personnel will be assigned 4 keys for range access. These keys include the perimeter gate keys, PGM target/interior road gate keys, range keys and building keys. Spare keys for these four series of keys will be kept in the JROC. All keys will be signed for on the Jefferson Range key control log. The FWS will be assigned the appropriate number of keys for distribution to FWS personnel. The FWS will be responsible for the control of these keys. The FWS will distribute the local law enforcement units perimeter gate keys from the FWS key allotment. The Army site staff will be issued 2 sets of keys and will be responsible for the control of these keys. Quarterly lock and key inventories will be made of all issued keys. In the event of a lost or missing key, the individual responsible for that key shall bear the cost for re-coring of applicable locks. Lock and Key Control guidance will be from 181<sup>st</sup> FW Instruction 32-1003. The Jefferson Range Commander has the ultimate responsibility for lock and key control on the range and refuge.

**Safety Signs.** The appropriate UXO safety signs will be maintained on the perimeter fence and gates. Gate numbers will be posted on all gates. Range and footprint gates will be posted with both Bombing Range and Laser Range danger signs. Radiation hazard signs will be maintained on DU field perimeter. Safety signs will be maintained on the west side of Machine Gun Road from K Road to Little Otter Creek.

**Safety Brief.** All visitors and contractors will receive a safety briefing from Jefferson Range Safety NCO. The safety brief will cover UXO, DU, driving hazards, flying operations and FWS operations. At no time will visitors or contractors be permitted to leave the JROC without first receiving an initial safety briefing.

**Communications.** Good communications between range, Army site staff and FWS personnel are a must to ensure a safe working environment for all concerned. The Range Operations Officer (ROO) will furnish FWS with a monthly flying schedule. The ROO will also inform FWS of any scheduled use of the PGM target. Use of this target will preclude any activity inside the safety footprint. All maintenance of the facilities will be coordinated with the Refuge Manager. At a minimum, monthly meetings will be conducted between the Refuge Manager and the Range Operations Officer to better facilitate a smooth work environment.

**Weapons Safety Footprint.** Two composite weapons safety footprints are associated with Jefferson Range. A composite footprint of approximately 5,100 acres supports the primary target area and a composite footprint of approximately 14,860 acres supports the PGM target area. During flight operations no personnel other than AF personnel will be allowed access inside the weapons footprints. The use of both footprints will be coordinated with the Refuge Manager through monthly scheduling or as necessary to meet mission requirements. When not in use, FWS personnel will have access to the safety footprints.

**Emergency Response.** Any emergency requiring an immediate response will be accomplished through the Ripley County Communication Supervisor. Emergency response personnel will be directed to Gate 8 for entrance and directions to the location of the emergency. AF personnel will provide escort to the incident location. Emergency response personnel will be informed of any hazards associated with the emergency. The Army site staff and FWS will be notified of all needs for emergency response.

**Aircraft Accident.** In the event of an aircraft accident, the Range Control Officer (RCO) will be the on-scene commander until relieved by the appropriate authority. Emergency response will be through the Ripley County Communication Supervisor. Fire and medical support will be directed to the perimeter gate most advantageous to the crash site. Due to the dangers posed by military aircraft, no persons will be allowed access to a crash site until deemed appropriate by the on-scene commander. Access to an aircraft or pilot in a designated restricted area will be accomplished by the appropriate Jefferson Range vehicle. Only the necessary rescue personnel will be permitted access to any restricted area. Access to aircraft or pilot outside of a restricted area will be made by the appropriate vehicle for the situation. The Army site staff and FWS will be notified immediately of any aircraft mishap.

**Fire Response.** Request for fire response will be made through the Ripley County Communication Supervisor. Fire fighters will be directed to Gate 8 for entrance and directions to the fire. Fire fighters will not leave any roadway to fight fires per US Army directives. In the event of a need for fire department response after duty hours, the local fire department will be instructed to cut the lock on the gate most advantageous to their response. In this case, fire department response will only occur if it is apparent that the fire will cause life or property damage outside JPG. A complete list of AF and FWS contacts will be provided all local fire departments in the area. Attachment 4 lists the Jefferson Range contacts available on a 24 hour basis.

**Law Enforcement Response.** Request for law enforcement response will be made through the Ripley County Communication Supervisor or the appropriate law enforcement agency. Caller will state the nature of the emergency, location of the emergency and the most accessible gate to respond to the emergency. Local law enforcement units will have perimeter gate keys issued to them from the FWS key allotment. All local law enforcement units will be issued a 24 hour contact list of Jefferson Range personnel.

**Old Timbers Lodge.** Access to Old Timbers Lodge will be through Gate 1B. The sponsor that has reserved the lodge will contact Jefferson Range to arrange a time for key sign out and the required safety briefing. The sponsor and all guests will be required this safety brief. A single key to Gate 1 B will be assigned the sponsor. The sponsor is responsible for the behavior and safe conduct of his/her guests. If the sponsor and/or guests wish to take part in recreational activities of Big Oaks NWR, those activities will fall under the rules and guidelines of the refuge. Use of Old Timbers Lodge does not guarantee hunting and fishing activities on the refuge. Attachment 3 depicts that area around the lodge to be maintained by the AF.



## Attachment 4

### 24 Hour Contact List

Major Bill Nolen  
Jefferson Range Commander  
Office: 812-689-7295 Home:  
317-73 8-2719 Cell Phone:  
317-441-3653

Major Matt Sweeney Jefferson  
Range Operations Officer Office:  
812-689-7295 Home: 812-988-6787  
Cell Phone: 812-528-0974

Senior Master Sergeant Jim Bergdoll  
Jefferson Range NCOIC Office:  
812-689-7295 Home: 812-265-2372

Master Sergeant Kerry Brinson  
Jefferson Range Asst NCOIC  
Office: 812-689-7295 Home:  
812-839-3557

Master Sergeant Todd Bass  
Jefferson Range Safety NCOIC  
Office: 812-689-7295 Home:  
812-265-215 3

ENCLOSURE 4-North of the Firing Line  
Unexploded Ordnance (UXO) Response  
Standing Operating Procedure

1. **PURPOSE:** To establish procedures to support emergency management/disposition of UXO items in the Firing Range area at Jefferson Proving Ground (JPG).

2. **OBJECTIVE:** To prescribe an explicit course of action for the safe and efficient management of situations involving UXOs in the Firing Range area at JPG.

3. **POLICY:**

- a. The Senior Explosive Ordnance Disposal (EOD) technician assumes primary responsibility for command and control of operations at the scene of a UXO.
- b. Only EOD technicians may attempt to perform render-safe procedures (RSP) on UXO.

4. **UXO OPERATIONAL PROCEDURES:**

a. If the FWS or Air Force discovers UXO which poses an imminent and substantial hazard to Refuge or Bombing Range operations (e.g., UXO has migrated to the surface of a roadway), the FWS or Air Force will immediately:

- (1) Restrict access to the UXO site,
- (2) Cease all work, mark location of the item,
- (3) Move all personnel away,
- (4) Ensure that no one uses a two-way radio, and
- (5) Notify the Army JPG Site Management Team if present at 812-273-2522/2551/6075. If the JPG Site Management Team is not

available, notify the Commander, Newport Chemical Depot at 765-245-4317.

b. Upon verification by the Commander, Newport Chemical Depot or the JPG Site Management Team that the UXO poses an imminent and substantial hazard to Refuge or Bombing Range operations, the Army shall notify the Fort Knox 703<sup>rd</sup> EOD Ordnance Company at 502-624-5631, and request disposal of the UXO item<sup>1</sup>.

c. EOD personnel shall coordinate their activities and gain access to areas in the Firing Range area by contacting the Commander, Newport Chemical Depot at 765-245-4317 and Army JPG Site Management Team at 812-273-2522/2551/6075.

d. The Senior EOD Technician shall determine if the UXO item is inert. If an inert verification is not possible the munition shall be blown in place. If detonation in place is not possible, the Senior EOD Technician will determine whether it is appropriate to attempt a RSP or use other approved means to move the item to a more suitable location for safe disposal.

e. Until the item is disposed of, the Army at its discretion may impose additional access restrictions to the Firing Range area.

**5. REVIEW:** This SOP shall be reviewed annually. Any revisions/updates shall be provided to the FWS, Air Force, the 703<sup>rd</sup> Fort Knox EOD Ordnance Company, the Real Estate Division of the Louisville Corps of Engineers, and Newport Chemical Depot Commander or the Army JPG Site Management Team.

<sup>1</sup> The Army will not be required to remove UXO that the JPG Site Management Team determines does not pose an imminent and substantial hazard to Refuge or Bombing Range operations.

## ENCLOSURE 5 - FWS/Air Force Infrastructure Maintenance Responsibilities

### **AIR FORCE**

1. Air Force shall maintain all roads, road shoulders and low water crossings, as well as associated bridges and culverts, that are shaded in green on the map at Tab A, in accordance with Army Regulation 420-72.
2. The perimeter fence shall be patrolled and inspected weekly. Inspections shall be documented to include: 1) the date of inspection, 2) the name of the inspector(s), 3) a description of any damage observed, and 4) the location of the damage. Holes in the fence large enough to permit human access, damaged gates and missing "windchimes" of the creek barriers will be repaired within 72 hours of being documented. For every incident of damage a record shall be maintained documenting the action taken to make repairs. In extraordinary circumstances when a repair will take more than 72 hours to complete (e.g. storm damage), the Air Force shall notify the Army in writing and milestones shall be given for completion of the repair. The Air Force shall take action to remove trees that fall into/onto the fence. Grass and other vegetation, located between the perimeter fence and perimeter road, shall be mowed or otherwise controlled to assure capability for visual inspection of the perimeter fence from the perimeter road; such mowing shall be done twice annually, usually in the April-June and September-October timeframes.
3. All roads approaching the DU area shall be barricaded and marked with radiation warning signs. In addition the Air Force will maintain warning signs around the entire perimeter of the firing range as well as around the submunitions area west of Machine Gun Road and the former Open Detonation area.
4. The Air Force shall maintain the cultural resource properties of the Firing Range (i.e., four stone-arch bridges as well as the Old Timbers Lodge) in accordance with the Cultural Resources Management Plan (reference maintenance standards in Table III-1 at Tab B). A complete copy of the Cultural Resources Management Plan was mailed to the Air Force(i.e. Mr. Masse) in March, 2000.

### **FWS**

1. The FWS shall maintain all buildings, roads, road shoulders, bridges, low water crossings, and culverts, not maintained by the Air Force, which are required for Refuge operations. The FWS shall maintain such facilities in accordance with Army Regulation 420-72. Prior to the start date of the Real Estate permit, the FWS will provide a map with clear identification of the roads, road shoulders, buildings, bridges, low water crossings and culverts that it shall maintain under terms of the real estate permit. This map will be

updated annually by the FWS to reflect their maintenance commitment for the next year. No later than December 1, 2000, the FWS will close all bridges in the Refuge footprint that are not required for Refuge operations or not maintained by the Air Force. The FWS shall provide access control signs on the east perimeter road between Gate 1B and K Road, as well as the minefield area on L Road.

2. FWS shall provide road maintenance sufficient for 4 x 4 vehicle access to the DU monitoring wells identified at Tab C.
3. FWS shall provide or negotiate and/or fund fire suppression, emergency medical response and local law enforcement agreements. Note that three different counties (i.e. Jefferson, Ripley, and Jennings) have different jurisdiction footprints in the firing range property.
4. The FWS shall pay a pro-rated share of the rent charged to the Army for the use of Building 125 and associated utilities beginning with the start date the real estate permit..


**LANG ROAD MAINTENANCE**

Table III-1  
Standards for Treatment of Significant Architectural Resources  
after the Secretary's Standards and Guidelines for Archeology and Historic Preservation [48 FR 44716]

Preservation is defined as the act or process of applying measures necessary to sustain the existing form, integrity, and material of an historic property. Work, including preliminary measures to protect and stabilize the property, generally focuses upon the ongoing maintenance and repair of historic materials and features rather than extensive replacement and new construction. New exterior additions are not within the scope of this treatment; however, the limited and sensitive upgrading of mechanical, electrical, and plumbing systems and other code-required work to make properties functional is appropriate within a preservation project.

Standards for Preservation

1. A property shall be used as it was historically, or be given a new use that maximizes the retention of distinctive materials, features, spaces, and spatial relationships. Where a treatment and use have not been identified, a property shall be protected and, if necessary, stabilized until additional work may be undertaken.
2. The historic character of a property shall be retained and preserved. The replacement of intact or repairable historic materials or alteration of features, spaces, and spatial relationships that characterize a property shall be avoided.
3. Each property shall be recognized as a physical record of its time, place, and use. Work needed to stabilize, consolidate, and conserve existing historic materials and features shall be physically and visually compatible, identifiable upon close inspection, and properly documented for future research.
4. Changes to a property that have acquired historic significance in their own right shall be retained and preserved.
5. Distinctive materials, features, finishes, and construction techniques or examples of craftsmanship that characterize a property shall be preserved.
6. The existing condition of historic features shall be evaluated to determine the appropriate level of intervention needed. Where the severity of deterioration requires repair or limited replacement of a distinctive feature, the new material shall match the old in composition, design, color, and texture.
7. Chemical or physical treatments, if appropriate, shall be undertaken using the gentlest means possible. Treatments that cause damage to historic materials shall not be used.
8. Archeological resources shall be protected and preserved in place. If such resources must be disturbed, mitigation measures shall be undertaken.

- Rehabilitation is defined as the act or process of making possible an efficient compatible use for a property through repair, alterations, and additions while preserving those portions or features which convey its historical, cultural, or architectural values.

Standards for Rehabilitation

1. A property shall be used as it was historically or be given a new use that requires minimal change to its distinctive materials, features, spaces, and spatial relationships.
2. The historic character of a property shall be retained and preserved. The removal of distinctive materials or alteration of features, spaces, and spatial relationships that characterize a property shall be avoided.
3. Each property shall be recognized as a physical record of its time, place, and use. Changes that create a false sense of historical development, such as adding conjectural features or elements from other historical properties, shall not be undertaken.
4. Changes to a property that have acquired historic significance in their own right shall be retained and preserved.
5. Distinctive materials, features, finishes, and construction techniques or examples of craftsmanship that characterize a property shall be preserved.
6. Deteriorated historic features shall be repaired rather than replaced. Where the severity of deterioration requires replacement of a distinctive feature, the new feature shall match the old in design, color, texture, and where possible, materials. Replacement of missing features shall be substantiated by documentary and physical evidence.
7. Chemical or physical treatments, if appropriate, shall be undertaken using the gentlest means possible. Treatments that cause damage to historic materials shall not be used.
8. Archeological resources shall be protected and preserved in place. If such resources must be disturbed, mitigation measures shall be undertaken.
9. New additions, exterior alterations, or related new construction shall not destroy historic materials, features, and spatial relationships that characterize the property. The new work shall be differentiated from the old and shall be comparable with the historic materials, features, size, scale and proportion, and massing to protect the integrity of the property and its environment.
10. New additions and adjacent or related new construction shall be undertaken in a such a manner that, if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.

Restoration is defined as the act or process of accurately depicting the form, features, and character of a property as it appeared at a particular period of time by means of the removal of features from other periods in its history and reconstruction of missing features from the restoration period. The limited and sensitive upgrading of mechanical, electrical, and plumbing systems and other code-required work to make properties functional is appropriate within a restoration project.

#### Standards for Restoration

1. A property shall be used as it was historically or be given a new use which interprets the property and its restoration period.
2. Materials and features from the restoration period shall be retained and preserved. The removal of materials or alteration of features, spaces and spatial relationships that characterize the period shall not be undertaken.
3. Each property shall be recognized as a physical record of its time, place, and use. Work needed to stabilize, consolidate and conserve materials and features from the restoration period shall be physically and visually compatible, identifiable upon close inspection, and properly documented for future research.
4. Materials, features, spaces, and finishes that characterize other historical periods shall be documented prior to their alteration or removal.
5. Distinctive materials, features, finishes, and construction techniques or examples of craftsmanship that characterize the restoration period shall be preserved.
6. Deteriorated features from the restoration period shall be repaired rather than replaced. Where the severity of deterioration requires replacement of a distinctive feature, the new feature shall match the old in design, color, texture, and, where possible, materials.
7. Replacement of missing features from the restoration period shall be substantiated by documentary and physical evidence. A false sense of history shall not be created by adding conjectural features, features from other properties, or by combining features that never existed together historically.
8. Chemical or physical treatments, if appropriate, shall be undertaken using the gentlest means possible. Treatments that cause damage to historic materials shall not be used.
9. Archeological resources shall be protected and preserved in place. If such resources must be distributed, mitigation measures shall be undertaken.
10. Designs that were never executed historically shall not be constructed.

Reconstruction is defined as the process of depicting, by means of new construction, the form, features, and detailing of a non-surviving site, landscape, building, structure, or object for the purpose of replicating its appearance at a specific period of time and in its historic location.

#### Standards for Reconstruction

1. Reconstruction shall be used to depict vanished or non-surviving portions of a property when documentary and physical evidence is available to permit accurate reconstruction with minimal conjecture, and such reconstruction is essential to the public understanding of the property.
2. Reconstruction of a landscape, building, structure, or object in its historic location shall be preceded by a thorough archeological investigation to identify and evaluate those features and artifacts which are essential to an accurate reconstruction. If such resources must be distributed, mitigation measures shall be taken.
3. Reconstruction shall include measures to preserve any remaining historic materials, features, and spatial relationships.
4. Reconstruction shall be based on the accurate duplication of historic features and elements substantiated by documentary or physical evidence rather than on conjectural designs or the availability of different features from other historic properties. A reconstructed property shall recreate the appearance of the non-surviving historic property in materials, design, color, and texture.
5. A reconstruction shall be clearly identified as a contemporary re-creation.
6. Designs that were never executed historically shall not be constructed.

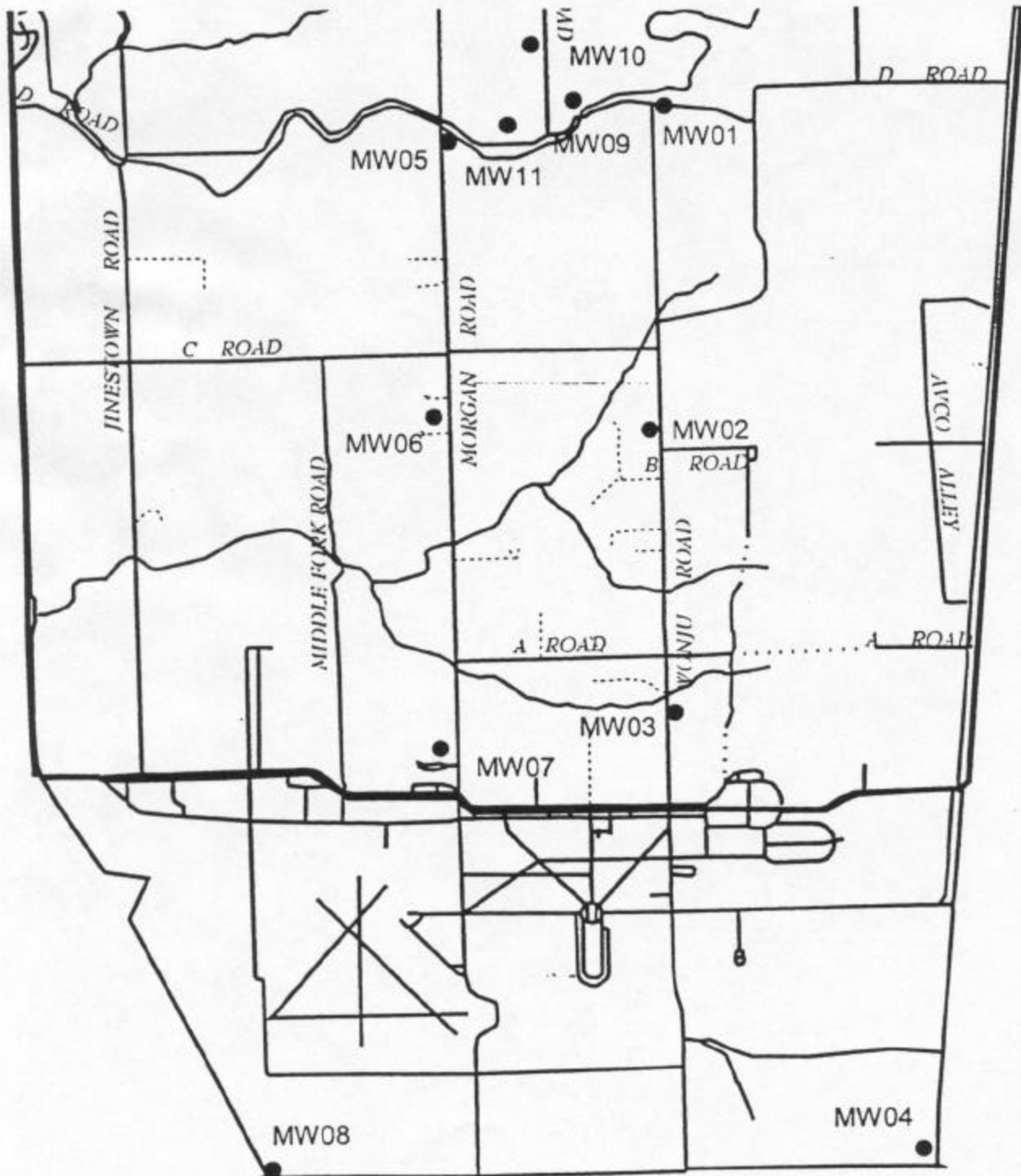
The presence of hazardous materials and material residues may impact considerations for preservation and mitigation. Coordination will be required.

#### a. Continued Operations, Maintenance, and Repair

Maintenance and repair activities, to the greatest extent possible, should seek to preserve the integrity of historic properties. The Secretary's *Standards and Guidelines* for archeological and historic preservation offers general and useful guidelines for the treatment of significant buildings (see Table III-1). The maintenance levels for eligible buildings and structures under the control of the Army must provide the



# JEFFERSON PROVING GROUND: DU SAMPLING GROUNDWATER MONITORING WELLS



TAB C to Enclosure 5

43

## **APPENDIX I: EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICES (BMPs)**

Extracts from Indiana Storm Water Quality Manual ..... Page I-1

Indiana Storm Water Quality Manual (IDEM 2007) <http://www.in.gov/idem/4899.htm>

Runoff Control Permanent Diversion

Runoff Control Water Bar

Runoff Control Rock Check Dam

Extracts from Indiana Drainage Handbook..... Page I-15

Indiana Drainage Handbook (IDNR 1999) <http://www.in.gov/dnr/water/4893.htm>

Practice 901 Culverts

Practice 902 Bridges

Practice 903 Fords

### **Additional BMPs are Available in the Following Manual:**

Best Management Practices Stormwater Management Manual for Southern Indiana (City of Madison, IN 2008) <http://www.madison-in.gov/pdf/best-management-practices-manual.pdf>. This pdf is locked and BMPs can not be extracted. A list of BMPs of interest from this manual are listed below:

Activity: Buffer Zones EPP-04 (pp. 83-85)

Activity: Nets and Mats EPP-09 (pp. 97-99)

Activity: Geotextiles EPP-10 (pp. 101-105)

Activity: Check Dams SMP-01 (pp. 113-115)

Activity: Silt Fence SMP-02 (pp. 117-120)

Activity: Brush or Rock Filters SMP-05 (pp. 125-126)

Activity: Sediment Traps SMP-06 (pp. 127-128)

Activity: Bank Stabilization SMP-08 (pp. 131-134)

Activity: Geotextiles EPP-02 (pp. 231-235)

Activity: Soil Bioengineering SPP-04 (pp. 239-246)

# RUNOFF CONTROL

---

## Permanent Diversion



*A permanent diversion is a storm water control measure consisting of a permanent channel and supporting ridge constructed on a predetermined grade across a slope to collect storm water runoff and divert it to a treatment device or stable outlet.*

### Purpose

---

To divert storm water runoff to a location where it can be stored, used, or released without causing erosion or flood damage.

### Specifications

---

#### Contributing Drainage Area

50 acres maximum. (Designed by a qualified individual/professional engineer. Larger drainage areas may be accommodated but may require additional design considerations.)

#### Capacity

Peak runoff from 25-year frequency, 24-hour duration storm event (or higher capacity where safety is a concern or flood damage cannot be tolerated).

#### Ridge

- Side slope – ratio of 2:1 or flatter (3:1 or flatter if mowed).
- Top width – four feet minimum.
- Freeboard – six inches minimum.
- Settlement – 10 percent of fill height.
- Stabilized with vegetation.

## Channel

- Shape – parabolic.
- Side slopes – ratio of 2:1 or flatter (3:1 or flatter if mowed).
- Depth – 18 inches minimum.
- Grade – positive towards outlet, but not exceeding two percent.
- Stabilized with vegetation or appropriate armor based on design flow.

## Outlet

Stable, with sediment-laden water diverted to a sediment trap or basin.

## Subsurface Drain (optional)

- Installed off to the side of the channel bottom (to eliminate seepage from channel side slopes).
- Perforated drain tile.
- Depth – two feet minimum.

## Installation

---

1. Lay out the diversion by setting grade and alignment to fit site needs and topography, maintaining a stable, positive channel grade towards the outlet.
2. Remove and properly dispose of brush, trees, and other debris from the foundation area.
3. Disk ridge base before placing fill to allow bonding of soil materials.
4. Excavate the channel and fill/shape the diversion ridge to alignment, grade and cross-section shown in the construction plans.  
**Note:** Install subsurface tile drain where a seasonal high water table exists.
5. Construct the ridge in six to eight-inch lifts, compacting each lift as it is placed. Build the diversion ridge higher than design elevation, allowing for 10 percent settlement. (Compaction of the ridge may be achieved by driving wheeled equipment along the ridge as soil lifts are added. The compacted ridge must be at or above design grade at all points, while the channel must be at design grade. Shape the ridge and channel to blend with the surrounding landscape and leave sufficient area along the diversion to permit cleanout and regrading.)
6. Stabilize outlets prior to or during construction of the diversion diverting sediment-laden storm water flow to a temporary sediment trap (see **Tempo-**

**rary Sediment Trap** on page 183) or a temporary dry sediment basin (see **Temporary Dry Sediment Basin** on page 191) or other appropriate sediment control measures.

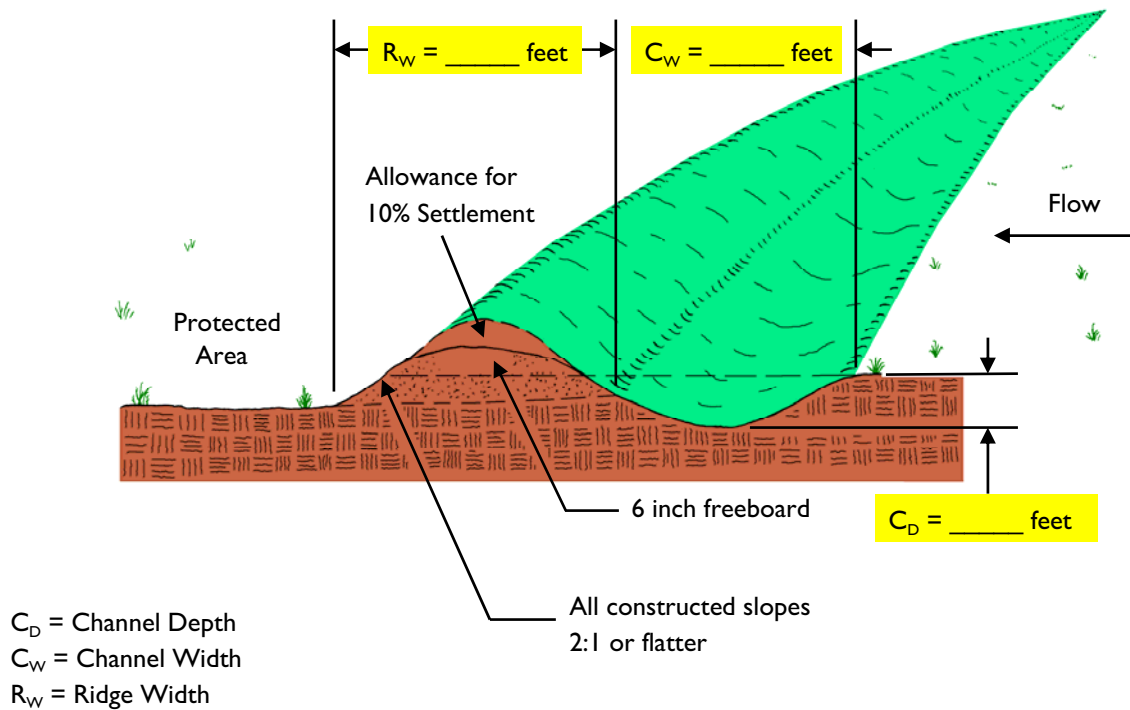
7. Stabilize diversions immediately after construction using vegetation and/or other suitable linings (e.g., riprap). If vegetation is used (see **Permanent Seeding** on page 35), protect newly seeded areas with properly anchored mulch (see **Mulching** on page 55), erosion control blankets (see **Erosion Control Blanket** on page 63), or by installing sod (see **Sod** on page 47).

### Maintenance

---

- Inspect within 24 hours of each rain event and at least once every seven calendar days.
- Remove sediment from channel to maintain positive grade.
- Check outlets and make necessary repairs immediately.
- Adjust ridge height to prevent overtopping.

## Permanent Diversion Worksheet



# RUNOFF CONTROL

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## Water Bar



*A **water bar** is a series of small ridges or ridges and channels used to intercept and divert storm water runoff from long, narrow corridors and discharge it into a stabilized area or sediment treatment device.*

### Purpose

---

To temporarily reduce erosion on narrow, long, sloping corridors by diverting storm water runoff at selected intervals.

### Specifications

---

#### Corridor Width

100 feet maximum.

#### Water Bars

- Spacing – as shown in Table 1.
- Ridge
  - Height – nine inches minimum from down-slope ground level to top of settled ridge.
  - Base width – six feet minimum.
- Side slope – ratio of 2:1 or flatter.
- K Alignment – stable, positive grade towards outlet, but not exceeding two percent.
- Settlement – 10 percent of fill height.

#### Outlet

- Water bar must cross full corridor width and extend to a stable outlet.
- Diversion grade near outlet should be reduced to one percent or less to slow storm water discharge velocities at outlet.



Table 1. Water Bar Spacing

| Slope      |              | Spacing  |
|------------|--------------|----------|
| < 5%       | < 20:1       | 125 feet |
| 5% to 10%  | 20:1 to 10:1 | 100 feet |
| 10% to 20% | 10:1 to 5:1  | 75 feet  |
| 20% to 33% | 5:1 to 3:1   | 50 feet  |
| >33%       | > 3:1        | 25 feet  |

## Installation

---

1. Remove and properly dispose of brush, trees, and other debris from the corridor.
2. Lay out (set) the water bars to the lines and dimensions shown in the construction plans, locating the first water bar at the required distance from the slope crest depending on steepness of the corridor slope.
3. Mark the locations and widths of the remaining water bars. If necessary, adjust length and/or spacing between water bars to prevent runoff from up-slope water bars converging with outlets of down-slope water bars.
4. Lay out the direction of the water bars to utilize the most stable outlet locations. Set water bar crossing angles to maintain a positive grade of less than two percent towards the outlet.
5. Construct sediment traps or outlet stabilization structures as needed.
6. Clear and grade the foundation for the water bars.
7. Disk the entire length of the water bar foundation.
8. Construct the water bar ridge in six to eight-inch lifts. Compact each lift by driving wheels of construction equipment along the ridge. Overfill and compact the ridge to design height plus 10 percent to allow for settlement.
9. Establish vegetation (see **Temporary Seeding** on page 31; **Permanent Seeding** on page 35; **Sod** on page 47; and **Mulching** on page 55) on water bar ridges immediately following construction or stabilize with a nonerosive cover.

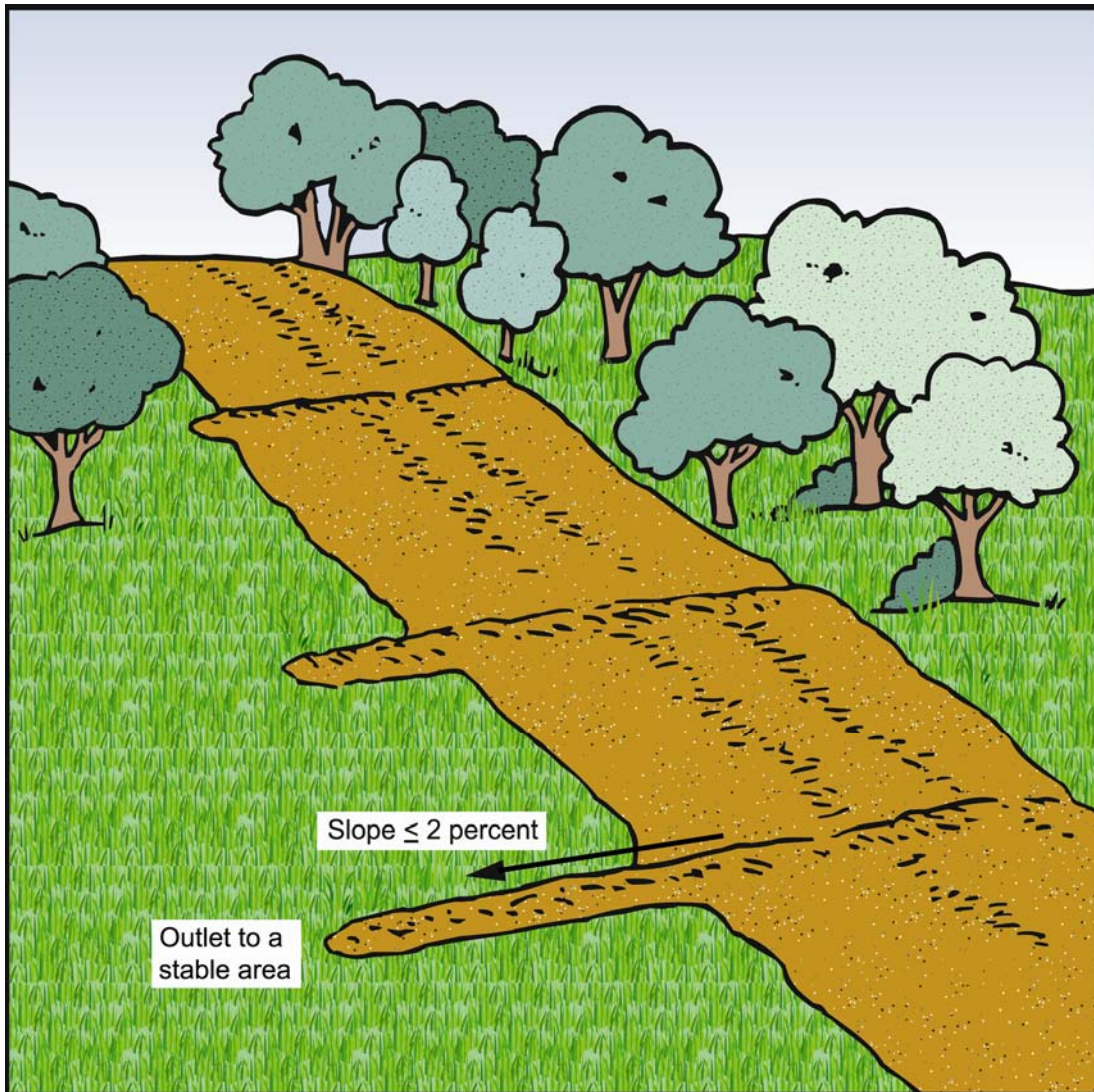


## **Maintenance**

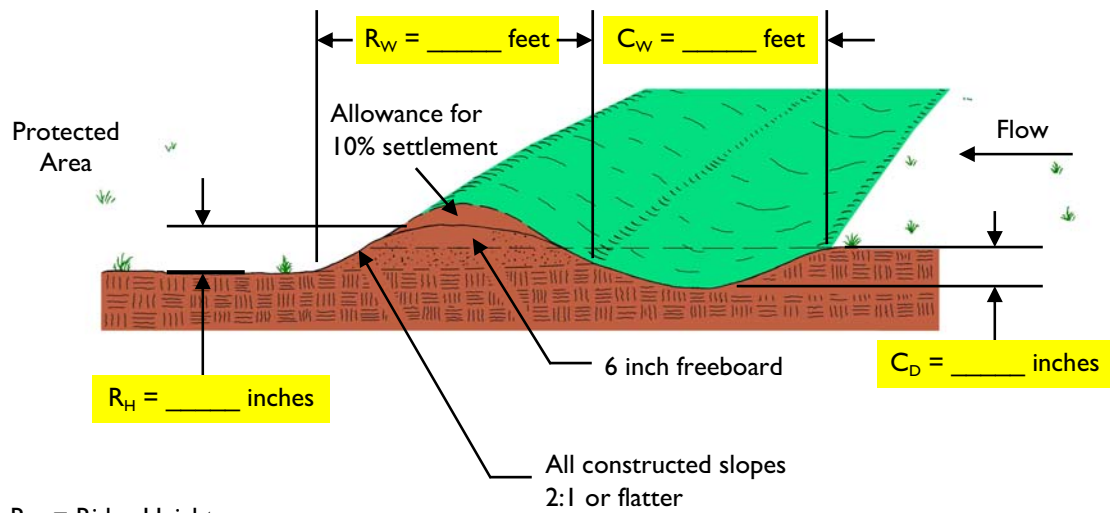
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- Inspect within 24 hours of each rain event and at least once every seven calendar days. Frequency of equipment action may require daily inspection.
- Inspect for erosion and sediment deposition; remove debris and sediment from channels and sediment traps or basins.
- Repair ridges to grade and design height.
- Inspect for vehicular wear; add aggregate at vehicle crossing areas when necessary.
- Inspect outlets and stabilize as needed.
- Repair and stabilize water bars immediately after installation of utilities in right-of-way.
- To remove temporary water bars, grade ridge and channel to blend with natural ground, compact channel fill and stabilize disturbed areas. Do not remove water bars until all disturbed areas draining into them are stabilized.

Exhibit 1



## Water Bar Worksheet



$R_H$  = Ridge Height

$R_W$  = Ridge Base Width

$C_D$  = Channel Depth

$C_W$  = Channel Top Width

Note: Drainage channel is optional.

# RUNOFF CONTROL

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## Rock Check Dam



*A **rock check dam** is a series of runoff control structures, consisting of geotextile fabric and aggregate, placed across drainage channels to slow storm water runoff. This measure may also provide limited effectiveness as a sediment control measure.*

### Purpose

---

- To reduce erosion in a drainage channel by slowing velocity of flow. (Check dams are commonly used (a) in channels that are eroding, but where permanent stabilization is impractical due to their short period of usefulness, and (b) in eroding channels where construction delays or weather conditions prevent timely installation of erosion-resistant linings.)
- To reduce flow velocities in a drainage channel.

**Note:** Do not use check dams in perennial streams.

### Specifications

---

#### Contributing Drainage Area

Two acres maximum.

#### Riprap Check Dam

- Dam height.
  - Two feet maximum.
  - center of the dam at least nine inches lower than the points of contact between the uppermost points of the riprap dam and channel banks.
- Side slope – ratio of 2:1 or flatter.
- Spacing – toe of the upstream dam at same elevation as overflow weir of the downstream dam.

## Overflow Areas

Stabilized to reduce scour/erosion along sides and below the dam.

## Filter Medium

- Placed on up-slope side of dam.
- Height – to base of overflow weir notch.

## Materials

- Geotextile fabric (8 ounce or heavier; nonwoven).
- K Indiana Department of Transportation Revetment riprap (see Appendix D) for dam.
- INDOT CA No. 5 aggregate (see Appendix D) for use as filter medium (Aggregate must be well-graded).

**Note:** INDOT CA No. 8 aggregate is acceptable if No. 5 aggregate is not available. The use of No. 8 aggregate may result in more frequent overtopping of the structure and will increase the frequency of structure maintenance.

## Installation

---

1. Lay out the location of the check dam.
2. Excavate a cutoff trench into the channel bottom and ditch banks, extending it a minimum of 18 inches beyond the top of the ditch bank.
3. Install and anchor filter fabric in the channel and cutoff trench.
4. Place riprap in the cutoff trench and channel to the lines and dimensions shown in the construction plans. The center of each dam must be at least nine inches lower than the uppermost points of contact between the riprap dam and channel banks (see Rock Check Dam Worksheet on page 101).
5. Extend the riprap at least 18 inches beyond the top of the channel banks to keep overflow water from eroding areas adjacent to the channel banks before it re-enters the channel.
6. Place filter medium (INDOT CA No. 5 aggregate) on the up-slope side of the dam. Place filter medium over the entire face of the dam up to the base of the overflow weir notch.
7. Stabilize the channel above the uppermost dam.
8. Install an erosion-resistant lining in the channel below the lowermost dam. The lining should extend a minimum distance of six feet below the dam.



## ROCK CHECK DAM

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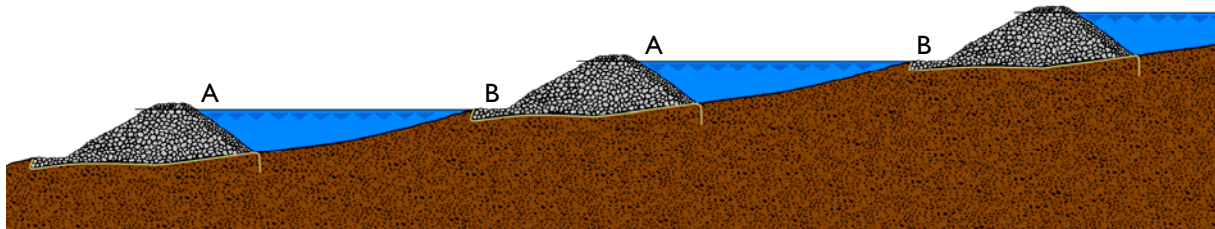
9. Additional sediment storage can be provided by excavating a small sediment trap on the upstream side of the check dam.

### Maintenance

---

- Inspect within 24 hours of each rain event and at least once every seven calendar days.
- If significant erosion occurs between dams, install an erosion-resistant liner in that portion of the channel.
- Remove accumulated sediment when it reaches one-half the height of the dam to maintain channel capacity, allow drainage through the dam, and prevent large flow from displacing sediment.
- Add riprap and aggregate as needed to maintain design height and cross section of the dams.
- When dams are no longer needed, remove the riprap and aggregate and stabilize the channel, using an erosion-resistant lining if necessary. (Riprap and aggregate from the dam may be removed or utilized to stabilize the channel.)

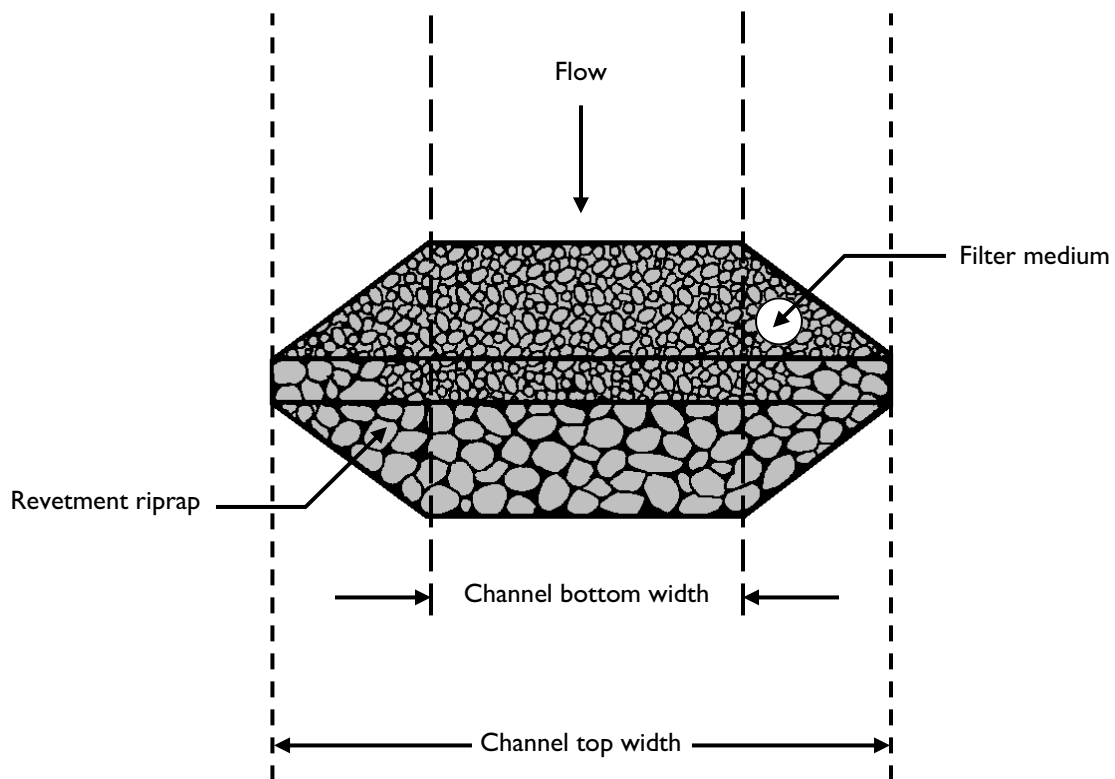
### Exhibit 1



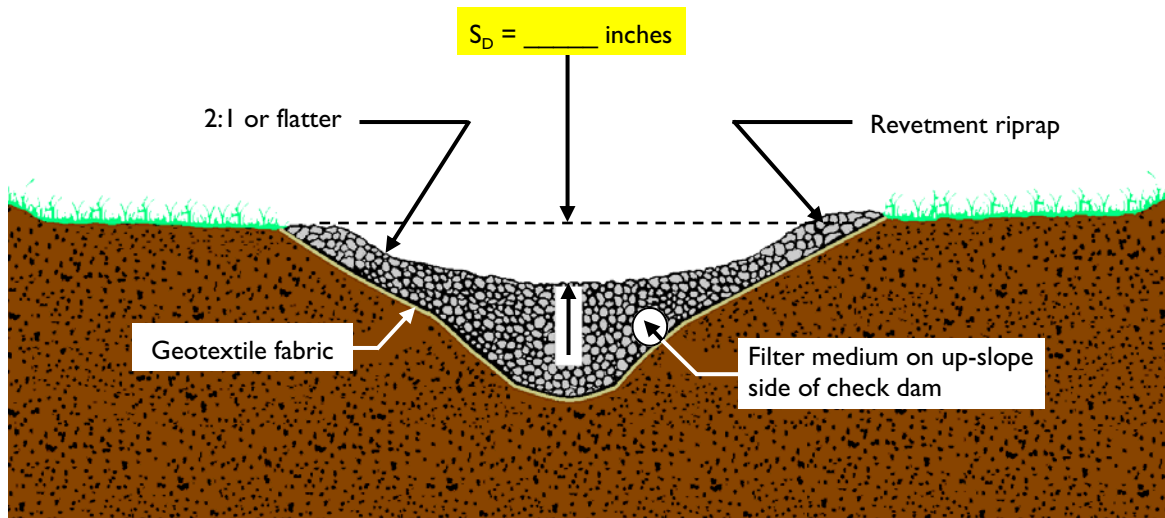
A = Crest of Dam

B = Toe of Dam

Exhibit 2

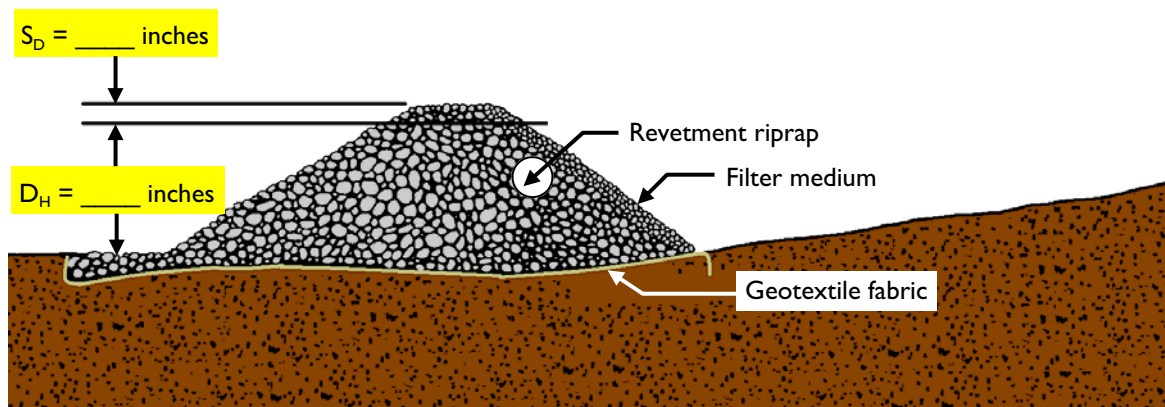


## Rock Check Dam Worksheet



$S_D$  = Spillway Depth

NOTE: For minimum dimensions see the "Specifications" section of this measure.



$D_H$  = Dam Height  
 $S_D$  = Spillway Depth

NOTE: For minimum dimensions see the "Specifications" section of this measure.

Source: Adapted from North Carolina Erosion and Sediment Control Planning and Design Manual, 1993



## PRACTICE 901 CULVERTS

### DESCRIPTION

- Hydraulically short conduit which conveys flow through a roadway embankment, or through some other type of obstruction.



**Exhibit 901a:** Permanent Road Culvert (Source: CBBEL Files)

|   |   |
|---|---|
| <b>PURPOSE</b>                            | <ul style="list-style-type: none"> <li>● Provide a channel crossing with minimal impact to conveyance.</li> </ul>   |
| <b>WHERE APPLICABLE</b>                   | <ul style="list-style-type: none"> <li>● When it is necessary to convey water under a roadway embankment or some other obstruction.</li> </ul>  |
| <b>ADVANTAGES</b>                         | <ul style="list-style-type: none"> <li>● May allow for channel crossing with minimal impact to the environment or conveyance.</li> <li>● Less expensive than a bridge.</li> </ul>   |
| <b>CONSTRAINTS</b>                        | <ul style="list-style-type: none"> <li>● Improper design can cause upstream flooding.</li> <li>● May increase velocity and cause downstream erosion problems.</li> </ul>  |
| <b>DESIGN AND CONSTRUCTION GUIDELINES</b> | <p><b>Materials</b></p> <ul style="list-style-type: none"> <li>● Concrete or corrugated metal pipe.</li> <li>● Selection of materials should be based on structural strength, hydraulic roughness, durability, and corrosion and abrasion resistance.</li> </ul> <p><b>Installation</b></p> <ul style="list-style-type: none"> <li>● Varies with each project.</li> <li>● Design permanent stream crossings in accordance with Indiana DOT standards and specifications, considering maximum loadings anticipated, safety, flow capacities, and other requirements for DOT installation approval. The local DOT can provide necessary guidance.</li> <li>● Keep clearing and excavation of the streambanks and bed and approach sections to a minimum.</li> <li>● Divert all surface water from the construction site onto undisturbed</li> </ul> |

areas adjoining the stream. Line unstable stream banks with riprap or otherwise appropriately stabilize them.

- Keep stream crossing at right angles to the stream flow.
- Align road approaches with the center line of the crossing for a minimum distance of 30 feet. Raise culvert fill a minimum of 1 ft above the adjoining approach sections to prevent erosion from surface runoff and to allow flood flows to pass around the structure.
- Ensure that bypass channels necessary to dewater the crossing site are stable before diverting the stream. Upon completion of the crossing, fill, compact, and stabilize the bypass channel appropriately.
- Install protective ground covers to provide permanent erosion protection and improve visual quality but not interfere with driver site distance from roadway.
- Ensure that permanent measures needed to control erosion from road water runoff (such as riprap and paved channels, paved flumes, or riprap outlet protection) meet all construction requirements for those practices.

### **Special Considerations**

- Culvert capacities may be calculated using "Hydraulic Charts for the Selection of Highway Culverts" (Hydraulic Engineering Circular No. 5, 1965), and "Capacity Charts for the Design of Highway Culverts" (Hydraulic Engineering Circular No. 10, 1965). The appropriate charts are dictated by the parameters of roughness, slope, headwater depth, tailwater depth, length, and either inlet or outlet control.
- When replacing a culvert and/or changing its size, it is important to consider both upstream and downstream ramifications. Choosing a culvert that is too small may cause upstream flooding. Choosing a culvert that is much larger than an existing under-sized culvert, will reduce the storage caused by the existing, under-sized culvert and therefore may cause increased discharges downstream.

---

### **MAINTENANCE**

- Inspect periodically and after major storms to check for channel blockage, erosion of abutments, channel degradation, riprap displacement, slope failure, and piping. Make all needed repairs immediately to prevent further damage to the installation.
- Most culvert maintenance problems occur at the outfall. See Activity 5.10 for Outlet Protection measures.

---

### **REFERENCES**

#### **Related Practices**

- Practice 902 Bridges.
- Practice 903 Fords/Low Water Crossings.
- Activity 5.10 Outlet Protection.

#### **Other Sources of Information**

- HERPICC Stormwater Drainage Manual.
- BPR Hydraulic Engineering Circular 5.
- North Carolina Erosion Control Manual

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Last Print/Revision Date: October 13, 1996

## PRACTICE 902 BRIDGES

- DESCRIPTION**
- Structure carrying a path or road over a channel.



**Exhibit 902a:** A typical bridge (Source: NRCS Files)

|   |   |
|---|---|
| <b>PURPOSE</b>                            | <ul style="list-style-type: none"> <li>• To provide cross channel access.</li> </ul>  |
| <b>WHERE APPLICABLE</b>                   | <ul style="list-style-type: none"> <li>• Any stream or ditch.</li> </ul>  |
| <b>ADVANTAGES</b>                         | <ul style="list-style-type: none"> <li>• Allows channel crossing with minimal environmental impact.</li> </ul>  |
| <b>CONSTRAINTS</b>                        | <ul style="list-style-type: none"> <li>• Expensive.</li> <li>• Requires professional engineering.</li> </ul>  |
| <b>DESIGN AND CONSTRUCTION GUIDELINES</b> | <p><b>Materials</b></p> <ul style="list-style-type: none"> <li>• Varies with the type of project.</li> </ul> <p><b>Installation</b></p> <ul style="list-style-type: none"> <li>• Varies dramatically with each project.</li> </ul> <p><b>Special Considerations</b></p> <p><u>Practicality</u></p> <ul style="list-style-type: none"> <li>• It is usually cheaper to install a culvert, pipe, or detour rather than a bridge. A bridge should be absolutely necessary.</li> </ul> <p><u>Aesthetics</u></p> <ul style="list-style-type: none"> <li>• Generally, bridges with long spans, shallow structure depth, and high columns are aesthetically pleasing. However, they are also expensive. Therefore: make spans as long as they need to be, use minimum vertical clearance, use open abutments, make structures as shallow as practical, and use single column supports if possible.</li> </ul> |

### Preliminary Design

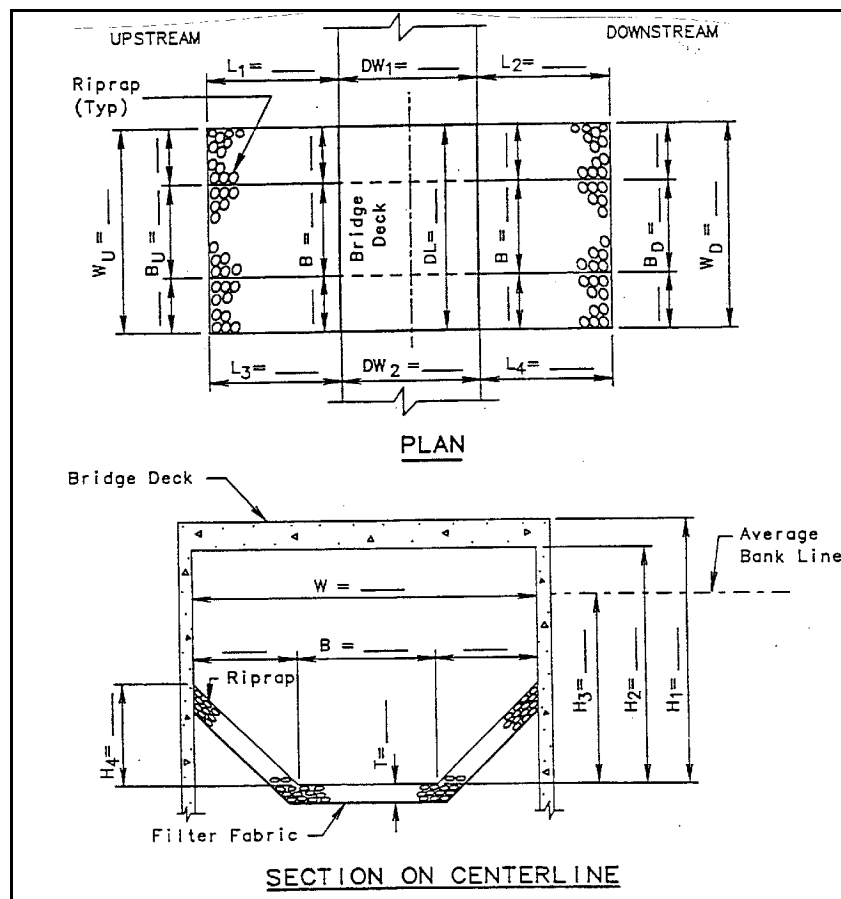
- Normal, skewed, or curved crossings will be dictated by the connections to other facilities. Normal crossings are cheapest and easiest to install.
- Approximate spans will be determined by the terrain, obstructions, required clearances, and assumed width of support.
- Wingwalls optimize bridge length.
- Vertical alignment will be determined on the basis of required clearance, depth for falsework, depth for structure and maximum allowable grades on approaches.
- Type selection is usually based upon required spans, available depth, permissibility of falsework use, length of construction season, and economy.
- Bridge opening size should be calculated based on appropriate hydraulic analysis to avoid upstream floodwater surcharge.

### Economy

- In selecting for economy, consider short spans, low columns, liberal allowance for depth, open abutments, continuous spans, reinforced concrete, as well as simplicity of layout, structural concept and execution.

### **MAINTENANCE**

- Erosion and scouring may occur around bridge abutments. See Exhibit 902b for plans for bridge scour protection.



**Exhibit 902b:** Bridge scour protection plan (Source: NRCS Standard Specifications)

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**REFERENCES****Related Practices**

- Practice 103 Temporary Wetland Crossing.
- Practice 104 Temporary Diversion.
- Practice 801 In-Channel Sediment Basin.

**Other Sources of Information**

- Indiana Erosion Control Handbook.
  - Aesthetics of Bridges.
  - Manual of Bridge Design.
  - NRCS Standard Specifications.
- 

Last Print/Revision Date: October 13, 1996

## PRACTICE 903

### FORDS/LOW WATER CROSSINGS

#### DESCRIPTION

- A ford or temporary structure installed across a stream or watercourse for short-term use by construction vehicles or heavy equipment (Note: this practice is also included in the Indiana Erosion Control Handbook).



**Exhibit 903a:** Fords/Low Water Crossings (Source: NRCS Files)

#### PURPOSE

- To provide a simple means for construction vehicles to cross channels.

#### WHERE APPLICABLE

- Where heavy equipment must be moved across a channel.

#### ADVANTAGES

- Allows channel crossing with minimal environmental impact.

#### CONSTRAINTS

- Drainage area should be less than 1 square mile.
- Anticipated life of crossing usually 1 year or less.
- Temporary diversions may be needed during construction.
- May temporarily increase erosion and flooding, if not installed properly.
- May be expensive to install.

- Source of a continuous downstream sediment movement.

## DESIGN AND CONSTRUCTION GUIDELINES

### Materials

- Riprap and geotextile fabric, culvert, or bridge abutments.

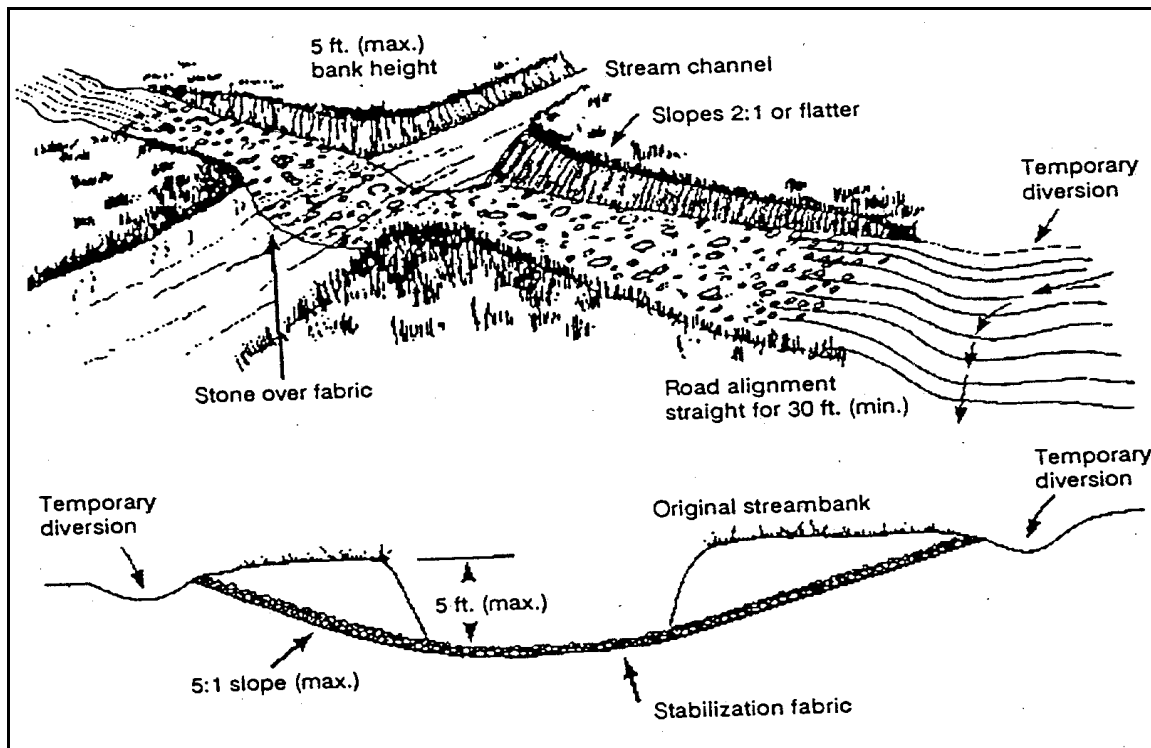
### Installation

#### • Preconstruction

1. Construct crossing when stream is low.
2. Install crossing at right angle to the stream.
3. Limit surface runoff by installing temporary diversion (Practice 104).

#### • Installing a Ford

1. If necessary, install an in-channel sediment basin (practice 801) before preparing the approaches to the ford.
2. Install temporary diversions in the road approach sections to divert surface runoff (Practice 104).
3. Excavate and grade the approaches.
4. Lay geotextile fabric for stabilization.
5. Apply weather resistant stone over the fabric to a minimum depth of twice the specified  $D_{50}$ .



**Exhibit 903b:** A temporary ford of stone over geotextile fabric (Source: Indiana Erosion Control Handbook)

#### • Installing a Temporary Bridge or Culvert

1. Elevate bridge abutments or culvert at least 1' above the adjoining streambank to allow storm overflow to bypass the structure without damage.
2. Extend the culvert pipe beyond fill side slopes.
3. Stabilize disturbed streambanks, fill slopes, and overflow and other disturbed areas.

### **Special Considerations**

- Try to avoid stream crossings whenever possible.
  - Bridges usually cause the least disturbance.
  - Culverts may be the least expensive crossing to install.
  - Fords are well suited for wide, shallow crossings.
- 

### **MAINTENANCE**

- Inspect periodically after storm events throughout the life the structure.
  - All deficiencies should be repaired immediately.
- 

### **REFERENCES**

#### **Related Practices**

- Practice 103 Temporary Wetland Crossing.
- Practice 104 Temporary Diversion.
- Practice 801 In-Channel Sediment Basin.

#### **Other Sources of Information**

- Indiana Erosion Control Handbook.
  - North Carolina Erosion Control Manual.
  - NRCS Standard Specifications.
- 

Last Print/Revision Date: October 13, 1996



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## **APPENDIX J: WILDLAND FIRE MANAGEMENT PLAN FOR BIG OAKS NATIONAL WILDLIFE REFUGE**

The entire Wildland Fire Management Plan for Big Oaks National Wildlife Refuge is provided here, as the USFWS typically provides wildfire response for and assists Jefferson Range during wildfires.

**WILDLAND FIRE MANAGEMENT PLAN**  
**BIG OAKS NATIONAL WILDLIFE REFUGE**



2006

# **WILDLAND FIRE MANAGEMENT PLAN**

## **BIG OAKS NATIONAL WILDLIFE REFUGE**

### **GREAT LAKES-BIG RIVERS REGION**

Prepared by: \_\_\_\_\_  
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Submitted by: \_\_\_\_\_  
Project Leader, Joseph Robb      Date

Reviewed by: \_\_\_\_\_  
Zone Fire Management Officer      Date

Reviewed by: \_\_\_\_\_  
Regional Fire Ecologist      Date

Concurred by: \_\_\_\_\_  
Regional Fire Management Coordinator      Date  
Great Lakes and Big Rivers Region

Concurred by: \_\_\_\_\_  
Chief, National Wildlife Refuge System      Date  
Great Lakes and Big Rivers Region

Approved by: \_\_\_\_\_  
Regional Director      Date  
Great Lakes and Big Rivers Region

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## I. INTRODUCTION

The Fire Management Plan (FMP) for Big Oaks National Wildlife Refuge (NWR) has been developed to provide direction in establishing operational procedures to guide all fire management activities. This plan will assist Big Oaks NWR in achieving resource management objectives as defined in several of the refuge's interim management plans (i.e., Interim Comprehensive Conservation Plan).

The FMP is subject to National Environmental Policy Act/National Historic Preservation Act compliance, since other related resource management plans do not address the environmental impacts of fire management activities. All potential environmental impacts resulting from this plan will be reviewed as required by law. An environmental assessment was completed in 2001 for this plan (Appendix K) and was made available to the public for review and comment. The public will also be encouraged to comment on revisions to the plan during each 5-year revision.

U.S. Department of the Interior policy states that refuge lands with vegetation capable of sustaining fire will develop a fire management plan (910 DM 1). The Fish and Wildlife Service's Fire Management Handbook (621 FW 1.4-5) states that "every area with burnable vegetation must have an approved Fire Management Plan." Big Oaks NWR's FMP is a detailed program of action to implement fire management policies and objectives. Additionally, the protection of life, property, and natural resources from fire is of the highest priority.

The mission of the U.S. Fish and Wildlife Service is:

Working with others to conserve, protect, and enhance fish, wildlife, plants and their habitats for the continuing benefit of the American people.

The mission of the National Wildlife Refuge System is:

To administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

The mission of Big Oaks National Wildlife Refuge is:

To preserve, conserve and restore biodiversity and biological integrity for the benefit of present and future generations of Americans.

For Big Oaks NWR, the fire management program will be carefully guided by resource management objectives designed to offer the greatest protection and perpetuation of Big Oaks NWR's natural resources and their associated natural processes. Long-term fire management needs to be formalized with an FMP regarding fire management practices and refuge habitat conditions.

This FMP is governed by several related statutory authorities. These include the Clean Air Act,



the Clean Water Act, the Endangered Species Act, the National Environmental Policy Act, and the Antiquities Act. The Departmental Manual (910 DM) and the Fire Management Handbook (621 FW) contain other cited statutes authorizing and providing the means for prevention, presuppression, and suppression of wildfire on or threatening lands under the jurisdiction of the National Wildlife Refuge System. For ease of reference, these Authorities are listed below.

1. Protection Act of September 20, 1992 (42 Stat. 857; 16 U.S.C. 594).
2. McSweeney-McNary Act of 1928 (45 Stat. 221; 16 U.S.C. 487).
3. Economy Act of June 30, 1932 (47 Stat. 417; 31 U.S.C. 1535).
4. Taylor Grazing Act of June 28, 1934 (48 Stat. 1269; 43 U.S.C. 315).
5. O. and C. Act of August 28, 1937 (50 Stat. 875; 43 U.S.C. 1181e).
6. National Park Service Acts as amended (67 Stat. 495; 16 U.S.C. 1b)
7. Federal Property and Administration Services Act of 1949 (40 U.S.C. 471; et seq.).
8. Reciprocal Fire Protection Act of May 27, 1955 (69 Stat. 66; 42 U.S.C. 1856a).
9. National Wildlife Refuge System Administration Act of 1966 as amended (80 Stat. 927; 16 U.S.C. 668dd through 668ee).
10. Alaska Native Claims Settlement Act of December 18, 1971 (85 Stat. 688; 43 U.S.C. 1601).
11. Disaster Relief Act of May 22, 1974 (88 Stat. 143; 42 U.S.C. 5121).
12. Federal Fire Prevention and Control Act of October 29, 1974 (88 Stat. 1535; 15 U.S.C. 2201).
13. Federal Land Policy and Management Act of 1976 (90 Stat. 2743).
14. Federal Grant and Cooperative Agreement Act of 1977 (P.L. 950224, as amended by P.L. 97-258, September 13, 1982 (96 Stat. 1003; 31 U.S.C. 6301 thru 6308)).
15. Alaska National Interest Lands Conservation Act of December 2, 1980 (94 Stat. 2371).
16. Supplemental Appropriation Act of September 10, 1982 (96 Stat. 837).
17. Wildlife Suppression Assistance Act of 1989 (P.L. 100-428, as amended by P.L. 101-11, April 7, 1989).
18. Indian Self-Determination and Education Assistance Act (PL 93-638 as amended).
19. National Indian Forest Resources Management Act (P.L. 101-630 November 28, 1990).

20. Tribal Self-Governance Act of 1994 (P.L. 103-413).
21. Department of the Interior and Related Agencies Appropriations Act (P.L. 103-32).

## **II. COMPLIANCE WITH U.S. FISH AND WILDLIFE SERVICE POLICY**

Big Oaks NWR was established on June 30, 2000, as an overlay refuge on approximately 50,000 acres north of the historic firing line of the former Jefferson Proving Ground (JPG). Through a real estate permit from the Department of the Army, the Service maintains Big Oaks NWR as habitat for endangered species, migratory birds and other wildlife in order to further the purposes of the Endangered Species Act and Migratory Bird Conservation Act.

Big Oaks NWR provides habitats for, and subsequently attracts, an abundance of wildlife species. Twenty-four species of amphibians, 17 species of reptiles, 46 species of mammals, and over 200 species of birds have been recorded or can reasonably be expected to be present on the refuge for a portion of the year.

Big Oaks NWR's primary objective is to provide habitat and protection for endangered species, migratory birds, and species of management concern (Appendix A); and to insure the availability of these resources to the American people for their enjoyment now and in the future.

Habitat management activities at Big Oaks NWR emphasize numerous goals, which include; enhancement of existing wetlands, active management of grassland and shrubland areas and the protection of late second-growth forests and wooded wetlands. All of these habitat management activities are designed to benefit populations of native wildlife species.

The wide array of both resident and migratory species found on Big Oaks NWR is due to the varied habitat types found in the grassland/forest/wetland complex. The mix of forests, grasslands, forested wetlands, emergent marsh, and early successional stages of vegetation contributes to the species diversity of the wildlife community found at the refuge.

Fire is a critical ecological process in the management of early successional habitats required by many species of wildlife that are of management concern within the region. Historically, fire was an infrequent natural ecological process within the southeastern Indiana area that includes Big Oaks NWR; but, fire was commonly used by Native Americans around their settlements to alter habitat conditions for wildlife and for agriculture. Fire was used by the Army to decrease fuel levels and lessen the chance of wildfires associated with the Army's munition testing mission prior to 1995. A by-product of the Army's management by fire has been the establishment of many large areas of early successional habitats used by many of these species of management concern.

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 and the American Bird Conservancy due to large Henslow's sparrow populations within 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.”

### **III. DESCRIPTION OF REFUGE**

#### **A. Location**

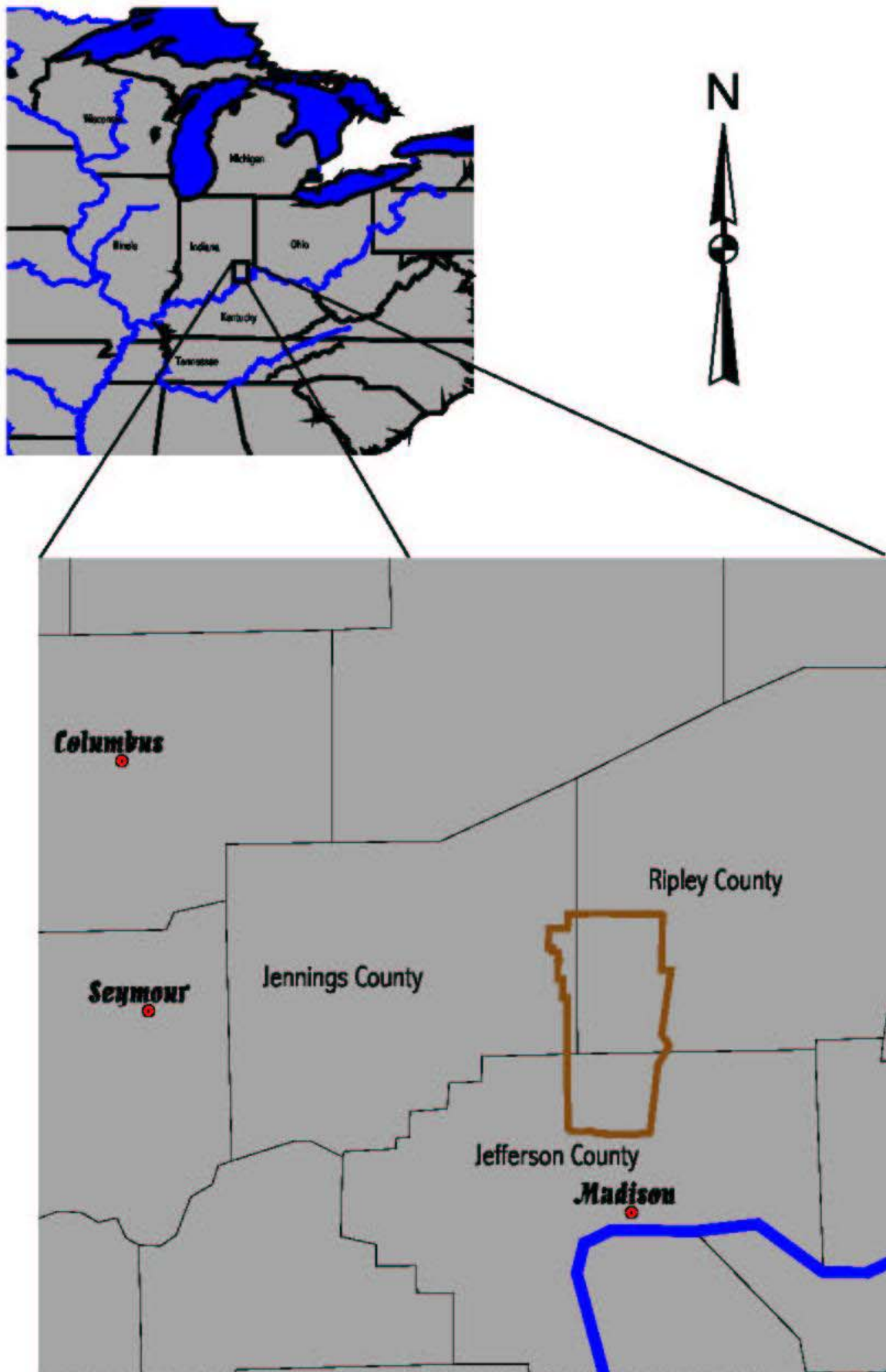
Big Oaks NWR is situated on approximately 50,000 acres in southeastern Indiana within Jefferson, Ripley and Jennings Counties. The refuge is about 55 miles north/northeast of Louisville, Kentucky and just north of the Ohio River (Figure 1). The nearest communities are Madison, Indiana, about 5 miles 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 north to south by about 6 miles east to west. Big Oaks NWR occupies land north of the firing line of the former Jefferson Proving Ground.

#### **B. History**

Army use of the site began in late 1940 with procurement of the land. Prior to purchase by the Army, this land was used for farming and grazing at levels of use similar to what can be found outside the boundaries of the property today. The Army mission at JPG was to test and evaluate all types of munitions. JPG performed this function virtually continuously until September 1994 when the last round was fired. The active use of the base by the Army stopped on 29 September 1995. The Service began to manage the natural resources of the base on 1 October 1996 under a three-year Memorandum of Agreement (MOA) with the Army. At the end of the MOA period, the Service continued to manage all land north of the historic firing line but expanded its role to make the area a National Wildlife Refuge under a new MOA and a real estate license from the Army.

#### **C. Climate**

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 (Table 1). Precipitation is fairly uniform throughout the year, averaging 3 - 4 inches per month. Spring and summer thunderstorms push the monthly average over 4 inches for the March-June period, while the fall of the year sees monthly rainfalls close to 3 inches. Measurable snowfall can be experienced



**FIG. 1. LOCATION OF BIG OAKS NATIONAL WILDLIFE REFUGE**

throughout the November to March period, and averages about 16 inches annually.

Approximately 39 days per year see temperatures exceeding 90° Fahrenheit (F), with occasional occurrences in excess of 100° F. The record high of 105° F 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 -26° F occurring in January 1994. Southerly winds vary from about 6 - 10 miles 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 78 miles 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.

**Table 1.** Monthly average weather data taken at Louisville, KY National Weather Service office.

| MONTH     | AVG. DAILY<br>MIN. TEMP<br>(°F) | AVG. DAILY<br>MAX. TEMP<br>(°F) | AVG.<br>MONTHLY<br>MEAN TEMP<br>(°F) | AVG.<br>PRECIPITATION<br>(in) | WIND<br>VELOCITY<br>(MPH) | WIND<br>DIRECTION |
|-----------|---------------------------------|---------------------------------|--------------------------------------|-------------------------------|---------------------------|-------------------|
| January   | 24.1                            | 40.8                            | 32.5                                 | 3.2                           | 9.6                       | S                 |
| February  | 26.8                            | 45.0                            | 36.0                                 | 3.2                           | 9.6                       | NW                |
| March     | 35.2                            | 54.9                            | 45.1                                 | 4.2                           | 10.2                      | NW                |
| April     | 45.7                            | 67.5                            | 56.7                                 | 4.0                           | 9.8                       | SW                |
| May       | 54.7                            | 76.3                            | 65.5                                 | 4.6                           | 8.0                       | SE                |
| June      | 63.3                            | 84.0                            | 73.8                                 | 4.1                           | 7.4                       | S                 |
| July      | 67.5                            | 87.6                            | 77.5                                 | 4.1                           | 6.8                       | S                 |
| August    | 66.0                            | 86.7                            | 76.5                                 | 3.4                           | 6.5                       | N                 |
| September | 59.2                            | 80.6                            | 70.0                                 | 2.9                           | 6.8                       | SE                |
| October   | 46.2                            | 69.3                            | 57.7                                 | 3.1                           | 7.3                       | SE                |
| November  | 36.7                            | 55.6                            | 46.0                                 | 3.7                           | 8.9                       | S                 |
| December  | 28.9                            | 45.5                            | 37.2                                 | 3.4                           | 9.3                       | S                 |
| Annual    | 46.2                            | 66.0                            | 56.1                                 | 43.8                          | 8.3                       | S                 |

#### **D. Topography/Soils/Water**

Ground elevations at Big Oaks NWR are generally between 850 - 900 feet Net Geodetic Vertical Datum, with elevations along the numerous streams flowing through the area being about 30 - 50 feet 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 Jefferson Proving Ground site 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 20 - 25 feet per mile 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 12 inches. 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 7 feet. The available water capacity of the soil is very high and the permeability is slow. There is a large area on the southern portion of the refuge with a perched, seasonal high water table at or near the surface during the winter and spring months.

### **E. Habitat Types**

The following habitat types were derived from 1995 and 1997 aerial photos. Photo interpretation was completed in 1998. Classifications are comparable to those used in the US GAP Analysis Project. The distinction between forest and woodland is based on the amount of canopy closure. Forest areas have 60% or greater canopy closure and woodlands have 20% to 40% canopy closure.

Upland forests comprise 27,400 acres (55%) of the 50,000 acre refuge (Figure 2). 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 Big Oaks NWR 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 a majority of 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.

Our second most abundant habitat at Big Oaks NWR is grasslands. This habitat type makes up 8,400 acres (17%) of Big Oaks NWR. The dominant grassland species appears to be broomsedge (*Andropogon* sp.).

Other habitat types at Big Oaks NWR include 5,200 acres (10%) palustrine wetland, 3,000 acres (6%) woodland, 6,200 acres (12%) early successional, and less than 250 acres each of open water, and bare soil 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.

## **F. Historical/Ecological Role of Fire**

Historically, fire was a rare ecological process within the southeastern Indiana area that includes Big Oaks NWR. Fire was commonly used by Native Americans around their settlements to alter habitat conditions for wildlife and for subsistence agriculture; early settlers used fire to clear the land to establish farms. Fire was used (in combination with herbicides and mechanical disturbance) after acquisition of the property by the Army, in 1940, to decrease fuel levels and lessen the chance of wildfires associated with the Army's munition testing mission. This disturbance regime has led to the establishment of productive grassland and other early successional habitats within Big Oaks NWR.

## **G. Refuge Fire History**

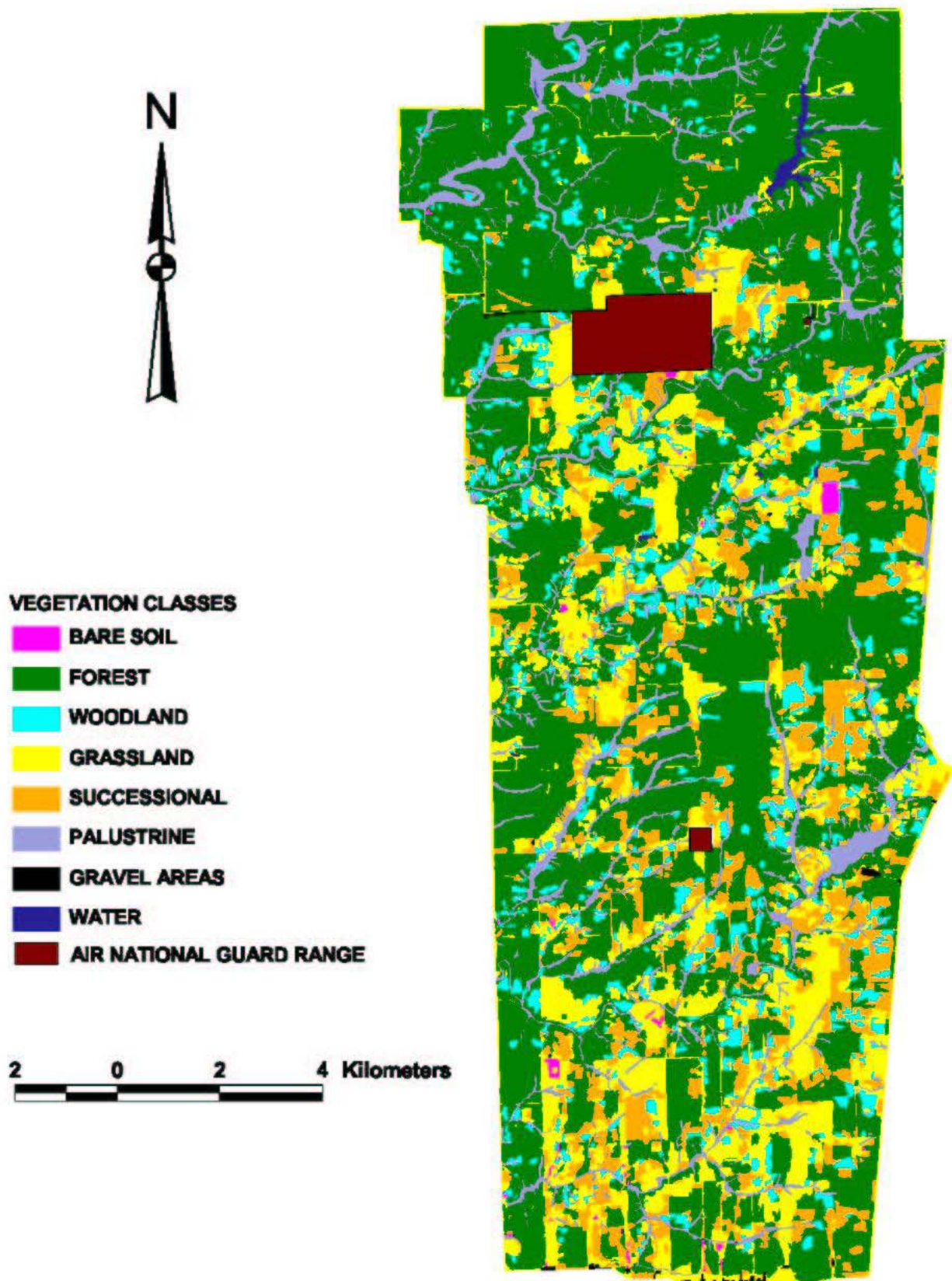
Prescribed fires and wildland fires were an annual occurrence throughout much of the southern 3/4 of Big Oaks NWR area during active Army management. Wildland fires occurred as a direct result of munitions testing and occasionally resulted from prescribed fires. Prescribed fires were used on an almost annual basis by the Army to reduce fuel loads and lessen the chance and/or severity of wildland fires. Due to the presence of unexploded ordnance (UXO), wildland fire suppression occurred from roadways (or off roadways within controlled access areas) using non-earth disturbing methods (i.e. water and backfires). The extent of wildland fires resulting from munitions testing was never documented. There are no reports of wildland fires resulting in loss of life or damage to private property during the Army management of the Big Oaks NWR area.

Records documenting the extent of the Army's prescribed fires are available from 1981 to 1997. Annual prescribed fires were primarily conducted in the spring but occasional fall fires are recorded. Total area burned varied from a high of approximately 15,000 acres in 1981 to a low of

1,000 acres in 1988. Due to Army personnel constraints no burns were conducted in 1994 & 1996. Beginning in spring 1998, the Service initiated its prescribed fire program with a 4,000 acre burn. The Service continued its prescribed fire program in 1999 with a 7,400 acre burn. Since 2001, Big Oaks has burned on average 10,500 acres annually.

## **H. Fire Effects**





**FIG. 2. VEGETATION CLASSES AT BIG OAKS NATIONAL WILDLIFE REFUGE**



## **1. Vegetation and Fuels**

Effects on vegetation and fuels vary depending on species, season and weather. Species of plants tend to be habitat specialists that have adapted to certain environmental conditions but many of these same plant species will tolerate a wide range of habitat conditions. Fires generally favor grasses and forbs that have adapted to disturbance and are shade intolerant. By reducing encroaching woody vegetation, fire will make available additional nutrients and available sunlight. Shade intolerant shrub species will quickly colonize a site to take advantage of the increase in nutrients, lack of competition and prevalence of sunlight. Within a fire prone or fire-managed landscape, this cycle of immediate beneficial response for grasses and slightly slower beneficial response to shade intolerant shrubs, will be continuously repeated.

The quantity and moisture level of surface fuels will have an affect on the rate of spread and intensity of the fire. In general, the longer the period between burns the greater the accumulation of fuels and the greater the likelihood of a more severe fire once ignited. High intensity fires associated with drought or excessive fuel levels will tend to be stand replacing, radically replacing the present plant community with early successional, shade intolerant species. Depending on the management objectives and the original vegetation this may either be beneficial or detrimental.

Depending on the intensity of the fire, larger trees may be minimally to severely effected. Fires of low to moderate intensity can cause high mortality in susceptible species of trees. Mature trees, especially those with thick insulating bark, have better survival rates

## **2. Wildlife**

In general, the effects of fire on wildlife are favorable, usually creating vital habitat and species richness. A wide variety of horizontal and vertical habitat components are created, with all fire regimes except at stand replacing level fire. This type of devastating fire has significant short term adverse impacts on wildlife habitat, including direct mortality, often displacing species. Over time, the site recovers and has positive effects on wildlife, favoring early successional species.

## **3. Air Quality**

The effects are minimal, with all but the most intense wildfires, where visual impairment or air quality are compromised over the duration of the incident. Adverse air quality associated with prescribed burning usually is minimal, as the units are burned under a developed prescription favorable for good smoke dispersal and total consumption of fuels less than 1 inch in diameter. In addition, the majority of the units burned are isolated (> 1 mile from the boundary).

#### 4. Soils

Adverse impacts are usually minimal, except under dry conditions where soil moisture is very low and deep burning of the organic layer can occur. Wildland fires and prescribed fires rarely consume more than 50 percent of the duff/litter layer and rarely transfer significant amounts of heat for an extended period of time.

#### IV. REFUGE FIRE MANAGEMENT GOALS AND OBJECTIVES

In accordance with the goals and objectives of the NWR System, Big Oaks NWR is committed to the protection of life, property and the environment, as well as perpetuating natural processes. By Service policy the primary objective of this FMP is wildland fire suppression, the use of prescribed fire for habitat and wildlife management is a secondary objective.

**In all suppression activities, the presence of UXO and depleted uranium (DU) contamination must be considered. All areas of Big Oaks NWR are considered contaminated with UXO, therefore, no earth-disturbing measures may be used to control wildland fires. DU is located on the DU Impact Area currently regulated by the Nuclear Regulatory Commission License (Number Sub-1435) to the Army. Evidence suggests that DU is not readily transported in smoke associated with burning of natural vegetation in an environment similar to that occurring at the refuge (Williams et. al. 1998).**

##### A. Fire Management Goals

The fire management goals for Big Oaks NWR are:

1. The protection of human life, both of the firefighter and the public within and adjacent to refuge lands.
2. The protection of property and natural/cultural resources within and adjacent to refuge lands.
3. Manage the use of fire to compliment or augment other means of maintaining refuge habitat to achieve identified management goals.
4. Develop and implement a process to insure the collection, analysis and application of high quality fire management information needed for sound management decisions.

5. To utilize fire for the reduction of fuels in areas of Big Oaks NWR which may pose risks to various types of resources both human and natural.

## **B. Fire Management Objectives**

The fire management objectives for Big Oaks NWR are:

1. Protect important scientific, cultural, historic and prehistoric, and scenic resources, private lands, and visitor, administrative and other facilities/structures from wildfire.
2. Prevent unplanned human-caused ignitions.
3. Maintain a diversity of plant communities and associated wildlife species through the use of prescribed fire.
4. Utilize prescribed fire as an integral part of a management program to enhance habitat critical to the recovery of endangered, threatened, rare or special concern species as required.
5. Control and eliminate, if possible, through the use of prescribed fire, plant species considered invasive, exotic or nuisance.
6. Implement a habitat monitoring program for all prescribed burn sites. Maintain a database at the refuge with, at a minimum, the following information: date of burn; weather conditions; fire behavior; and pre and post burn photos.
7. Promote an interagency approach to managing fires on an ecosystem basis.
8. Integrate fire management with all other aspects of refuge management.

## **V. FIRE MANAGEMENT STRATEGIES**

### **A. Overall Approach to Fire Management Strategies**

Fire suppression will continue to be the primary objective of the fire management program. Presuppression and prevention will continue to be Big Oaks NWR's primary means of preventing the spread of wildland fires. Overall, the FMP is designed to implement a safe, cost-effective program of fire protection, fuels management and resource enhancement through management-ignited prescribed fire strategies. These strategies include:

1. Suppress all human-caused fires commensurate with the values at risk, through the use of control, contain, and confine suppression alternatives. **In all suppression activities, the presence of UXO and depleted uranium (DU) contamination must be considered.**
2. Determine specific fuel loadings in high-risk areas in relationship to natural conditions and to conditions that may be determined hazardous based on values or risks. Utilize hazard reduction prescribed burns and mechanical means as treatment methods to reduce excessive fuel hazards.
3. Continue to develop and maintain inter-agency coordination to promote local, regional and national cooperation. Based on local NWR conditions, contribute firefighting resources to meet the needs at Regional and National levels.
4. Initiate a habitat improvement program through management-ignited fire for the purposes of optimizing grassland habitat for the benefit of a variety of upland wildlife species, such as Henslow's sparrow.

## **B. General Constraints on Strategy Options**

Refuge-wide constraints are primarily the result of UXO contamination. Due to the past use-history of Big Oaks NWR, UXO contamination can be encountered within any portion of the refuge. Similarly, DU contamination is located within the DU Impact Area. Due to the dangers associated with fire and fire suppression in combination with UXO and DU, the following restrictions are in place to protect the safety of any persons involved in suppression activities:

1. Earth-disturbing fire suppression techniques may never be used within Big Oaks NWR unless done using armored equipment or within an area that has been cleared of UXO and DU.
2. All suppression must occur from established roadways within closed areas, or by foot within unrestricted areas.
3. The preferred and safest method for suppression of wildland fires, within both closed and unrestricted areas, will be the use of fire to make a black-line along established roadways (or at the discretion of the Refuge Manager along natural features) to widen existing firebreaks as needed to prevent the spread of (Contain strategy) or to monitor fires to ensure confinement within (Confine strategy) a designated area.

4. Due to the possibility of heat induced detonation of UXO, a UXO hazard zone, covering all areas within 4,000 feet of open flames, will be established. Entry into this zone is considered hazardous and may only be permitted by the Refuge Manager or his designee. Entry will be allowed only after wildfire "size-up" that includes an analysis of resources threatened and risk to personnel.
5. No unapproved prescribed fires will be ignited between the periods of 15 April to 15 September due to the presence of Federally endangered Indiana bats within portions of many burn units. Fires during this time period would require an intra-Service consultation with the Ecological Services Field Office and an Endangered Species Permit for this activity.

### **C. Rationale for Selection of Strategies**

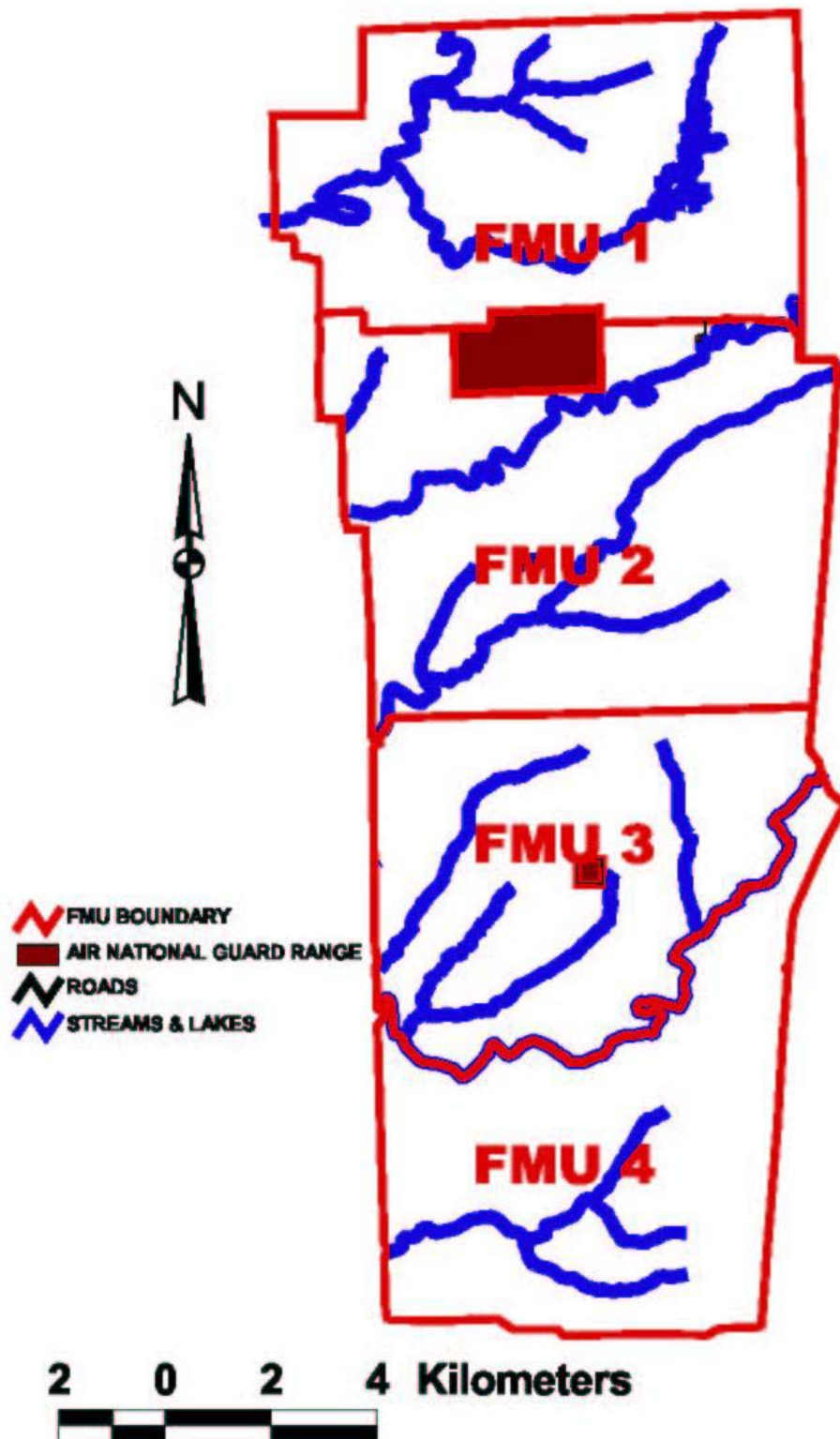
In most cases, the suppression of wildfires, under a confine strategy, is the least costly and the most appropriate for Big Oaks NWR. In all but the most severe wildfire cases, natural and manmade features within the refuge would be sufficient to allow the use of the confine strategy. To maximize the effectiveness of the confine strategy it is necessary that maintenance (grading and mowing) on 90 - 100 miles of roads occur on an annual basis.

Modifying fuels through prescribed fire provides additional support of wildland fire suppression through defensible barriers and buying time for suppression forces to arrive. By reducing fuel hazards, fire intensities are lower and a fire is easier to contain in all but the most severe fire weather years. A detailed inventory to identify high fuel loads and their relationship to defendable barriers is needed. Once these areas are identified they should be evaluated for the most cost efficient disposal method in order to reduce the risk.

Habitat maintenance through the use of fire is of benefit to early successional species and promotes maximum diversity on a local scale by breaking up large continuous blocks of shade tolerant stands. The role of fire as it applies in regional habitat diversity and region-wide habitat goals should be evaluated in other management documents to ensure that fire is used to maximize these goals.

### **D. Wildland Urban Interface**

Wildland Urban Interface (WUI) is defined as the area where houses meet or intermingle with undeveloped wildland vegetation. This makes the WUI a focal area for human-environment conflicts such as wildland fires, habitat fragmentation, invasive species, and biodiversity decline. FIREWISE is an excellent community safety program developed to educate the public to the wildland urban interface and corrective measures needed. Additional examples include working toward a comprehensive social awareness and support system to educate the public concerning the benefits of management ignition in fire adapted ecosystems.



**FIG. 3. FIRE MANAGEMENT UNITS OF BIG OAKS NATIONAL WILDLIFE REFUGE**

The remote location of the refuge lands somewhat diminishes the WUI presence but still creates the need to reduce wildland and urban intermix fire threats. The fire management program will mitigate any interface risks by a combination of mechanical fuels treatments near any buildings and prescribed fire to reduce and eliminate hazard fuel loadings while creating wide buffers around developed areas and adjacent to private property.

## **VI. FIRE MANAGEMENT UNITS (FMU'S)**

Big Oaks NWR is subdivided into 4-FMU's (Figure 3). There is a 1038 acre Air National Guard (ANG) range inholding consisting of 2 separate range areas and 1 historic structure. The first range (983 acres) is located adjacent to FMU's 1&2, the historic structure is located within a 5 acre area in FMU 2 and the remaining range (50 acres) is within FMU 3. These range areas and this structure are excluded from Big Oaks NWR and subsequently from this FMP. The ANG maintains firebreaks around structures within their ranges due to the frequent outbreak of fires associated with their mission. Currently, no firebreaks entirely separate the ANG range areas and the historic structure from the refuge.

The size, linear shape, differing fire management strategies and the known hazards of Big Oaks NWR were considered when evaluating overall resource management strategies, vegetation characteristics and location of major access routes to define FMU boundaries. Other criteria, such as proximity to human development, were not significant enough to further define additional FMU's.

**ALL FMU'S ARE CONSIDERED CONTAMINATED WITH UXO. THE DU IMPACT AREA IS LOCATED WITHIN FMU-3 AND FMU-4. DESIGNATED RESTRICTIONS ARE TO BE FOLLOWED WHEN CONDUCTING SUPPRESSION ACTIVITIES WITHIN ANY AREA OF BIG OAKS NWR.**

### **Fire Management Unit 1**

FMU-1 is 13,000 acres and is 75% forested (Figure 4). Most structures within this FMU are located just north of K Road (south boundary of the FMU) within the ANG Range. Firebreaks maintained by the ANG are sufficient to prevent damage to structures in all but the most severe wildfires. One additional structure, a picnic shelter, is located within the refuge boundary and adjacent to Old Timbers Lake at the end of Snag Hole Point Road. Damage to this structure is considered unlikely in all but the most severe wildfire situations.

Roads and their adjacent mowed grassy areas form 75% of the boundary of this FMU. A firebreak is maintained adjacent to the perimeter fence for the remaining 25% of the boundary of this FMU. Access to the interior of most areas of this FMU is severely limited. Initial attack response times are estimated to take 2 to 2.5 hours. This FMU is the unit with the least amount of UXO contamination. This FMU is the only unit in which all suppression strategies may be allowed if the Refuge Manager believes that the resources involved necessitate the use of these strategies. Use of earth disturbing tools and equipment would still be prohibited.

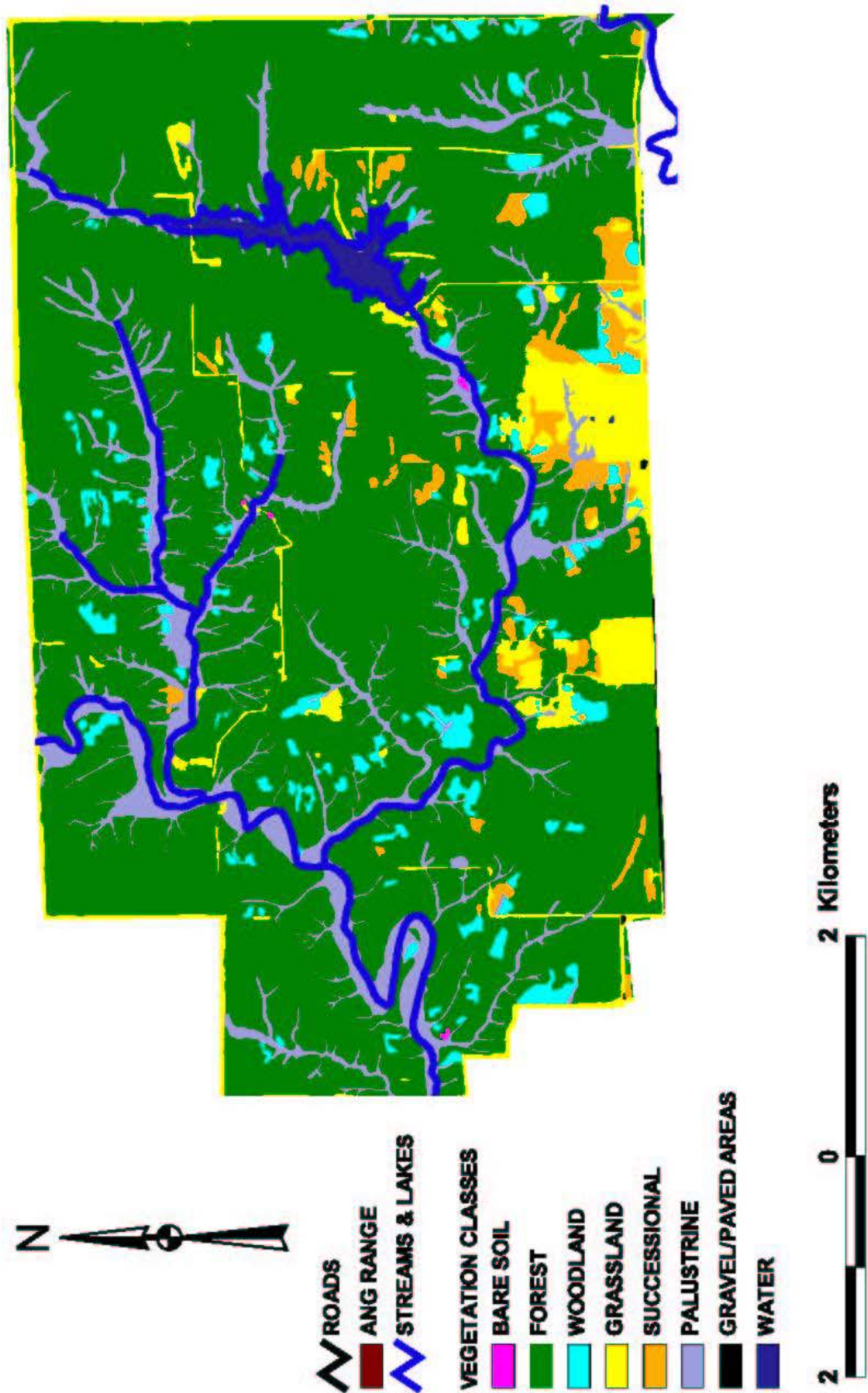


FIG. 4. FIRE MANAGEMENT UNIT 1



Fires within this FMU are expected to exhibit relatively low intensity (flame lengths) and generally low to moderate rates of spread. Exceptions to this will be within areas of steep topography in the northwest corner of the FMU. Most fires are expected to be largely confined to the leaf litter with occasional flare-ups caused by pockets of evergreens. Roads and maintained firebreaks around the perimeter of Big Oaks NWR are sufficient to prevent the spread of all but the most severe wildfires. The potential for spread to adjacent private agriculture lands is low. Should the appropriate management response indicate that suppression is needed, the suppression strategy most appropriate for FMU-1, will usually be a Confine strategy.

Fire management objectives for this unit are:

1. The protection of human life from wildland fire.
2. The prevention of property loss or resource damage from wildland fire.
3. Confine wildfires in the FMU to the smallest size possible through the use of roads and natural features.
4. Retire existing grassland habitats and allow natural succession to convert these areas to forest habitat.
5. Maintain refuge roads as firebreaks on an annual basis and refuge boundary firebreaks on a 2 to 3 year rotation.

## **Fire Management Unit 2**

FMU-2 is approximately 15,000 acres in size, and is located south of K Road and north of H Road (Figure 5). Roads make up the boundaries of this FMU and are maintained annually. Access to the perimeter of this FMU is excellent but access to most interior areas is severely limited. Initial attack response times are estimated to take 2 to 2.5 hours. Two storage barns (wood frame with metal siding and roofs) and one historic structure, Old Timbers Lodge (stone and timber construction with shingle roof), are located within this FMU. The 2 barns are located south of K Road, each approximately 1 mile from the respective east and the west perimeters. The historic lodge is located ½ mile south of K Road just northwest of Graham Creek within an Air National Guard inholding. Access to the lodge is a single lane road. Threat to structures within Big Oaks NWR from wildfires is considered low in all but the most extreme conditions.

Fuel types within this FMU vary from perennial grasses to mature forests and form a mosaic of habitat types within the unit. Fires of moderate intensity with moderate to high rates of spread would be expected within areas of grass and shrub habitats while low intensity fires with low to moderate rates of spread would be likely within forested areas. The potential for spread to adjacent private agriculture lands is low. Should the appropriate management response indicate that suppression is needed, the suppression strategy most appropriate for FMU-2, will usually be a Confine strategy.

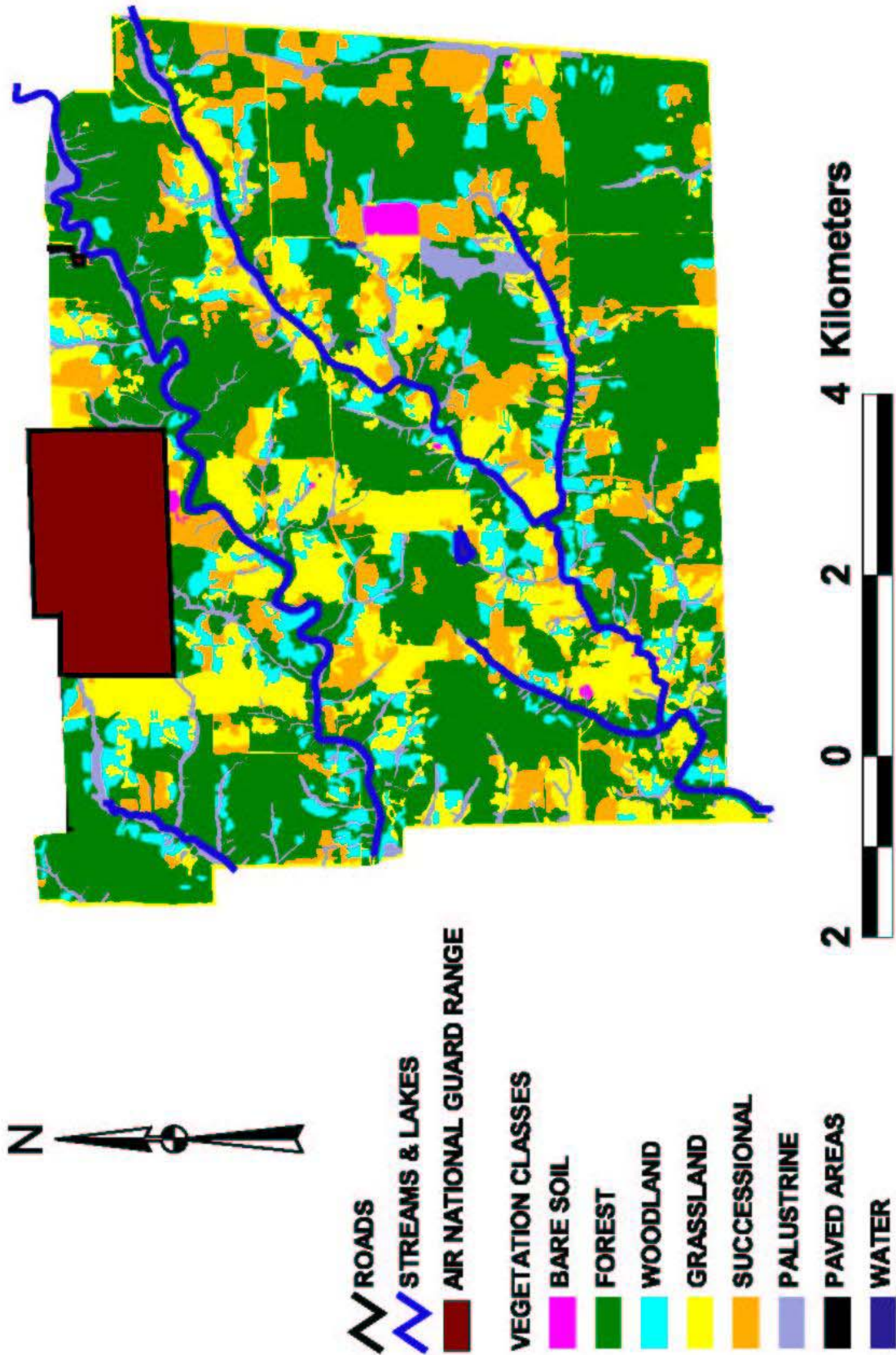


FIG. 5. FIRE MANAGEMENT UNIT 2

Fire management objectives for this unit are:

1. The protection of human life from wildland fire.
2. The prevention of property loss or resource damage from wildland fire.
3. Confine wildfires in the FMU to the smallest size possible through the use of roads and natural features.
4. Maintain or increase existing grassland and maintain or decrease existing woodland and early successional vegetation. Allow existing grasslands east of Little Graham Creek to convert to forest habitat through natural succession.
5. Maintain refuge roads as firebreaks on an annual basis.

### **Fire Management Unit 3**

This 11,000 acre FMU is bounded on the north by H Road and to the south by Big Creek and D Road (Figure 6). Perimeter roads bound the unit to the west. Access to the FMU is excellent at the north, south and west perimeters but poor along the east perimeter. Elsewhere within the unit access is considered good. Initial attack response times are estimated to take 2 to 2.5 hours. No structures exist within the FMU that would be negatively affected by fire. Several abandoned “igloos” (vegetated, earthen covered, concrete bunkers) and elevated steel observation bunkers exist within the unit but would not be affected by fire.

Fuel types within this FMU vary from grassland to forest forming a mosaic of successional habitats within the unit. Fires of moderate intensity with moderate to high rates of spread would be expected within areas of grass and shrub habitats while low intensity fires with low to moderate rates of spread would be likely within forested areas. The potential for spread to adjacent private agriculture lands is low. Should the appropriate management response indicate that suppression is needed, the suppression strategy most appropriate for FMU-2, will usually be a Confine strategy.

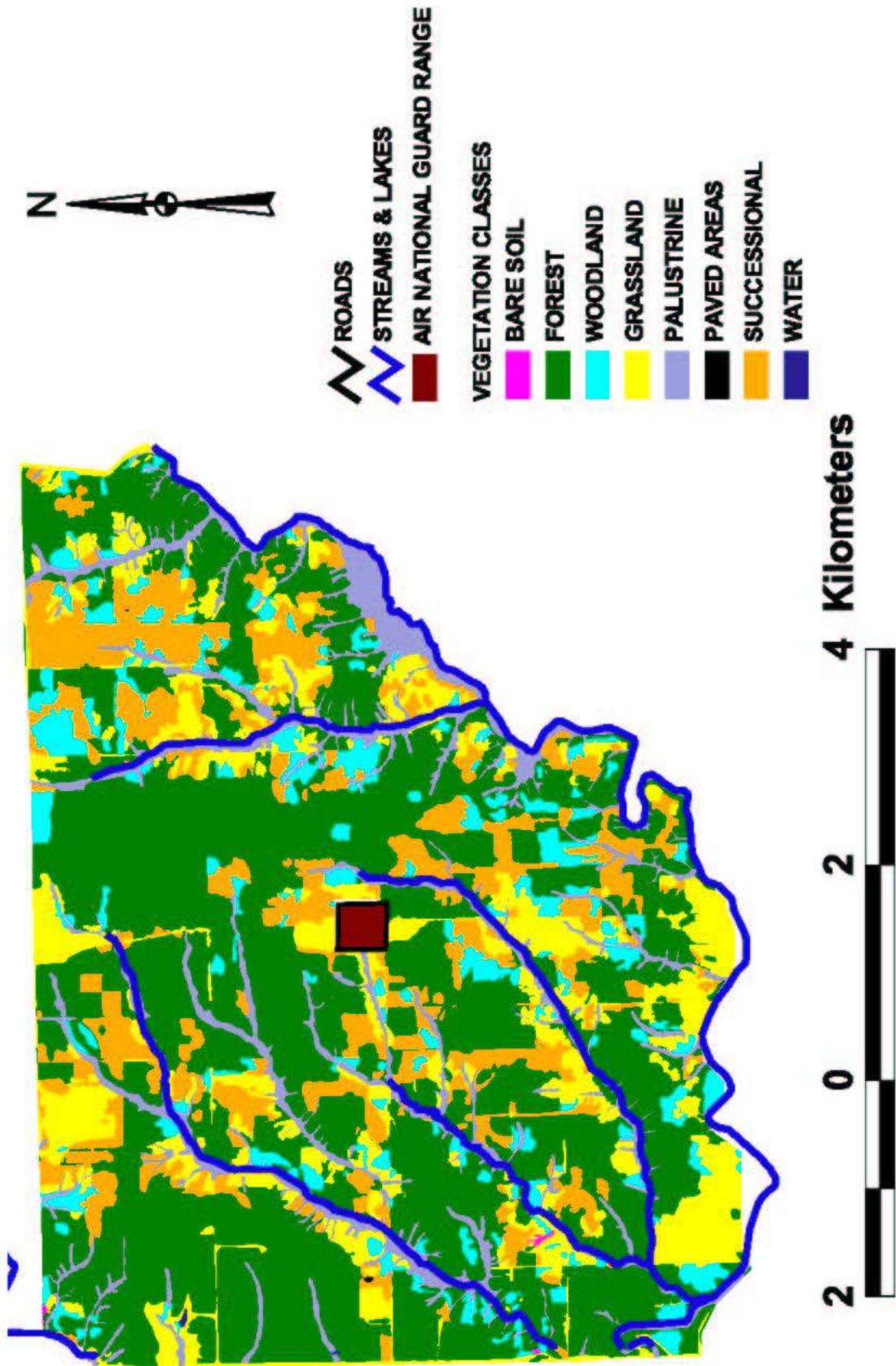


FIG. 6. FIRE MANAGEMENT UNIT 3

Fire management objectives for this unit are:

1. The protection of human life from wildland fire.
2. The prevention of property loss or resource damage from wildland fire.
3. Confine wildfires in the FMU to the smallest size possible through the use of roads and natural features.
4. Allow smaller existing grasslands to convert to forest or woodland habitat through natural succession with the exception of larger grasslands (e.g., along the southern boundary) of the FMU that may be maintained by prescribed fire.
5. Maintain refuge roads as firebreaks on an annual basis.

#### **Fire Management Unit 4**

This 11,000 acre FMU is bounded on the north by D Road and Big Creek and to the south by Firing Line Road (Figure 7). Perimeter roads bound the unit to the east and west. Access to the FMU is excellent at the perimeters and good elsewhere within the unit. Initial attack response times are estimated to take 2 to 2.5 hours. Structures within the FMU that could be negatively affected by fire are located along the southern boundary of this FMU and include an historic one room stone schoolhouse with a shingled roof, several concrete structures with metal or concrete roofs and one brick structure with asbestos shingles. Several abandoned “igloos” (vegetated, earthen covered, concrete bunkers) and elevated steel observation bunkers also exist within the unit but would not be affected by fire.

Fuel types within this FMU vary from grassland to forest forming a mosaic of successional habitats within the unit. The west perimeter of the unit is mostly forested with the center of the unit being comprised of mostly grassland and savannah habitats. Fires of moderate intensity with moderate to high rates of spread would be expected within areas of grass and shrub habitats while low intensity fires with low to moderate rates of spread would be likely within forested areas. The potential for spread to adjacent private agriculture lands is low. Should the appropriate management response indicate that suppression is needed, the suppression strategy most appropriate for FMU-2, will usually be a Confine strategy.



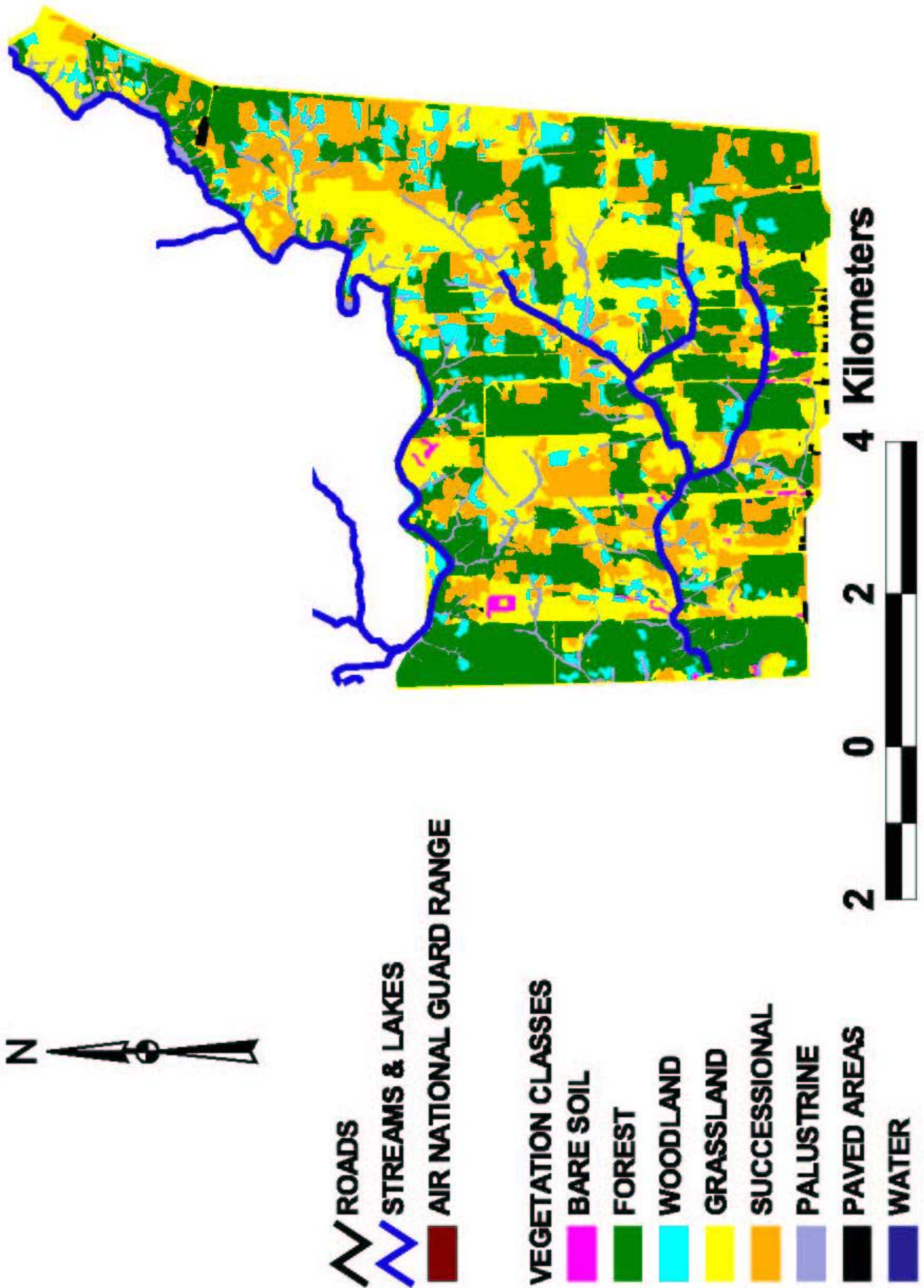


FIG. 7. FIRE MANAGEMENT UNIT 4

Fire management objectives for this unit are:

1. The protection of human life from wildland fire.
2. The prevention of property loss or resource damage from wildland fire.
3. Confine wildfires in the FMU to the smallest size possible through the use of roads and natural features.
4. Maintain or increase existing grassland and maintain or decrease existing woodland and early successional vegetation.
5. Maintain refuge roads as firebreaks on an annual basis.

#### **A. Fuel Model 1- Short Grass (NFDRS Models A&L)**

Most areas with Fuel Model 1 are former impact fields. Due to chemical application and mechanical manipulation during Army use, these fields have remained bare for several years following cessation of use. These areas are slowly becoming dominated by grasses and forbs. FMU-1, FMU-2, and FMU-4 are where this model is most abundant. Fuel loading is generally under 4,000 lb/acre. High spread rates can be expected, but fire intensities remain low and short in duration. Most fields are small in size, under 50 acres, and will spread into another fuel type or natural barrier effectively slowing the forward rate of spread. Flame lengths may approach 4 feet with a ROS in excess of 50 chains/hour with an associated wind event. A fire in this type usually will do little resource damage.

#### **B. Fuel Model 3- Tall Grass (NFDRS Model N).**

This model applies to grasslands found in many upland fields and in similar habitats with species 1 or more meters in height, with a total load in excess of 4,000 lb/acre. This model may include cattail stands. This model is abundant in all FMU's. Dominant vegetation types include broomsedge and several species of goldenrods. This fuel model is among the most valuable wildlife habitat within Big Oaks NWR. Because amounts of this fuel type will increase with fire, the relative hazard of wildfires in this fuel model will also increase. Within most areas containing FM 3, a woody shrub component is often present thus increasing the total fuel load.

Fires in this fuel are the most intense of the grass group and display high rates of spread under the influence of wind. Windy spring or fall days with warm temps and low humidity will make this fuel type hazardous. With continuous stands of tall grass, fire will carry across standing water under sustained wind conditions. Expect an extremely fast moving fire front in excess of 100 chains/hour, with flame lengths over 12 feet.

### **C. Fuel Model 6- Shrubs (NFDRS Model F)**

All FMU's have this vegetation component to one extent or another, however it is not a dominant vegetation type. Fire typically moves through this fuel model by creeping through the litter layer with low flame heights and rates of spread. During dry conditions, and high winds, fire can move through the crowns of shrub communities with rates of spread over 100 chains/hour and 12 feet flame lengths.

### **D. Fuel Model 8- Hardwood/mixed (NFDRS Model H or R)**

Closed to semi-closed canopy stands of hardwoods and conifer associates best represent this fuel model at Big Oaks NWR. Litter layer is compact, composed of leaves, needles and twigs.

Fires will normally exhibit low rates of spread, under 5 chains/hour, with flame lengths less than 2 feet, except when an occasional fuel concentration is encountered. Fires normally will remain on the surface, except under dry conditions where fire may burn through the duff layer, which may be deep. Under severe weather conditions involving high temperatures, low relative humidity and high winds, moderate fire behavior may occur and pose fire hazards. Occasional flare-ups are then possible when fire encounters heavier fuel concentrations.

### **E. Fire Behavior Fuel Model 9- Hardwoods (NFDRS Model K).**

The vegetation component of this fuel model is open or closed hardwood stands and mixed stands with leaf off. The litter layer often contains dead leaves, which are subject to moving around under windy conditions. Scattered concentrations of dead-down woody material are greater than in Fuel Model 8 above.

Fires in this fuel type will have a higher rate of spread due to the deciduous leaf litter layer and the increased oxygen available. Under windy conditions expect spotting problems from rolling and blowing leaves. Fires will generally remain on the surface, and can be a problem in the spring, before green-up. This fuel type can also be a problem in the fall, if normal moisture is not received and an unwanted ignition source is present. Expect flame lengths in excess of 2 feet with a ROS of 5 to 10 chains/hour as a rate of spread and containment problems under windy conditions.

## **VII. FIRE MANAGEMENT AND RESPONSIBILITIES**

The suppression of wildfire is given priority over all activities except the safeguarding of human



life (910 DM 1.4.ET. SEQ). It is expected that all refuge employees (with exception of administrative personnel) will be fire-trained and available to assist with emergency suppression as needed on Big Oaks NWR. Fire duty assignments will include only those duties for which each employee is qualified according to guidelines specified in the National Interagency Fire Qualification Subsystem Guide (PMS 310-1). Individuals must meet training, experience, and physical fitness requirements. Depending on fire complexity, several non-line support functions may be necessary.

#### **A. Fire Management Team Responsibilities**

**Refuge Manager (RM):** The RM, stationed at Big Oaks NWR, is responsible for the full range of management duties within Big Oaks NWR including fire management activities that implement an effective fire management program. Fire management duties and responsibilities will include:

- Approving and signing the Delegation of Authority and “Go-No Go” checklist.
- Acting as a resource advisor on initial and extended attack during wildfires and prescribed burns.
- Approving all Prescribed Fire Plans.
- Ensuring that an approved FMP is prepared for the refuge.
- Assign fire management responsibilities as a collateral duty to non-fire funded staff.
- Ensuring that all fire funded staff are made available for dispatch to off-refuge/interagency wildland and prescribed fire management operations.
- Meeting fire management training requirements established by the service for their position.
- Controlling entrance into any UXO hazard zone (as defined in Fire Management Strategies under General Refuge-Wide Constraints Item 4). (621 FW 1.5F)

**Prescribed Fire Specialist (PFS):** The Prescribed Fire Specialist assigned to Big Oaks NWR has primary responsibility for fire program management over Big Oaks NWR (all FMU’s). He will direct field operations in resource protection and implement and carry out the FMP. This position is responsible for the day to day implementation of the fire suppression program. Other duties and responsibilities will include:

- Ensuring fire readiness of unit personnel, supplies, equipment and apparatus.
- Acting as an Initial Attack Incident Commander Type IV on wildfires, a Resource Advisor on extended attack project sized wildfires and serve as prescribed Type 2 burn boss on refuge and non-refuge burns.
- Implementing Big Oaks NWR annual prescribed burn program.
- Recommending to RM the scheduling and implementation of management-ignited prescribed fire needs.
- Maintaining all fire related databases.

- Managing the fire budget.
- Coordinating and documenting training needs and experience records for refuge staff.
- Writing refuge prescribed fire plans and related documents.
- Maintaining safety first as the foundation for all aspects of fire management.
- Ensuring that all fire management policies are understood, followed and coordinated.

**Fire Program Technician (FPT):** This position, stationed at Big Oaks NWR, is responsible for maintenance of fire related equipment (pumper, pumps, tools, etc.) and maintaining an inventory of the fire cache. This position relays information to the PFS to determine needs for NUS or for the fire cache. This position assists the PFS with all fire related activities including supervising the seasonal firefighters. The FPT also serves as a prescribed fire crew leader and is responsible for operation of the specialized fire equipment.

**Administrative Technician (OT):** Responsible for posting of firefighter time and meeting procurement needs at the local level during an on-going incident. The OT serves as communications link for on-going wildfires and prescribed fires. The OT maintains a unit log during a wildfire.

**Regional Fire Management Coordinator (RFMC):** The RFMC provides coordination, training, planning, evaluation, and technical guidance for the region and is available to provide assistance for intra-agency and interagency wildland fire management needs. The RFMC will meet qualification requirements established by the service for the position. The RFMC, through written delegation by the Regional Director, is delegated authority to represent the region on the Geographic Multi-Agency Coordinating Group (GMAC Group). The RFMC is responsible for implementing the decisions of the MAC Group as they affect U.S. Fish and Wildlife Service areas. The decisions of the GMAC Group include the prioritizing of incidents and the allocation or reallocation of firefighting resources to meet wildland fire management priorities.

**Zone Fire Management Officer (ZFMO):** The ZFMO, stationed in Mio, Michigan, is a shared resource for Region 3 refuges, including Big Oaks NWR. The ZFMO advises the RM or staff on matters relative to fire planning, fire preparedness, suppression and prescribed burning. The ZFMO's duties will also include:

- Assisting in intra-agency and interagency fire management needs. Supplying technical assistance relative to fire management activities and also advises the RM on priorities, strategies and tactics to reduce adverse fire impacts.
- Assisting with oversight and coordination of Big Oaks NWR's fire management program, including wildfires, prescribed burning, WUI projects and fire related dispatch and mobilization.
- Representing Big Oaks NWR and coordinating fire related activities with: other refuges,

regional fire coordinator, and local, state and other federal fire organizations as directed by the RM or Regional Office.

- Maintains training and qualification records for refuge personnel; coordinating refuge fire training; maintains fire records and systems; assists developing and implementing fuel management and prescribed fire projects; coordinates mobilization of refuge resources for off-refuge assignments.(621 FW 1.5.G)

- Providing direction, supervision and leadership to Zone Fire Management Staff.

- Coordinate with and provide timely and accurate reports to Project Leaders, Deputy Project Leaders and Appropriate Refuge Managers on all activities of the zone and personnel.

- Coordinating and overseeing fire budgets to assure the fiscal guidelines are adhered to within the Region.

- Coordinating all prescribed fire activities for the district including requests and oversight of funding for Hazardous Fuel and WUI projects.

- Requesting and overseeing distribution of Severity and Emergency Pre-suppression Funding for District Fire and Aviation.

- Ensure all district incidents are managed in a safe and cost-effective manner.

- Coordinating, propositioning, sending and ordering fire and aviation resources in response to current and anticipated district, regional and national fire conditions.

**Seasonal Fire Technicians (SEAS):** Big Oaks NWR currently has 4 Seasonal Fire Technicians that work during the spring prescribed fire season. Each position is currently funded for 7 pay periods. These positions are intended to help the refuge implement the prescribed fires, suppress wildfires and maintain equipment and facilities. Hiring these seasonal fire technicians will be done on a yearly basis and be dependent on funding.

## **B. Refuge Fire Management Team**

The Big Oaks NWR fire management team consists of the individuals listed above, assigned under the supervision of the RM. Big Oaks NWR staff members will change periodically, as do individual fire qualifications, we have attempted to list individuals by name, position and qualifications in this section (Table 2). However, this information will change periodically and the most up-to-date information will be found in the mobilization directories prepared on an annual basis.

**Table 2.** Big Oaks National Wildlife Refuge fire qualified staff.

| Employee              | Position                     | Qualification                  | Physical Fitness Level |
|-----------------------|------------------------------|--------------------------------|------------------------|
| Joe Robb              | Refuge Operations Specialist | Firefighter 2<br>RXB3          | Arduous                |
| Brian Winters         | Prescribed Fire Specialist   | ICT4, RXB2<br>ENGB,<br>STLD(T) | Arduous                |
| Dave Jones            | Fire Program Technician      | Firefighter 1                  | Arduous                |
| Dale Sides (3 vacant) | Seasonal Firefighters        | Firefighter Type 1 or 2        | Arduous                |
| Dan Matiatos          | Refuge Operations Specialist | Firefighter 1                  | Arduous                |
| Jason Lewis           | Refuge Biologist             | Firefighter 2                  | Arduous                |
| Janet Pike            | Administrative Technician    | N/A                            | N/A                    |

The current refuge staff is qualified to conduct prescribed burns of moderate complexity. Personnel and resources on hand are insufficient to plan and conduct more complex prescribed burns and suppress wildland fires following initial attack. Additional staff needed to fully implement this Fire Management Plan are described in Table 3.

**Table 3.** Big Oaks National Wildlife Refuge additional staff needs for fire management.

| Position                    | Pay Grade | Status                              |
|-----------------------------|-----------|-------------------------------------|
| Career Seasonal Firefighter | GS 5/6/7  | Permanent Seasonal (14 pay periods) |

### C. Prescribed Fire Validation

The PFS at Big Oaks NWR advises the RM on issues pertaining to prescribed fire validation.

This allows the RM to confirm that burns will be within prescription and make appropriate decisions on the daily application of prescribed fire as appropriate.

#### **D. Interagency Coordination.**

Big Oaks NWR currently has a small number of fire-qualified individuals and a minimum base of equipment for suppression activities. The refuge depends heavily on other agencies for suppression activities, especially with wildfire incidents stretching beyond initial attack to an extended attack situation.

Big Oaks NWR has a signed Cooperative Fire Agreement with a local Volunteer Fire Department (Appendix B). For a per response payment, their equipment and manpower are available to support refuge fire personnel. This agreement is updated by the Regional FMO by April 1 of each year. Big Oaks is currently part of the Indiana Interagency Coordination Center (IICC). The IICC agreement assures mutual aid between the State of Indiana, the Forest Service and the U.S Fish and Wildlife Service. Details including dispatching and accounting practices are also contained within the document.

Additional Service resources are located at Muscatatuck NWR. Consult the Zone FMO when considering additional support through neighboring agencies and refuges. If these organizations fail to meet fire suppression needs, then resource requests can be made through the Zone FMO or IICC working in consultation with the RFMC to the national level.

### **VIII. WILDFIRE PROGRAM**

This section covers the actual implementation of this action plan. It explains the method to achieve the plan objectives, relative to wildland fire. Tables showing NUS needs is found in Appendix C.

#### **A. Fire Prevention**

Person-caused wildfires result in major expenditures of fire suppression funds and will usually cause unacceptable resource damage. Prevention efforts will be directed toward reducing fire occurrence from these causes.

Big Oaks NWR will not undertake its own specific fire prevention program but will utilize existing fire prevention programs for the state and direct refuge neighbors to those sources for

additional information.

Big Oaks NWR will also conduct a Fire Prevention Analysis that identifies the hazards, risks and values of the refuge. Prevention efforts for Big Oaks NWR will be guided by the Fire Prevention Analysis. Those areas identified of having the greatest hazards and risks shall be considered for some method of fuels management to reduce the hazards. This may include management ignited fires and construction/maintenance of fuel breaks.

## **B. Fire Season**

Wildfires can potentially start during all months of the year, however, the late November through late February period has the lowest incidence of wildfire starts. The mid-March through mid-November period is the historic fire season for this area of Indiana. During early spring, snow cover is rare, fine fuels (grasses, forbs and cattail) are cured, and cool, dry windy conditions are common. Fires at this time are normally faster spreading and human caused. Summer fires, resulting from prolonged drought conditions, may approach the rate of spread of spring fires but are normally shorter in duration. Normal summer and fall weather patterns are not conducive to wildfire spread since the prevalence of green vegetation reduces the likelihood of ignition and greatly reduces the rate of spread.

For Big Oaks NWR there is a split fire season. First, the fire season runs from snow melt, to vegetative green-up. This corresponds to a fire season beginning as early as February 15 to about May 1. Fire danger then drops to Low/Moderate levels throughout the summer months, due to broad leaf shading, high humidity and transpiration rates associated with hardwood species. Precipitation remains fairly uniform throughout the year, with a monthly average of about 3 - 4 inches. In the fall, a late fire season is possible, once deciduous vegetation has cured and leaves are on the ground. This increased litter layer is highly available as it is very loose, fluffy and dried out when denied normal moisture.

In recent drought years, fires have occurred in September and October and continued through the fall, until adequate moisture is received. Fires in the spring and fall usually pose little resource damage and are fairly easy to suppress. However, under accumulated drought conditions, fires can be very severe in late summer and early fall, when soil moisture is low. All size classes of down woody fuel are available as well as a deep litter layer.

## **C. Presuppression**

This section describes the tasks that are completed in advance of fire occurrence to ensure an effective response and action in the event of a wildfire.

## **1. Training**

Fire training emphasis will be to maintain fully qualified individuals at Big Oaks NWR to meet the objectives of this plan. Additional employee development training will be a second priority, depending on budget limitations and refuge and regional needs. At Big Oaks NWR level, the PFS will oversee and recommend individual fire training needs, ensure course prerequisite requirements are met, and assist individuals in scheduling training. The PFS then submits training requests to the RFMC for approval and funding, based on regional priorities and needs. To reduce training costs, attempts will be made to take advantage of training programs offered locally, through other refuges, and agencies.

Red Card qualification information, such as training records and fire assignments, are maintained through the Incident Qualification and Certification System (IQCS), which is a FWS computer database system. Information will be updated annually by the PFS, as submitted through the FMO after verification. The PFS will maintain a file on refuge personnel; Big Oaks NWR should document the training an individual receives in their personnel file with a copy of the course completion certificate placed within the individual's file.

## **2. Annual fire readiness needs**

The wildfire and prescribed fire season for Big Oaks NWR begins in February and ends for the most part in November. The PFS will keep the RM advised as to the need for readiness above the normal level described below. He also will advise on pre or post fire season readiness needs.

The PFS shall have fire equipment, supplies, and personnel readied and available by March 1. This includes the following:

- a. Fire engines and specialized equipment are fully functional. The engine is outfitted to a type VI standard. Reference *Fireline Handbook*, p. A-27.
- b. The fire cache and NUS are adequately supplied, at levels specified within the Fire Management Handbook (3.1-8 to 3.1-11). Maintain a well-organized and clean fire cache throughout the fire season.
- c. All fire employees meet minimum training and fitness guidelines as detailed in the Fire Management Handbook (621 FW 1.5-6 to 1.5-18).

- d. All fire employees will have all initial attack gear and personal protection gear available on a daily basis.
- e. All chainsaws and ignition equipment are functional and available.
- f. Handtools are adequately maintained and safe to use.
- g. The PFS, with input from the RM will review all fuel break needs. This includes scheduling the maintenance of existing roads and firebreaks.
- h. The PFS will insure that the Annual Prescribed Burn Plan is completed and approved by January 15 of each year. This will allow for maximizing the number of burn days available based on prescription limits set forth in the Plan.

### **3. Fire Detection**

As potential fire danger increases, Big Oaks NWR will place added emphasis on periodic patrols as part of normal operating procedures.

### **4. Regional and National Concerns**

Regional preparedness levels tend to follow the national preparedness level unless the central U.S. is experiencing very dry conditions and high potential for wildfire. Normal refuge operations will occur through Preparedness Level III. At Preparedness Level IV, Big Oaks NWR will seek approval through the RFMC prior to igniting any prescribed burns. At Preparedness Level V, no prescribed burns are permitted.

Subject to RM approval, fire trained individuals will be made available for regional and national needs, especially when the National Preparedness Level is at Level V.

### **D. Emergency Presuppression**

During periods of extreme or unusual fire danger, emergency presuppression activities should be initiated to provide additional coverage and protection. Appropriate activities for emergency presuppression funds include extended tour-of-duty for refuge firefighting personnel, authorizing



overtime or premium pay beyond regularly scheduled hours, extending types and tours of detection, and pre-positioning resources. The RFMC will make the final determination and if appropriate, open an emergency account authorizing the expenditure of emergency presuppression funds. A generalized Step-Up Plan for Big Oaks NWR is included as Appendix D.

#### **E. Fire Detection**

Because of small staff size and limited resources, Big Oaks NWR depends heavily upon visitors, Air National Guard and the U.S. Army Site Management Team to assist in early detection and reporting of refuge fires. As potential fire danger increases, Big Oaks NWR will place added emphasis on periodic patrols and monitoring as part of normal operating procedures.

#### **F. Pre-attack Plan**

Since there is currently a low wildfire occurrence associated with Big Oaks NWR, the RM will determine the need for a Pre-attack Plan on an annual basis. Should severe fire environmental conditions necessitate the need, a simple, informative plan will be prepared addressing the elements listed in the Fire Management Handbook (exhibit 1.4.2). Once developed, the Pre-attack Plan will be appended to Big Oaks NWR FMP.

#### **G. Fire Suppression**

The goal of fire suppression at Big Oaks NWR is to suppress all human-caused wildfires at minimum cost, consistent with the values at risk, while minimizing the adverse impacts resulting from suppression activities. Additional refuge suppression objectives include:

1. Protect human life, including all fire management personnel involved in suppression operations.
2. The protection of refuge structures, facilities, and improvements.
3. The protection of property and the environment adjacent to Big Oaks NWR.
4. The protection of all Threatened/Endangered species, natural, and cultural resources.

For most wildland fires the appropriate management response will be a suppression action. Numerous situations exist where suppression will be needed and desired. Examples of these situations include:

1. The Fire Situation shows that, regardless of the fire location, it is human-caused.
2. The Initial GO/NO-GO decision indicates that managing the fire for resource benefits is not within described limits or capabilities at this time.

The appropriate management response is not a replacement term for prescribed natural fire, or the suppression strategies of control, contain, confine, limited or modified, but it is a concept that offers managers a full spectrum of responses. It is based on objectives, environmental and fuel conditions, constraints, safety and ability to accomplish objectives. It includes wildland fire suppression at all levels, including aggressive initial attack. Use of this concept dispels the interpretation that there is only one way to respond to each set of circumstances (Fire Management Handbook 3.2-3).

Wildland Fire Situation Analysis (WFSA) (Appendix E) will be completed when fire spread and behavior exceed suppression efforts, when management capability is inadequate to accomplish wildland fire use objectives, or when prescribed fire plans are no longer adequate to guide full implementation (Fire Management Handbook 1.1-6 to 1.1-8). The WFSA will be updated daily or when strategic changes warrant. The original WFSA will be approved by the RM. Included in Appendix F is a sample Delegation of Authority to insure a smooth transition from an extended attack to a Type II or I incident or project fire.

Generally, at Big Oaks NWR, most wildfires will use confine or contain as the suppression strategy. The WFSA will consist of alternatives based on the management response and appropriate suppression strategy. The three suppression strategies are listed in order of increasing intensity of tactical action:

1. Confine - To restrict the wildfire within determined boundaries, established either prior to or during the fire. These identified boundaries will confine the fire with no direct action being taken to extinguish the fire.

Tactics include, but are not limited to, indirect human-made lines, burning out or backfiring, holding at natural barriers, cold trailing, hose lays and aerial delivery of water or retardant, perimeter mop-up and patrol. This strategy may have the least impact from suppression operations but generally involves larger areas and longer incident duration than containment and control.

2. Contain - To restrict a wildfire to a defined area using a combination of natural and constructed barriers that will stop the spread of the fire under the prevailing

and forecasted weather conditions until it is out.

Tactics include, but are not limited to direct and indirect line construction, burning out or backfiring, holding at natural barriers, cold trailing, hose lays and aerial delivery of water or retardant, perimeter mop-up and patrol. This strategy utilizes natural barriers to the greatest extent, minimizing suppression impacts from line construction. Areas are generally smaller, incident duration reduced and perimeter secured more quickly as compared with the confinement strategy. Suppression costs will be higher and additional resources will be required to meet tactical needs.

3. Control - To aggressively fight a wildfire through the skillful use of personnel, equipment, and aircraft to establish firelines around a fire, halt the fire's spread, and extinguish all hot spots until the fire is completely out. This strategy is an effective technique to achieve prompt control of a wildfire.

Tactics are directed at total suppression of the fire as quickly as possible, usually through aggressive direct attack designed to minimize the fire size or area involved. Negative resource impacts are potentially the greatest due to the direct tactical control measures employed.

### **1. Considerations and Constraints**

The assigned Incident Commander will determine the appropriate management response, suppression strategy and resulting tactics based on, but not limited to values at risk, current and expected weather conditions, current and expected fire behavior, available resources, threats to refuge and non-refuge resources, season of year, and firefighter safety.

All fires that are not management ignited prescribed fires are wildfires. Should management ignited prescribed fires fall out of prescription, they may then be considered a wildfire, and appropriate suppression action will be undertaken.

Indirect tactical methods may be used in all suppression strategies. The suppression methods employed will be those that cause the least resource damage (minimal tool concept) based on the values at risk. Chainsaws, portable pumps, and other small, portable equipment may be used in all FMU's outside of designated closed areas. Vehicles may be used inside Big Oaks NWR where roads exist and are identified for public use. The use of heavy equipment (such as bulldozers) is not permitted in any FMU without written consent of the RM.

The Incident Command System will be implemented in all refuge fire management operations. Only personnel who meet the qualifications (training, experience, and physical fitness requirements) of assigned positions will be permitted to participate in fire management activities.

## **2. Initial Attack**

Initial action will be rapid and efficient for all wildfires within or threatening Big Oaks NWR. First response will usually consist of two or three firefighters and Big Oaks NWR's initial attack Type 6 engine. If suppression strategies other than those identified for the FMU's are utilized, the rationale for using the other strategy will be documented on the WFSA (Appendix E) and DI-1202 Fire Report (Appendix G) by the Incident Commander (IC) Type 5 (T5).

The ICT4 is responsible for the fire until relieved or until the fire is declared out. As a minimum guideline, a wildfire can usually be declared out 24 hours after the last smoke has been extinguished. If initial actions are not successful during the first operational or burning period, or at any point the IC determines that the incident requires a more complex organization, the fire will be reassessed by the assigned ICT4, RM, and the RFMC.

## **3. Extended Attack**

Any fire which is not contained or controlled, usually by the end of the first operational period, is considered an extended attack fire. This designation will continue until the fire is declared out. A WFSA will be prepared and updated daily until such time as the incident is contained or controlled. If the fire complexity reaches a point requiring multiple resources, an IC Type III (ICT3) will be assigned after consultation with the RFMC.

As the fire complexity increases, the RM will approve requests to mobilize a local or national incident management team (Type II or I). The RFMC will coordinate the transition to an incident management team with the RM. The RM will represent Big Oaks NWR at the initial meeting, issue the delegation of authority, approve the WFSA, and approve the Agency Advisor to the team. The RM will also perform the close-out and evaluation of the team.

An ICS-209, Incident Status Report (Appendix H), will be completed daily for extended attack incidents greater than 100 acres in size. The IC is responsible for report completion. The ICS-209 will be sent to the RFMC for transmittal to the Eastern Area Coordination Center, Minneapolis, MN.

## **4. Dispatch/Mobilization**

The RM will designate the Initial Attack Incident Commander (ICIA), brief the ICIA on what

fire information (size-up) is available, ensure an efficient get-away time, and inform the RFMC of the incident. If additional resources (reinforcements) are necessary, then the first choice will be the Kent Volunteer Fire Department. Additional FWS support can be considered, keeping in mind the travel time required to get to the fire location. Resource needs beyond this level will be requested through the RFMC.

The following information will be included in the size-up:

- Name (person reporting fire)
- Location (general and legal description)
- Cause
- Estimated size
- Discovery: date, time, by who or type
- Initial attack: date, time, and type
- Topography
- Position of fire on slope
- Fire behavior (smothering, creeping, running, torching)
- Rate of spread (slow, moderate, fast)
- Weather conditions: wind speed and direction
- Smoke: color, amount (light, moderate, heavy)
- Other considerations: access points, water source, fuel
- Resource requests

Upon receiving a report of fire, get as much of the above information as possible. Dispatch information and procedures can be found in Appendix I.

## **5. Minimum Impact Suppression Guidelines**

Suppression efforts can sometimes cause more resource damage than the actual fire. Efforts to minimize resource damage must be a consideration with all suppression actions. The assigned IC will evaluate the suppression resource needs, seek alternatives to mechanized equipment that limit soil movement, maintain natural water courses, and minimize resource degradation, while minimizing the threat to human life and property. The IC will seek RM approval prior to the use of any heavy equipment or retardant within any FMU.

It is the responsibility of the IC to establish the minimum impact suppression tactics to protect natural and cultural resources. All personnel involved with fire management are expected to have an understanding of minimum impact suppression tactics such as indirect or parallel attack (instead of direct attack), utilization of existing barriers for control lines, and cold trailing.

A Resource Advisor will be used on any fire that has the potential for significant resource damage caused by suppression operations or whenever the IC requests the position. The Resource Advisor should be an employee with resource management knowledge to advise the Incident Management Team on issues related to mitigating the effects of suppression operations on cultural and natural resources. The Resource Advisor will also assist in developing and implementing the Rehabilitation Plan for the incident.

## **6. Rehabilitation**

Rehabilitation is any action taken to restore an area to the pre-burn or natural condition. Incident Commanders are responsible for short-term (less than six months) actions to mitigate the effects of fire suppression activities. Immediate rehabilitation actions will be outlined in the Incident Action Plan. Post-incident rehabilitation actions will be documented in a Rehabilitation Plan approved by the RFMC.

In the event of a large fire, a Resource Advisor will be designated to develop the Rehabilitation Plan. The Plan will be approved by the RM and implemented by the Incident Commander prior to the release of personnel from the fire. The Rehabilitation Plan will establish counter measures and outline methods to minimize or restore damage.

Once a fire is out, efforts will be made to return the fire site to as natural a state as possible. Generally, most initial attack fires will not have rehabilitation needs. However, each incident will be evaluated individually.

Rehabilitation (when necessary) will occur according to the following standards and techniques:

- a. Remove all trash and debris from firelines, staging areas, Incident Command Posts, and other locations. Attempt to return such areas back to their original condition.
- b. Flush cut all stumps that were created or disturbed on the incident.
- c. Mechanically constructed firelines should be built with water bars (when necessary) to prevent erosion. Consideration should be given to moving woody debris back into firelines and reseeding with native grasses to simulate natural processes and accelerate healing of the disturbed site.
- d. Disturbed natural water channels will be restored to pre-burn conditions by

removing and rehabilitating all constructed dams, water drafting sites, and equipment/personnel access points.

- a. During mop-up operations use cold trailing techniques and/or water or foam. Limit the use of control techniques that require soil disturbance and take all necessary measures to prevent concentrated foam from directly entering water sources.

## **7. Records and Reports**

Each incident will be documented on an Individual Fire Report (DI-1202) (Appendix G). This includes all fires within refuge boundaries and fires threatening NWR System lands (see Fire Management Handbook 1.6-6). In addition, the Incident Commander is responsible for conducting an initial investigation and documenting whether the fire was human-caused or from natural agents. When investigation indicates the fire was caused by arson, evidence (including the point of origin) will be protected and the proper local and/or state law enforcement agencies will be notified.

Incident Commanders are responsible for completing the DI-1202 and forwarding a copy to the FMO. The FMO will assign refuge fire numbers, the suppression account number, and input the report information into the FMIS.

All wildfires escaping initial response action will require the completion of a WFSA to determine the next appropriate suppression response. In addition, all large fires (greater than 100 acres) will have form ICS 209 (Incident Status Summary Report) (Appendix H) submitted daily until the incident is controlled.

A documentation package will be assembled for each fire to include:

1. Unit logs.
2. Map of the fire area (7.5 min. quad. showing point of origin).
3. Dispatch log and telephone log.
4. Aircraft documentation.
5. Resource orders.
6. Incident Actions Plans.
7. Photographs, slides, videos.
8. Press clippings.
9. Accident reports.
10. Performance ratings.

11. Other documents pertinent to each individual fire.

Fire related reports and documents will be maintained at refuge headquarters. Other reports that should be kept on file include fire training schedules, qualification reports, weather data, situation reports, and prescribed burn plans.

## **H. Mechanical Fuel Treatments**

Mechanical fuel reduction is the use of mechanical equipment (i.e. weed whackers, chainsaws, dozers, rubber tired skidders, chippers, mowers, etc.) to cut and remove, or prepare for burning, woody fuels. Mechanical treatments are intended to help in achieving resource management goals and objectives, most often a combination of ecosystem restoration and reduction of high hazard fuel loadings. Mechanical fuel treatments must be described in a fuels project plan. The plan will contain a prescription defining goals, objectives, and treatment methods employed to achieve the objectives.

Mechanical fuel treatment is often used in concert with prescribed fire treatment. High hazard fuel conditions can be reduced while meeting structural objectives in areas immediately adjacent to infrastructure values (Wildland Urban Interface) or on boundary areas through a mix of mechanical treatment and prescribed fire. Mechanical treatment can be used as the primary method of reaching structural goals while prescribed fire actually removes and eliminates the hazardous fuels.

### **Long-term Program Objectives:**

The primary program objective is the reduction of hazardous fuels to protect adjacent landowners and values at risk. As regeneration of agricultural areas continues, annual reviews will be conducted to determine necessity of treatment. Due to UXO issues at Big Oaks, ground disturbance is prohibited unless authorized by the Army. In most cases mechanical work will be limited to the perimeter of the refuge where fire could escape onto public lands. Interior work will be limited to the established roadways.

### **Annual Preparation:**

There is little preparation needed for mechanical treatments. Review of proposed projects to ensure that damage would be minimal will be part of the planning process. What can be critical is the timing of the mechanical treatment to ensure that soil compaction and disturbance does not occur during wet season or times of high precipitation. Conducting mechanical treatments during frozen ground conditions or late in the growing season tend to yield the best results.

### **Required Staffing:**

The required number of personnel will be used to meet the work plan and job hazard analysis provisions.

### **Sensitive Resource Considerations:**

Depending on the type of mechanical operation, mowing, etc., ground disturbance may occur.



Mowing does not disturb the ground so no effects are expected on potential, undiscovered, cultural sites.

Federally listed and State listed threatened or endangered species are likely to be found on the Refuge. Should reconnaissance prior to treatment indicate T&E presence, an intra-Service Section 7 consultation will be initiated. Depending on access conditions, mechanical treatments can usually be timed to mitigate adverse effects on listed species. Lists of Federal and state T&E species potentially present are found in Tables 6 and 7 in Appendix G.

Air quality is not expected to be affected by mechanical fuels treatments. Some fugitive dust may be generated over the immediate area. It is not expected to be of a quantity or duration to contribute to regional haze conditions.

*Restrictions:*

Equipment

There are no restrictions on types of equipment that may be used. Common agricultural equipment and implements would generally be used in fuel management operations. As stated before, UXO concerns would have to be evaluated and Army guidance would be sought before any mechanical treatment would be approved.

Seasonal

Depending on the season and precipitation levels, operations would be timed to reduce potential for ground disturbance. The only other seasonal restriction involves delay of operations until ground nesting is essentially complete.

*Documentation and Reporting:*

Effects Monitoring

Monitoring of mechanical operations is intended to provide information for quantifying and predicting ecological effects on refuge resources while building a historical record. In addition, ecological changes such as species composition and structural changes in vegetation should be monitored after each operation. Operational monitoring provides a basis for evaluation and comparison of management actions. Possible monitoring actions addressed in the Prescribed Fire Plan are usable for mechanical operations as well.

Cost Accounting

All costs of planning, implementation and first order, post-operation, monitoring will be charged to the appropriate cost code. This data may be tracked in several locations including FIREBASE, the National Fire Plan Operations and Reporting System (NFPORS) as well as the Federal Financial System. Detailed cost tracking provides for constantly improving cost estimates for budget purposes.

Public Information/Interaction:

As needed, opportunities for public input should be made available to reduce public concern about increases in fuels, potential use of fire for management and potential for mechanical treatment of fuels.

## **IX MANAGEMENT IGNITED PRESCRIBED FIRE PROGRAM**

At Big Oaks NWR, fire is proposed to be used as a tool to achieve specific resource management objectives. These objectives include enhancing wildlife and plant species populations, preserving endangered species habitats, promoting biological diversity, reducing hazardous fuels, and accomplishing basic maintenance needs such as disposal of vegetative waste and debris. This Management Ignited Prescribed Fire Program is designed to retain fire as a vital ecosystem process to control undesirable vegetation, to release soil nutrients, and to improve vigor of desirable vegetation.

### **A. Long-term Prescribed Burn Program**

Big Oaks NWR was established primarily to benefit non-game grassland and forest birds. Much of the habitat management work implemented at Big Oaks NWR benefits a wide array of wildlife species. Current management activities support several landscape elements to promote maximum vegetation and wildlife species diversity. Management practices also protect sensitive cyclic processes necessary to maintain the various ecosystems on Big Oaks NWR.

Big Oaks NWR's various habitat management plans are implemented to meet the habitat requirements of several different wildlife species. Prescribed fire has been used as a management tool on an almost annual basis for the last 20 years. The exclusion of fire from Big Oaks NWR would result in extensive deterioration of grasslands and the invasion of woody species and undesirable perennials.

Prescribed fire will be used to suppress woody shrub invasion within open grass fields. These fields, if not kept open by manipulation, will progress to more advanced stages of succession, eliminating habitat diversity. In addition, dead and down ground fuels accumulate quickly over time due to rapid vegetation growth. The use of management ignited prescribed fire on a continuing annual basis will help to maintain fuel hazards at an acceptable level where resource values at risk are high.

### **B. Description of Management Ignited Prescribed Burn Program**

In general, the prescribed burn program at Big Oaks NWR is aimed at habitat maintenance, focusing on preventing shrub and tree encroachment in grass fields. Other burning is fuel reduction related, in high risk areas and where woody debris has been piled. Objectives include:

1. Maintain grasslands through prescribed burning to control hardwood shrub and

tree encroachment.

2. Provide nesting habitat for grassland and early successional dependent species including Henslow's sparrows.
3. Reduce the dominance of invasive exotic plant species.
4. Reduce hazard fuel concentrations to prevent or reduce the severity of wildfires.

Annual activities required to prepare for and implement the prescribed burn program at Big Oaks NWR include the following:

1. Planning starts several months to one year in advance of the burn program implementation. Generally, old fields will be burned on a repeated basis, every three to four years.
2. Once all areas for burning are identified, they are priority ranked and the time of year for burning is determined. In general, light fuel units, such as grass fields, are scheduled for spring burning prior to green-up.
3. Collect and compile base line information, prepare, and submit the Prescribed Burn Plan by February 1 for necessary approvals.
4. Prescribed burning qualifications are reviewed in the fall, matching available training courses to agency and personnel needs. Training requests are submitted to the FMO for further consideration and scheduling. At the refuge level, most of the burning is of low complexity, requiring minimal fire qualifications of Firefighter 2 rating. At least one individual, who meets the qualifications for Prescribed Fire Burn Boss (RXB2), is required to function as the Burn Boss. A minimum crew of 8 to 10 individuals have been sufficient to carry out the prescribed burn program at Big Oaks NWR in the past.
5. Implement the Prescribed Burn Program as approved by the RFMC.
6. Conduct monitoring and evaluation and complete reporting requirements following completion of all prescribed burning activities.

### **C. Fire Management Unit (FMU) Correlation**

Management ignited prescribed fire may occur within any FMU. Management plans currently being developed call for the elimination of Prescribed Fire, for grassland management purposes, within FMU 1 but Prescribed Fires may occur to meet other management objectives within all 4 FMU's (Figure 8). Detailed location maps will be included in the Prescribed Burn Plan.

#### **D. Correlation with Fire Strategies and Objectives**

The Management Ignited Prescribed Fire Program is consistent with refuge resource management objectives. In addition, wildfire strategies are enhanced through the treatment of natural and management generated fuel loads which might pose a threat to resource values.

A normal fire season at Big Oaks NWR also offers the optimum burning conditions for implementation of a prescribed burn program. Most burning will be accomplished in the spring. After green-up, debris burning could carry into the summer months, as conditions permit. Opportunities for fall burning are normally limited due to poor burning conditions. However, since "burning windows" are fairly limited at any time of the year, we will develop spring and fall prescriptions for certain units to allow for maximum opportunity to best achieve program objectives.

#### **E. Resources Necessary to Plan/Execute/Evaluate Prescribed Burn Program**

Most prescribed burning at Big Oaks NWR is of moderate complexity. Fire qualified individuals previously identified are supplemented with other fire-qualified individuals in order to plan, execute, and evaluate the burn program. Usually a burn crew, composed of a qualified Burn Boss and seven to nine additional qualified individuals will be sufficient to minimally meet most burn program objectives.

The PFS at Big Oaks NWR is responsible for planning, executing, and evaluation of the refuge prescribed burn program. The RFMC or designee will supply the technical expertise to support the burn program and ensure that the proper burn plan implementation procedures are followed. More specific evaluation criteria are addressed within the Prescribed Burn Plan.

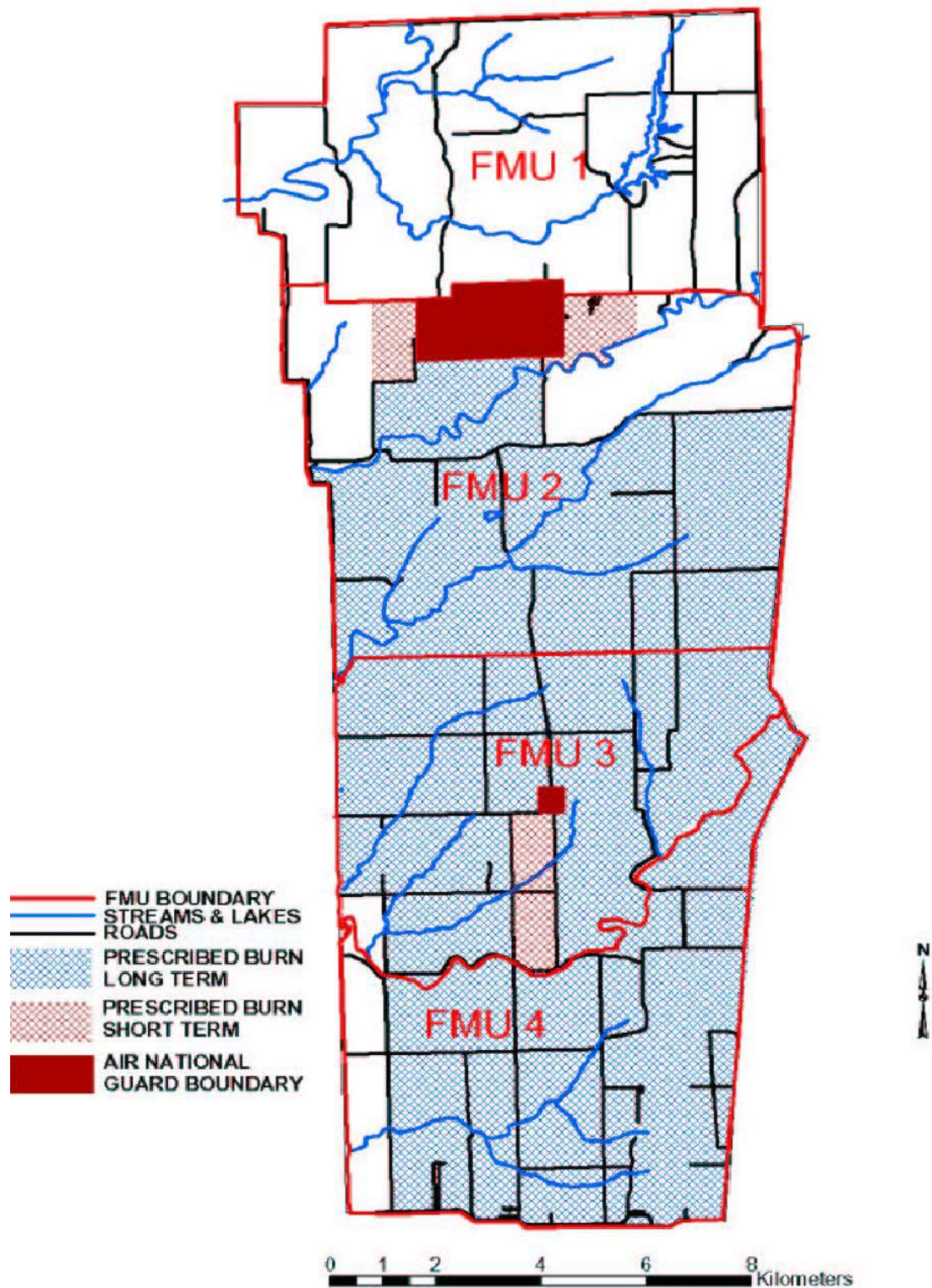


Fig. 8. PRESCRIBED BURN AREAS WITHIN FIRE MANAGEMENT UNITS

## **F. Procedures Required for Prescribed Fire Implementation**

As of the writing of the FMP, Big Oaks NWR is exempt from obtaining an annual Open Burning Permit from the Indiana Department of Environmental Management (IDEM). This permit typically specifies the type of burn being conducted, responsible individual, and type of holding resources on site. Careful monitoring of changing state regulations is necessary to ensure any open burning is done in compliance with existing or future regulations.

All prescribed burning restrictions or notifications imposed at the state, Regional, or National level, as determined by Preparedness Level, will be adhered to.

Site preparation needs are specified within the Prescribed Burn Plan. These will be completed prior to ignition and approved by the RM. The Burn Boss or the RM may impose additional site preparation needs or request additional holding requirements based on potential risks involved.

The PFS at Big Oaks NWR is responsible for all suppression equipment and personnel. These resources are also used for implementing the prescribed burn program. All equipment and personnel are generally fire ready by February 1. No prescribed burning is to occur when a wildfire is in progress within the boundary of Big Oaks NWR.

## **G. Prescribed Fire Program Complexity**

The Prescribed Fire Complexity Analysis (Fire Management Handbook 2.2-3 to 2.2-9) will be used to determine prescribed fire complexity for the various units burned annually and included in the Prescribed Burn Plan.

The weighted rating is categorized as low, normal, or complex based on the potential risk, potential consequence, and technical difficulty of each element. This in turn helps to establish the degree of difficulty that is involved in completing the burn and determines if current refuge resources can accomplish the planned burn and the degree of training required by the burn boss. Before the fire is ignited, a GO/NO GO Checklist must be completed. A sample can be found in Appendix J.

**Table 4.** Complexity analysis.

## Complexity Worksheet

Station: Big Oaks National Wildlife Refuge

Burn Unit Name:           

| Element                           | Sub Element            | Rating Value<br>(L-M-H) |  | Rationale |
|-----------------------------------|------------------------|-------------------------|--|-----------|
| Potential for Escape              | Risk                   | Preliminary             |  |           |
|                                   |                        | Final                   |  |           |
|                                   | Potential Consequences | Preliminary             |  |           |
|                                   |                        | Final                   |  |           |
|                                   | Technical Difficulty   | Preliminary             |  |           |
|                                   |                        | Final                   |  |           |
| Number & Dependency of Activities | Risk                   | Preliminary             |  |           |
|                                   |                        | Final                   |  |           |
|                                   | Potential Consequences | Preliminary             |  |           |
|                                   |                        | Final                   |  |           |
|                                   | Technical Difficulty   | Preliminary             |  |           |
|                                   |                        | Final                   |  |           |
| Off-Site Values                   | Risk                   | Preliminary             |  |           |
|                                   |                        | Final                   |  |           |
|                                   | Potential Consequences | Preliminary             |  |           |
|                                   |                        | Final                   |  |           |
|                                   | Technical Difficulty   | Preliminary             |  |           |
|                                   |                        | Final                   |  |           |
| On-Site Values                    | Risk                   | Preliminary             |  |           |
|                                   |                        | Final                   |  |           |
|                                   | Potential Consequences | Preliminary             |  |           |
|                                   |                        | Final                   |  |           |
|                                   | Technical Difficulty   | Preliminary             |  |           |
|                                   |                        | Final                   |  |           |
| Fire Behavior                     | Risk                   | Preliminary             |  |           |
|                                   |                        | Final                   |  |           |
|                                   | Potential Consequences | Preliminary             |  |           |
|                                   |                        | Final                   |  |           |
|                                   | Technical Difficulty   | Preliminary             |  |           |
|                                   |                        | Final                   |  |           |
| Management Organization           | Risk                   | Preliminary             |  |           |
|                                   |                        | Final                   |  |           |

|                             |                        |             |  |  |
|-----------------------------|------------------------|-------------|--|--|
|                             | Potential Consequences | Preliminary |  |  |
|                             |                        | Final       |  |  |
|                             | Technical Difficulty   | Preliminary |  |  |
|                             |                        | Final       |  |  |
| Public & Political Interest | Risk                   | Preliminary |  |  |
|                             |                        | Final       |  |  |
|                             | Potential Consequences | Preliminary |  |  |
|                             |                        | Final       |  |  |
|                             | Technical Difficulty   | Preliminary |  |  |
|                             |                        | Final       |  |  |
| Fire Treatment Objectives   | Risk                   | Preliminary |  |  |
|                             |                        | Final       |  |  |
|                             | Potential Consequences | Preliminary |  |  |
|                             |                        | Final       |  |  |
|                             | Technical Difficulty   | Preliminary |  |  |
|                             |                        | Final       |  |  |
| Constraints                 | Risk                   | Preliminary |  |  |
|                             |                        | Final       |  |  |
|                             | Potential Consequences | Preliminary |  |  |
|                             |                        | Final       |  |  |
|                             | Technical Difficulty   | Preliminary |  |  |
|                             |                        | Final       |  |  |
| Safety                      | Risk                   | Preliminary |  |  |
|                             |                        | Final       |  |  |
|                             | Potential Consequences | Preliminary |  |  |
|                             |                        | Final       |  |  |
|                             | Technical Difficulty   | Preliminary |  |  |
|                             |                        | Final       |  |  |
| Ignition Procedures Methods | Risk                   | Preliminary |  |  |
|                             |                        | Final       |  |  |
|                             | Potential Consequences | Preliminary |  |  |
|                             |                        | Final       |  |  |
|                             | Technical Difficulty   | Preliminary |  |  |
|                             |                        | Final       |  |  |
| Interagency Coordination    | Risk                   | Preliminary |  |  |
|                             |                        | Final       |  |  |
|                             | Potential Consequences | Preliminary |  |  |
|                             |                        | Final       |  |  |
|                             | Technical Difficulty   | Preliminary |  |  |
|                             |                        | Final       |  |  |
|                             |                        | Preliminary |  |  |



|                   |                        |             |  |  |
|-------------------|------------------------|-------------|--|--|
| Project Logistics | Risk                   | Final       |  |  |
|                   |                        | Preliminary |  |  |
|                   | Potential Consequences | Final       |  |  |
|                   |                        | Preliminary |  |  |
|                   | Technical Difficulty   | Final       |  |  |
|                   |                        | Preliminary |  |  |
| Smoke Management  | Risk                   | Final       |  |  |
|                   |                        | Preliminary |  |  |
|                   | Potential Consequences | Final       |  |  |
|                   |                        | Preliminary |  |  |
|                   | Technical Difficulty   | Final       |  |  |
|                   |                        | Preliminary |  |  |

#### RISK OVERALL RATING

#### POTENTIAL CONSEQUENCES OVERALL RATING

#### TECHNICAL DIFFICULTY OVERALL RATING

#### SUMMARY COMPLEXITY RATING

#### RATIONALE:

##### I. Regional/National Preparedness Levels

Regional and National Preparedness Levels are monitored by the RFMC. Big Oaks NWR will contact the RFMC concerning reporting requirements or limits to prescribed burning activities. Guidelines are set forth in the National Interagency Mobilization Guide. Big Oaks NWR will adhere to the direction given as preparedness levels change. Generally, regional preparedness levels follow the national level.

##### J. Potential Impacts of Plan Implementation

Big Oaks NWR's management ignited prescribed fire program is sensitive to potential adverse impacts. All known or suspected impacts are addressed within the Environmental Assessment completed for this FMP and, once approved, will be included as Appendix K to this document. Visitors will be warned ahead of time of a planned burn. Most of the burn blocks are well within Big Oaks NWR's boundary, easily accessible, and present few control problems. Threats to human life and property are minimal. There are no known social and economic impacts.

Smoke management is critical for prescribed fire planning at Big Oaks NWR. Highway 421 is adjacent to Big Oaks NWR on the east and is a concern for smoke management. Prescriptions

will be designed to minimize impacts along this major transportation corridor and on nearby homes. Wind direction and ignition patterns will be carefully prescribed to carry smoke away from potentially impacted roadways. As a further precaution, warning signs or guards will be used to advise motorists of a burn in progress if smoke was to reduce visibility along one of the roads adjacent to Big Oaks NWR. Listed below are written principles that will guide smoke management planning at Big Oaks.

Have clear objectives. Be sure to have clear resource objectives and consider the impact on the total environment, both on and off-site.

Obtain and use weather forecasts. Weather information is needed to determine what will happen to smoke, as well as to determine the behavior of fire.

Don't burn during pollution alerts or temperature inversions. Smoke tends to stay near the ground and not disperse readily.

Comply with air pollution control regulations. Check with the appropriate agency prior to burning.

Burn when conditions are good for rapid smoke dispersion. The atmosphere should be slightly unstable so smoke will rise and dissipate rapidly.

Determine the direction and volume of smoke and use caution when near or upwind of smoke sensitive areas. Burning should be done when wind will carry smoke away from heavily traveled roads, airports, and populated areas.

Use test fires to confirm smoke behavior. Set test fires in the area proposed for burning, away from roads and other "edge" effects.

Notify local fire control office. Notification will inform potentially impacted residents that it is not a wildfire.

Use backing fires where possible. Assuming resource management objectives can be met, backing fires produce more complete consumption of fuels and produce less smoke. If other firing methods are used, ensure that fire is hot enough and the weather conditions are suitable to vent smoke into the upper atmosphere.

Burn in small blocks. The larger the area being burned, the more visibility is reduced downwind and the higher the concentration of particulates put into the air. However, it may be better to burn all of an area when weather conditions are ideal

for smoke dispersion.

Mop-up along roads. Burn out and mop-up operations should be started as soon as possible along roads to reduce smoke impact on visibility.

Have an emergency plan. Be prepared to control traffic on nearby roads if the wind direction changes. Be prepared to stop a prescribed fire if it is not burning according to plan or if weather conditions change.

Follow the prescription and burn smart. Burn when duff and soil moisture levels are high to prevent smoldering ground fires. Burn under conditions of low relative humidity and fuel moisture to avoid smoke particles from combining with moisture to produce smog and poor visibility. Avoid days with low transport windspeed (less than 9 MPH) or low morning mixing heights (less than 1640 feet).

Additional information regarding smoke management can be found in the following publications:

Southern Forestry Smoke Management Guidebook. Mobley et al., USDA Forest Service. GTR SE-10, December 1976.

Prescribed Fire Smoke Management. National Wildfire Coordinating Group. Publication No. 420-1, February, 1985.

With the exception of smoke, there are no other known negative environmental impacts associated with prescribed fire implementation at Big Oaks NWR. Local communities are far enough away that smoke should not seriously impact them. In addition, much of the burning contemplated at Big Oaks NWR is composed of fine fuels which burn out quickly and normally do not produce lingering smoke problems. Prescribed fires in other fuel types will be carefully prescribed and implemented to avoid smoke problems.

## **K. Documentation Requirements**

To implement management ignited prescribed fire on Big Oaks NWR, a Prescribed Fire Plan is prepared, addressing the required elements as outlined within the Fire Management Handbook. The Plan is usually prepared and submitted by the ROS. The Plan is then reviewed by the RFMC and Burn Boss and given final approval by the RM.

Prior to burn implementation, a checklist of burn-day actions, as specified within the burn plan, and a Go No-Go Checklist are completed and become part of the final burn report. Additional documentation includes burn day notifications and contacts, documentation of current, expected, and extended forecasted weather conditions for a three to five day period beyond the day of the burn. The Burning Boss is responsible for gathering and documenting the above information prior to burn implementation.

Normally the position of a Prescribed Fire Behavior Analyst is not activated. The Burn Boss assumes this role and documents all fire behavior and weather readings specified within the Burn Plan. He may choose to delegate this responsibility. A critique is made for each burn where the Burn Boss documents Burn Plan implementation. The Burn Boss also will evaluate burn objective accomplishment in consultation with the ROS.

Post-burn monitoring and follow-up evaluation will be the responsibility of the ROS. It is important that this documentation be completed, attached to the burn report, and sent to the Regional Biologist and RFMC as feedback to wildlife objective accomplishment.

#### **L. Reporting Requirements**

Each individual burn will have a DI-1202 (Appendix G) and narrative prepared and entered into the Fire Management Information System FMIS. A hard copy, along with the documentation listed above, will be kept on file at the Big Oaks NWR office. A copy will also be sent to the RFMC for input into the Fire Management Information System.

#### **M. Critique Format**

Critiques will follow the format specified within the Fire Management Handbook (1.4-31). This will be the minimum standard. Additional critique documentation, such as prescribed burn summaries and cost documentation, will be prepared as necessary based on refuge or regional needs.

#### **X. WILDLAND FIRE USE**

Wildland fire use (also referred to as *fire use*) is the management of unplanned wildland fires, such as lightning-ignited fires, to accomplish specific resource management objectives. Lightning-caused wildland fires will receive appropriate management responses that give consideration to values, hazards, and risks. There is no planned wildland fire use on the Refuge at this time due to UXO constraints and the potential for smoke impacting roadways. A

Wildland Fire Use Management Plan must first be prepared in the event that wildland fire use would be used on the refuge.

## **XI. WILDLAND FIRE MANAGED FOR RESOURCE BENEFITS**

The fire management program at Big Oaks NWR will focus on suppression of human-caused wildland fires and management of ignited prescribed fires. The Service could manage some naturally occurring fires, such as lightning started fires, under pre-written plans (i.e., a natural prescribed fire plan) to accomplish specific resource management objectives. The Service does not have an active prescribed natural fire program and it is not anticipated that such a program will be implemented at Big Oaks NWR.

The Service will utilize the full spectrum of fire management actions - from control suppression efforts to confine and contain strategies to realize and accomplish specific resource objectives during naturally ignited wildland fires. This policy promotes fire management actions along a "sliding scale" with ranges of minimal on-the-ground actions to prompt, aggressive actions to fully extinguish the fire. Use of this spectrum of responses allows land managers more flexibility to design responses closely allied with objectives and fuel, weather, and topographic conditions. This will permit the refuge to achieve effectiveness and efficiency in operations. (Fire Management Handbook 1.1-9)

## **XII. AIR QUALITY/SMOKE MANAGEMENT GUIDELINES**

Visibility and clean air are primary natural resource values at Big Oaks NWR and the protection of these resources will be given full consideration in fire management planning and operations. Big Oaks NWR will comply with all applicable Federal, Indiana State, and local air pollution control requirements, as specified within Section 118 of the Clean Air Act, as amended (42 USC 7401). In addition, further guidance can be found in the Fire Management Handbook, 2.3, pp. 1-9.

Our objective at Big Oaks NWR is to take aggressive action to manage smoke from wildland and prescribed fires in order to minimize negative impacts to visibility/public safety and maintain air quality. For the type of burns occurring at Big Oaks, the following guidelines will be followed when planning a prescribed fire and addressing wildfire planning.

All burning is permitted provided that the existing wind speed, wind direction, and atmospheric conditions do not create nuisance smoke conditions.

Smoke sensitive areas will be identified and addressed within the Prescribed Fire Plan. The direction of wind vector selected will be such that smoke and other

particulate emissions are transported away from sensitive areas.

Burning will be conducted only when visibility exceeds four miles and when the fire weather forecast indicates the presence of an unstable airmass; mixing heights are greater than 1640 feet and a minimum of 9 MPH windspeed is required.

No burning will occur if any government agency has issued an air pollution health advisory, alert, warning, or emergency for the area surrounding Big Oaks NWR.

Backing and flanking fires will be used when possible to minimize particulate emissions.

Media sources will be kept informed of any adverse fire and smoke dispersal conditions throughout any fire event.

### **XIII. FIRE RESEARCH AND MONITORING**

All burning done at Big Oaks NWR will be well documented and is expected to be representative of other prescribed burns documented within the Fire Effects Information System (FEIS).

Monitoring to determine habitat response will employ photo points and aerial photography to aid in determining burn objective and resource objective accomplishment.

Special equipment will be used, when available and practicable, for measuring burn parameters. Data loggers and heat sensitive temperature probes can be used to measure flame intensity and duration. Most burns will be of low to moderate intensity and easily measured through rate of spread and flame length observations. Should more comprehensive fire behavior and effects information be necessary, it will be documented within the Prescribed Burn Plan.

Currently, monitoring is being conducted annually on Henslow's sparrow populations. The resulting Henslow's sparrow population index may be used to indirectly indicate changes in habitat resulting from Big Oaks NWR's prescribed fire program. The current burn program does not negatively impact the endangered Indiana Bat because no winter burns are conducted that would impact hibernating bats. Snags found on the edges of burn units may provide resting and hiding cover for the Indiana Bats, but no bats should be present at the time of the burns because they are conducted before March 15<sup>th</sup> or after September 15<sup>th</sup> and Indiana Bats are hibernating during this time. It is believed that the extensive amount of prescribed burning currently being conducted on Big Oaks NWR will require research, on specific plant and animal responses, and these should be initiated in the near future. Fire research or monitoring projects of Regional or National significance are submitted to the Regional Fire Ecologist and RFMC for consideration. The Regional Fire Ecologist will provide annual funding information for potential fire projects submitted for consideration under the Joint Fire Science Program (JFSP). Additional research opportunities may exist with the State University system.

Aerial photos will be used to determine the success of burn and resource objectives. Photos will be taken before and following implementation of our prescribed fire season (provided sufficient funding is available for monitoring) to assess the spatial extent of the burn. These aerial photos will be geo-referenced in ArcGIS and then habitat types can be classified. Due to the presence of UXO within many of our burn units, the only way to determine burn success away from access points is through aerial photos. Current photos will be compared to photos taken during previous years to gauge success of prescribed fire on the refuge over time by detecting differences in habitat types.

#### **XIV. PUBLIC SAFETY**

Our greatest concern is the safety of all suppression personnel and the public when a wildland fire or prescribed burn is in progress. Only properly trained and qualified personnel will be assigned to fire activities. After the initial attack phase is complete, unqualified individuals at the incident will be relieved from suppression duty, or reassigned to a non-fireline function when adequate initial attack forces arrive.

#### **XV. PUBLIC INFORMATION AND EDUCATION**

The public will be notified of any emergency response on Big Oaks NWR, the incident's status, and of any special restrictions that may affect the general public. It is important to convey the fact that the incident is being handled by trained professionals. It is just as important to be supportive of the public's concerns, accurately report what is known about the incident, and explain the actions that are being undertaken to bring the situation under control.

Within the Incident Command System, an Information Officer position is identified. The Information Officer is responsible for the preparation and release of all information concerning the incident to the news media, incident personnel, and other agencies. Normally a structured overhead team will include this position to handle all public inquiries generated by the incident. If an overhead team is not required, but an Information Officer is needed, consider using refuge office support personnel to handle media and public inquiries.

The same degree of communication is required for any management ignited prescribed fires. It is essential to keep the local populace informed of prescribed fires through the issuance of news releases. Usually this will include the preparation of a news release prior to any prescribed burns.

Public education is a critical component of fire management. It is an important tool to garner support and understanding for Big Oaks NWR's fire management program. An education program that teaches the value of fire as a management tool to achieve resource objectives will

be incorporated into Big Oaks NWR's overall educational program.

"Fire can play an integral role in this outreach through the use of education and demonstration projects. The Region 3 fire program has an outreach coordinator stationed at Trempealeau NWR. Her name and contact number are: Lauri Munroe-Hultman, ph: (608) 539-2311, ext. 17, who may be contacted for additional fire outreach materials. Additionally, the FWS National Fire Office in Boise, ID has a National Outreach Coordinator on staff that can assist in these efforts and provide further educational media. Region 3 also maintains a "Fire Management in the Midwest" website at: <http://www.fws.gov/midwest/Fire/> which is an excellent source of pertinent local fire information.

## **XVI. ARCHEOLOGICAL/CULTURAL/HISTORIC RESOURCES**

Preparation for prescribed fires such as constructing fire lines are subject to Section 106 of the National Historic Preservation Act. The procedures in the Notice dated December 8, 1999, "Historic Preservation Responsibilities," apply to the planning and preparation for conducting prescribed fires.

Efforts to control wildland fires (including prescribed fires that get out of control) are also subject to Section 106 of the National Historic Preservation Act. We will meet our obligations under this act in the following ways:

When the land covered by a wildfire has been inventoried to identify cultural resources, and the cultural resources have been evaluated for significance according to the criteria for the National Register of Historic Places, the Fire Management Officer will direct ground disturbing fire suppression efforts around (will avoid impacting) historic properties. Nevertheless, evidence of a previously undetected cultural resource may be encountered. The project leader shall immediately notify the Regional Historic Preservation Officer (RHPO). The RHPO will take immediate steps to have the cultural resource evaluated and protected, as appropriate, to the extent required by law and policy. This may require arranging for a qualified professional to visit and evaluate the site's importance and recommend a course of action. An evaluation and decision on the disposition of the cultural resource should be made within 48 hours of the discovery unless the project's schedule allows greater flexibility.

When the land covered by a wildfire has *not* been inventoried for cultural resources and wildfire suppression activities do result in ground disturbing activities, we will take the following action. Soon after fire control, the project leader will contact the RHPO to arrange for an archeologist to investigate the disturbed areas to determine if sites were affected.

Refuge operations and maintenance funds (subactivity 1261) will pay the cost of these activities unless the action is an emergency archeological and historic property survey in unstable areas



prone to further degradation (i.e., erosion) following a wildland fire or in association with an emergency fire rehabilitation treatment. Emergency archeological and historic property surveys in unstable areas prone to further degradation (i.e., erosion) following a wildland fire or in association with an emergency fire rehabilitation treatment, and archeological, historic structure, cultural landscape, and traditional cultural property resource stabilization and rehabilitation can be funded with emergency rehabilitation funding (subactivity 9262).

## **XVII. FIRE CRITIQUES AND ANNUAL PLAN REVIEW**

The RM is responsible for conducting a fire review of all wildfires occurring on refuge lands. This review will normally yield information important to improving future suppression planning and implementation. Big Oaks NWR's Fire Management Plan will be modified as needed based on fire review recommendations.

This plan will be reviewed annually. Changes in format or content (including Directory changes) identified from the previous fire season will be incorporated by October 1. Cooperative Agreements will be reviewed prior to the start of the fire season. Other refuge plans associated with fire suppression and presuppression are reviewed annually as well. Changes will be documented and forwarded to the RFMC for review.

A structured overhead team, brought in to manage a large incident, will be debriefed by the RM upon their release from the incident. The Incident Commander will prepare a written narrative of the fire activities and present it to the RM as a required part of the debriefing. The RM will assess the overhead team's performance using the appropriate ICS evaluation form and submit a copy to the RFMC.

## **XVIII. CONSULTATION AND COORDINATION**

The intent of the fire management program at Big Oaks NWR is to protect and enhance natural resources in support of refuge management goals and objectives. Section 7 consultation procedures and smoke management guidelines will be followed. Maintaining a good working relationship with the Indiana Department of Natural Resources and Department of Environmental Management and other Agencies is essential to the overall fire management program. Throughout the planning stages of this document, the Service was in direct contact with the U.S. Fish and Wildlife Ecological Services Office at Bloomington, Indiana, the Indiana Division of Forestry and other state and Federal agencies. Through these contacts, throughout the planning and writing process, the Service was able to identify the concerns of these agencies and, where possible, incorporate their concerns and suggestions into this document.



# APPENDICES

## **APPENDIX A**

### **FEDERAL AND STATE SPECIES OF CONCERN THAT OCCUR OR ARE LIKELY TO OCCUR AT BIG OAKS NATIONAL WILDLIFE REFUGE**

| Status             | Common Name             | Scientific Name                         | Federal Classifications |    |     | IN Classification |   |    | Habitat                                       |
|--------------------|-------------------------|---|-------------------------|----|-----|-------------------|---|----|---|
|                    |                         |   | FE                      | FT | FSC | E                 | T | SC |   |
| MUSSELS            |                         |   |                         |    |     |                   |   |    |   |
| Present-YR         | Salamander mussel       | <i>Simpsonaias ambigua</i>              |                         |    |     |                   |   | X  | medium to large rivers on mud and gravel bars |
| CRUSTACEAN         |                         |   |                         |    |     |                   |   |    |   |
| Present-YR         | Rusty Crayfish          | <i>Orconectes rusticus</i>              |                         |    | N   |                   |   |    | lacustrine, riverine                          |
| INSECTS            |                         |   |                         |    |     |                   |   |    |   |
| Unlikely           | American Burying Beetle | <i>Nicrophorus americanus</i>           | X                       |    |     | X                 |   |    | forest, grassland, mixed woodland             |
| Potential          | Dusted Skipper          | <i>Atrytonopsis hianna</i>              |                         |    |     |                   | X |    | prairies, old fields                          |
| Potential          | Mottled Duskywing       | <i>Erynnis martialis</i>                |                         |    |     | X                 |   |    | open brushy fields                            |
| Potential          | Regal Fritillary        | <i>Speyeria idalia</i>                  |                         |    |     | X                 |   |    | tall grass prairie                            |
| AMPHIBIANS         |                         |   |                         |    |     |                   |   |    |   |
| Present-YR         | Mudpuppy                | <i>Necturus maculosus</i>               |                         |    |     |                   |   | X  | river, streams, ponds                         |
| Present-YR         | N. Crawfish Frog        | <i>Rana areolata circulosa</i>          |                         |    |     | X                 |   |    | crawfish holes                                |
| AMPHIBIANS cont'd. |                         |   |                         |    |     |                   |   |    |   |
| Potential          | Eastern Spadefoot       | <i>Scaphiopus holbrookii holbrookii</i> |                         |    |     |                   |   | X  | forest areas w/sandy soils                    |
| REPTILES           |                         |   |                         |    |     |                   |   |    |   |
| Present-YR         | Kirtland's Snake        | <i>Clonophis kirtlandii</i>             |                         |    |     | X                 |   |    | moist meadow and forest                       |
| REPTILES cont'd.   |                         |   |                         |    |     |                   |   |    |   |
| Suspected          | Rough Green Snake       | <i>Opheodrys aestivus</i>               |                         |    |     |                   |   | X  | riparian habitat                              |

|                      |                            |                                       |  |  |     |   |   |   |  |
|----------------------|----------------------------|---------------------------------------|--|--|-----|---|---|---|--|
| Potential            | N. Copperbelly Water Snake | <i>Nerodia erythrogaster neglecta</i> |  |  | R/D |   |   |   | swamps, marshes  |
| <b>BIRDS</b>         |                            |                                       |  |  |     |   |   |   |  |
| Present-M            | Double-crested Cormorant   | <i>Phalacrocorax auritus</i>          |  |  | N   |   |   |   | lacustrine, riverine, barren lands (islands) , forests (islands) |
| Potential-B          | Least Bittern              | <i>Ixobrychus exilis</i>              |  |  |     | X |   |   | marsh and wet meadows  |
| Present-M            | American Bittern           | <i>Botaurus lentiginosus</i>          |  |  |     | X |   |   | marshes, wet meadows   |
| Potential-B          | Yellow-crowned Night-Heron | <i>Nyctanassa violacea</i>            |  |  |     | X |   |   | moist woods, swamps  |
| <b>BIRDS cont'd.</b> |                            |                                       |  |  |     |   |   |   |  |
| Present-M            | Black-crowned Night-Heron  | <i>Nycticorax nycticorax</i>          |  |  |     | X |   |   | moist woods, swamps  |
| Present-M            | Great Egret                | <i>Ardea alba</i>                     |  |  |     |   |   | X | marshes  |
| Present-B            | Great Blue Heron           | <i>Ardea herodias</i>                 |  |  |     |   |   | X | marshes, streams   |
| Present-M            | Sandhill Crane             | <i>Grus canadensis</i>                |  |  |     |   | X |   | marshes, grasslands  |
| Potential-B          | Blue-winged Teal           | <i>Anas discors</i>                   |  |  | REC |   |   |   | palustrine, grasslands   |
| Present-B            | Mallard                    | <i>Anas platyrhynchos</i>             |  |  | REC |   |   |   | palustrine, grasslands, forest (mature bottomland)               |
| Present-M            | American Black Duck        | <i>Anas rubripes</i>                  |  |  | REC |   |   |   | lacustrine, palustrine (shrub/scrub)                             |
| Present-B            | Wood Duck                  | <i>Aix sponsa</i>                     |  |  | REC |   |   |   | palustrine, riverine, forests                                    |
| Potential-B          | King Rail                  | <i>Rallus elegans</i>                 |  |  |     | X |   |   | swamps and marshes   |
| Present-M            | Virginia Rail              | <i>Rallus limicola</i>                |  |  |     |   |   | X | marshes, wetlands  |
| Potential-M          | Yellow Rail                | <i>Coturnicops noveboracensis</i>     |  |  |     |   |   |   | marshes, wet fields  |
| Present-M            | Black Rail                 | <i>Laterallus jamaicensis</i>         |  |  |     |   |   |   | marshes, wet meadows   |

|              |                         |                                 |   |   |     |   |  |   |                                      |
|--------------|-------------------------|---------------------------------|---|---|-----|---|--|---|--------------------------------------|
| Present-B    | American Woodcock       | <i>Scolopax minor</i>           |   |   | R/D |   |  |   | moist woodland, thickets             |
| Present-M    | Bald Eagle              | <i>Haliaeetus leucocephalus</i> |   | X |     | X |  |   | lacustrine, riverine, forests        |
| Present-M    | Northern Harrier        | <i>Circus cyaneus</i>           |   |   |     | X |  |   | wetlands and open fields             |
| Present-YR   | Sharp-shinned hawk      | <i>Accipiter striatus</i>       |   |   |     |   |  | X | mixed woodlands                      |
| Present-YR   | Red-shouldered hawk     | <i>Buteo lineatus</i>           |   |   | R/D |   |  | X | moist, mixed woodlands               |
| Present-B    | Broad-winged Hawk       | <i>Buteo platypterus</i>        |   |   |     |   |  | X | woodlands                            |
| Present-M    | Osprey                  | <i>Pandion haliaetus</i>        |   |   |     | X |  |   | riverine, lacustrine                 |
| Suspect-M    | Peregrine Falcon        | <i>Falco peregrinus</i>         |   |   |     | X |  |   | palustrine, lacustrine, riverine     |
| Suspected-YR | Barn Owl                | <i>Tyto alba</i>                |   |   |     | X |  |   | grasslands                           |
| Present-M    | Short-eared Owl         | <i>Asio flammeus</i>            |   |   |     | X |  |   | marshes, weedy fields                |
| Present-M    | Marsh Wren              | <i>Cistothorus palustris</i>    |   |   |     | X |  |   | marshes and swamps                   |
| Present-B    | Sedge Wren              | <i>Cistothorus platensis</i>    |   |   | R/D | X |  |   | moist meadows                        |
| Present-B    | Loggerhead Shrike       | <i>Lanius ludovicianus</i>      |   |   | R/D |   |  | X | open or brushy areas                 |
| Present-M    | Golden-winged Warbler   | <i>Vermivora chrysoptera</i>    |   |   |     | X |  |   | shrub/scrub                          |
| Present-B    | Black-and-White Warbler | <i>Mniotilta varia</i>          |   |   |     |   |  | X | mixed mature woodlands               |
| Present-B    | Cerulean Warbler        | <i>Dendroica cerulea</i>        |   |   |     |   |  | X | swamps, bottomlands, mixed woodlands |
| Potential-M  | Kirtland's Warbler      | <i>Dendroica kirtlandii</i>     | X |   |     | X |  |   | open woodlands, shrub, thickets      |
| Present-M    | Canada Warbler          | <i>Wilsonia canadensis</i>      |   |   |     |   |  | X | dense woodlands                      |
| Present-B    | Hooded Warbler          | <i>Wilsonia citrina</i>         |   |   |     |   |  | X | moist mature woodlands               |
| Present-B    | Worm-eating warbler     | <i>Helmitheros vermivorus</i>   |   |   |     |   |  | X | mature forest                        |

|                |                          |                                 |   |  |     |   |  |   |                               |
|----------------|--------------------------|---------------------------------|---|--|-----|---|--|---|-------------------------------|
| Present-B      | Grasshopper Sparrow      | <i>Ammodramus savannarum</i>    |   |  | R/D |   |  |   | grasslands, old fields        |
| Present-B      | Henslow's Sparrow        | <i>Ammodramus henslowii</i>     |   |  |     | X |  |   | moist meadows and fields      |
| Potential-B    | Bachman's Sparrow        | <i>Aimophila aestivalis</i>     |   |  |     | X |  |   | dry open woods                |
| Present-B      | Dickcissel               | <i>Spiza americana</i>          |   |  | R/D |   |  |   | weedy meadows, prairies       |
| Present-M      | Bobolink                 | <i>Dolichonyx oryzivorus</i>    |   |  | R/D |   |  |   | weedy meadows, hayfields      |
| Present-B      | Eastern Meadowlark       | <i>Sturnella magna</i>          |   |  | R/D |   |  |   | fields, meadows               |
| <b>MAMMALS</b> |                          |                                 |   |  |     |   |  |   |                               |
| Present-YR     | Bobcat                   | <i>Lynx rufus</i>               |   |  |     | X |  |   | mixed woodland                |
| Present-YR     | River Otter              | <i>Lutra canadensis</i>         |   |  |     | X |  |   | marshes, rivers, lakes        |
| Potential-M    | Gray Bat                 | <i>Myotis grisescens</i>        | X |  |     | X |  |   | caves                         |
| Present-B      | Indiana Bat              | <i>Myotis sodalis</i>           | X |  |     | X |  |   | caves, forest                 |
| Potential      | Smokey Shrew             | <i>Sorex fumeus</i>             |   |  |     |   |  | X | moist woods                   |
| <b>PLANTS</b>  |                          |                                 |   |  |     |   |  |   |                               |
| Present        | American Ginseng         | <i>Panax quinquefolium</i>      |   |  |     |   |  | X | rich woods                    |
| Present        | American Pinesap         | <i>Monotropa hypopithes</i>     |   |  |     |   |  | X | woods                         |
| Present        | Black Bugbane            | <i>Cimicifuga racemosa</i>      |   |  |     |   |  | X | woods                         |
| Present        | Blunt-lobed Grape-fern   | <i>Botrychium oneidense</i>     |   |  |     |   |  | X | mature flatwoods              |
| Present        | Broom Panic-grass        | <i>Panicum scoparium</i>        |   |  |     | X |  |   | moist soil                    |
| Present        | Barren Strawberry        | <i>Waldsteinia fragarioides</i> |   |  |     |   |  | X | woods, clearings              |
| Present        | Carolina Willow          | <i>Salix caroliniana</i>        |   |  |     |   |  | X | streams, exposed gravel bars  |
| Present        | Clasping St. John's Wort | <i>Hypericum gymnanthum</i>     |   |  |     | X |  |   | eroded areas                  |
| Present        | Climbing Fern            | <i>Lygodium palmatum</i>        |   |  |     | X |  |   | early successional flat woods |



|         |                          |   |  |  |  |   |  |   |  |
|---------|--------------------------|---|--|--|--|---|--|---|--|
| Present | Clustered Foxglove       | <i>Agalinis fasciculata</i>               |  |  |  |   |  | X | moist fields, young flatwoods              |
| Present | Crinkleroot              | <i>Dentaria diphylla</i>                  |  |  |  |   |  | X | moist woods                                |
| Present | Dwarf Ginseng            | <i>Panax trifolius</i>                    |  |  |  |   |  | X | flatwoods, moist upland forest             |
| Present | Elliptical Rushfoil      | <i>Crotonopsis elliptica</i>              |  |  |  | X |  |   | eroded banks, bladed roadbanks             |
| Present | False Hellebore          | <i>Veratrum woodii</i>                    |  |  |  |   |  | X | forested ravines and narrow stream valleys |
| Present | Fewflower Nutrush        | <i>Scleria pauciflora</i>                 |  |  |  |   |  | X | grassy fields                              |
| Present | Goldenseal               | <i>Hydrastis canadensis</i>               |  |  |  |   |  | X | moist ravine forests                       |
| Present | Illinois Woodsorrel      | <i>Oxalis illinoensis</i>                 |  |  |  |   |  | X | floodplain forest                          |
| Present | Lesser Ladies'-tresses   | <i>Spiranthes ovalis</i>                  |  |  |  |   |  | X | forest, floodplain forest                  |
| Present | Little Ladies'-tresses   | <i>Spiranthes tuberosa</i>                |  |  |  |   |  | X | eroded old fields, dry upland forest       |
| Present | Longbeak Arrowhead       | <i>Sagittaria australis</i>               |  |  |  |   |  | X | wetland, flatwoods, stream banks           |
| Present | Louisiana Sedge          | <i>Carex louisianica</i>                  |  |  |  |   |  | X | floodplain forest                          |
| Present | Maryland Meadow-beauty   | <i>Rhexia mariana</i> var. <i>mariana</i> |  |  |  | X |  |   | moist, acidic grasslands                   |
| Present | Narrow-leaved Sunflower  | <i>Helianthus angustifolius</i>           |  |  |  | X |  |   | moist, acid grasslands                     |
| Present | Netted Chain-fern        | <i>Woodwardia areolata</i>                |  |  |  |   |  | X | regrowth flatwoods                         |
| Present | Northern bog Clubmoss    | <i>Lycopodeiella inundata</i>             |  |  |  | X |  |   | shallow ditches                            |
| Present | Pretty Sedge             | <i>Carex woodii</i>                       |  |  |  |   |  | X | moist woodlands                            |
| Present | Purple Fringeless Orchis | <i>Platanthera peramoena</i>              |  |  |  |   |  | X | moist meadows, open swampy woods           |
| Present | Ragged-fringed Orchis    | <i>Platanthera lacera</i>                 |  |  |  |   |  | X | wet, open fields, young flatwoods          |

|           |                         |                                 |   |  |  |   |   |   |                                 |
|-----------|-------------------------|---------------------------------|---|--|--|---|---|---|---------------------------------|
| Present   | Ridged Yellow Flax      | <i>Linum striatum</i>           |   |  |  |   |   | X | flatwoods                       |
| Present   | Round-leaved Boneset    | <i>Eupatorium rotundifolium</i> |   |  |  |   |   | X | grassy fields, open flatwoods   |
| Potential | Running Buffalo Clover  | <i>Trifolium stoloniferum</i>   | X |  |  |   |   |   | open woodlands                  |
| Present   | Running Pine            | <i>Lycopodium clavatum</i>      |   |  |  |   |   | X | regrowth flatwoods              |
| Present   | Silver Bluestem         | <i>Andropogon ternarius</i>     |   |  |  |   |   | X | old fields, grassy barrens      |
| Present   | Single-head Pussytoes   | <i>Antennaria solitaria</i>     |   |  |  |   |   | X | woods, clearings                |
| Present   | Slick Seed Wild-bean    | <i>Strophostyles leiosperma</i> |   |  |  |   | X |   | eroded areas                    |
| Present   | Small Sundrops          | <i>Oenothera perennis</i>       |   |  |  |   | X |   | meadows, fields                 |
| Present   | Smooth White Violet     | <i>Viola blanda</i>             |   |  |  |   |   | X | mature flatwoods                |
| Present   | Sparse-lobed Grape-fern | <i>Botrychium biternatum</i>    |   |  |  |   |   | X | old fields                      |
| Present   | Spotted Wintergreen     | <i>Chimaphila maculata</i>      |   |  |  |   |   | X | upland woods                    |
| Present   | Thicket Sedge           | <i>Carex abscondita</i>         |   |  |  |   |   | X | moist forest, stream valleys    |
| Present   | Thread-like Naiad       | <i>Najas gracillima</i>         |   |  |  | X |   |   | shallow water                   |
| Present   | Tree Clubmoss           | <i>Lycopodium obscurum</i>      |   |  |  |   |   | X | regrowth flatwoods              |
| Present   | Twining Bartonias       | <i>Bartonia paniculata</i>      |   |  |  |   |   | X | open flatwoods                  |
| Present   | Wall-rue Spleenwort     | <i>Asplenium ruta-muraria</i>   |   |  |  |   | X |   | limestone cliffs                |
| Present   | Weakstalk Bulrush       | <i>Scirpus purshianus</i>       |   |  |  | X |   |   | edge of bodies of water         |
| Present   | Wolf Bluegrass          | <i>Poa wolfii</i>               |   |  |  |   |   | X | limestone boulders, moist woods |
| Present   | Yellow Buckeye          | <i>Aesculus octandra</i>        |   |  |  |   |   | X | ravine forest                   |

**Status:**

**Present**-known to occur

**Suspected**-some evidence that it occurs

**Potential**-potentially within the species range

**B**-breeds on site, **M**-found on site during migratory periods, **YR**-found on site year round

**Federal Classifications:**

**Endangered (FE)** - Any species that is in danger of extinction throughout all or a significant portion of its range.

**Threatened (FT)**- Any species that is likely to become endangered within the foreseeable future throughout all or a significant portion of its range. Federally threatened species are designated with a "FT".

**Species of Concern (FSC)**- An informal term referring to those species Region 3 believes might be in need of concentrated conservation actions. These species of concern receive no legal protection and the use of the term does not mean that the species will eventually be proposed for listing as a threatened or endangered species. Federal species of concern are designated with "FSC".

**R/D** - rare/declining

**REC** - recreational/economic value

**N** - nuisance species

**Indiana Animal Classifications:**

**Endangered (E)**- Any animal species whose prospects for survival or recruitment within the state are in immediate jeopardy and are in danger of disappearing from the state. This includes all species classified as endangered by the federal government which occur in Indiana.

**Threatened**- An animal species whose survival in Indiana is not in immediate jeopardy, but to which a threat exists. Continued or increased stress will result in its becoming endangered.

**Special Concern (SC)**- Any animal species about which some problems of limited abundance or distribution in Indiana are known or suspected and should be closely monitored.

**Indiana Plant Classifications:**

**Endangered** - Any plant species whose prospects for survival or recruitment within the state are in immediate jeopardy and are in danger of disappearing from the state. This includes all species classified as endangered by the federal government which occur in Indiana. One to five extant populations in the state.

**Threatened** - Any species that is likely to become endangered within the state in the foreseeable future throughout all or a significant portion of its range. Six to ten extant populations within the state.

**Rare** - Eleven to twenty extant populations within the state.

**Watch List** - Greater than (>) 20 extant populations, but populations are still considered at risk.

## **APPENDIX B**

# **COOPERATIVE AGREEMENTS**



IN REPLY REFER TO:

FWS/301815J073


## United States Department of the Interior

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

April 4, 2005

### Memorandum

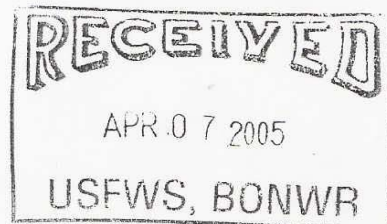
To: Brian Winters, Prescribed Fire Specialist  
Big Oaks N.W.R.

From: Ken Kaseforth, Level III Contracting Officer   
Contracting and Facilities Management (CFM), Region 3

Subject: Cooperative Fire Protection Agreement with Kent V.F.D.

Enclosed is agreement 301815J073, sent in original duplicate form. This documentation has been sent to you since I do not have the fire department's mailing address. Please ensure that Fire Chief Lloyd Lamb signs both originals [on p.3 and Attachment B]. He should keep one of the originals and the other must be returned to me for filing in CFM. Your office should keep a copy of the fully-executed document. Call me at (612) 713-5219 if you have any questions.

Cc: R3 Fire Management  
FMO  
CFM



COOPERATIVE FIRE PROTECTION AGREEMENT No. 301815J073  
BETWEEN THE U.S. DEPARTMENT OF THE INTERIOR FISH  
AND WILDLIFE SERVICE AND THE  
KENT VOLUNTEER FIRE DEPARTMENT

THIS AGREEMENT was made and entered into April 4, 2005 pursuant to the Reciprocal Fire Protection Act of 1955 (42 U.S.C. 1856) as amended by the Wildfire Suppression Assistance Act of 1989 (16 U.S.C. 2106). It is between the United States Department of the Interior, Fish and Wildlife Service, Big Oaks National Wildlife Refuge (hereinafter referred to as the "Refuge") and the Kent Volunteer Fire Protection District (hereinafter referred to as the "Fire Department"). This Agreement outlines the cooperative efforts between the Refuge and the Fire Department for fire protection, and specifically authorizes the expenditure of funds for any fire protection activity resulting from its execution.

THE FIRE DEPARTMENT SHALL:

1. Provide wildland fire prevention and suppression equipment and prescribed fire equipment as available (such as mobile pumpers and grass rigs, shovels and fire rakes, etc.) as well as fire service personnel. The following equipment will be available at commencement of this agreement: Brush Truck-1995 Dodge (200 gallon with foam), Water Tender-1999 Kenworth (2,000 gallon), Fire Engine-2002 Kenworth (1,000 gallon) Water Tender-1 983 GMC (1,500 gallon)
2. Respond to all wildland fires in the Refuge boundaries that are within the Fire Department's designated fire protection area, as requested by Refuge Management.
3. At the discretion of the Fire Chief upon request by Refuge Management, respond to all wildland fires within the Refuge's boundaries but outside of the Fire Department's designated fire protection area. This response will include mutual aid calls.
4. Agree to stay with all wildland fires until out, or until released from duty by the designated Incident Commander for the Refuge, or until called to another fire or other structure fires in the Fire Department's designated protection area.
5. Submit billings for wildland fire actions on Refuge lands within 48 hours of each fire. Billings must reference "Fire Protection Agreement No. 301815J 073" and be submitted to

Big Oaks National Wildlife  
Refuge 1661 W. IPG Niblo  
Madison, IN 47250

**THE REFUGE  
SHALL:**

1. Reimburse the Fire Department at a flat rate of \$200.00 for the first hour of services required under "THE FIRE DEPARTMENT SHALL" section of this Cooperative Agreement, and \$100.00 for each additional half hour thereafter. These flat reimbursement rates shall pertain, whether one or two wildland firefighting vehicles are sent to the Refuge wildland fire site. In addition to these amounts, the Fire Department shall be reimbursed \$10.00 per hour for each Fire Department firefighter working on the wildland fire site, and shall also be reimbursed \$100.00 per hour for a third or each additional wildland firefighting vehicle(s) owned by the Fire Department and needed by the Service's Incident Commander. Reimbursement at these price rates shall include reasonable transit times from and to the Fire Department station. Invoices must include a list of firefighters by name with times and hours each worked, and must also list the number and types of firefighting vehicles owned and used by the Fire Department during the call (including the times and number of hours each vehicle was used during the call).
2. Assist the Fire Department with wildland fire training
3. Assume the role of "Incident Commander"~ on any fire within the boundaries of the Refuge once Refuge personnel are on the scene.
5. Respond with available manpower and equipment, upon the request of the Fire Chief, on wildland fires outside of the Refuge boundaries.

**SPECIAL  
PROVISIONS:**

1. Each party agrees that it will be responsible for its own acts and the results thereof and shall not be responsible for the acts of the other party and the results thereof. Each party therefore agrees, to the extent authorized by applicable law, to assume all risks and liability to itself, its agents or employees, for any injury to persons or property resulting from any operations of its agents or employees under this agreement, and for any loss, cost, damage or expense resulting at any time from any and all causes due to any acts, or negligence, or the failure to exercise proper precautions of or by itself or its own agents to this Agreement. The liability of the Federal Government will be governed by the Federal Tort Claims Act (28 U.S.C. Section 2761 et seq.) while the liability of the Fire Department will be governed by applicable federal and state laws.

2. Repairs needed to keep operational any equipment covered by this agreement will be



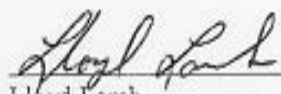
and at the expense of the party owning the equipment.

3. The Refuge's fiscal obligations hereunder are contingent upon the availability of funds as appropriated by Congress, from which payment for the purposes of this agreement can be made.
4. Fish and Wildlife Service personnel will not participate in the suppression of structure fires, but may assist in preventing a structure fire from spreading in wildland and becoming a wildland fire.

**WILDLAND FIRE PROTECTION COOPERATIVE AGREEMENT 301815J 073** is effective on the date specified on page 1 hereof and is subject as applicable to the attached General Provisions for Financial Assistance (Attachment A) and certifications (Attachment B). It is to continue in force until April 4, 2009 (five years from the effective date) unless earlier terminated unilaterally by either party giving at least thirty (30) days' written notice to the other or by mutual written agreement at any time.

IN WITNESS WHEREOF, the following authorized representatives of the parties hereto have memorialized this Agreement by their signatures inscribed below:

**KENT FIRE VOLUNTER FIRE COMPANY**



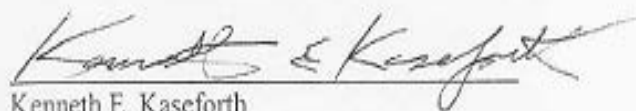
Lloyd Lamb

Kent Volunteer Fire Chief




Date

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



Kenneth E. Kaseforth

Level III Contracting Officer



Date

ATTACHMENT A

## **GENERAL PROVISIONS FOR FINANCIAL ASSISTANCE**

The following Regulations and OMB (Office of Management and Budget) Circulars are hereby incorporated by reference in this agreement

**A. THE FOLLOWING REGULATIONS APPLY TO RECIPIENTS as indicated:**

1.43 CFR Part 12:

- a. Subpart A - Administrative and Audit Requirements and Cost Principles for Assistance Programs. (All Recipients)
- b. Subpart B - Audit Requirements for State and Local Governments.
- c. Subpart C - Uniform Administrative Requirements for Grants and Cooperative Agreements to State and Local Governments.
- d. Subpart D - Government wide Debarment and Suspension (Nonprocurement) and Government wide Requirements for Drug-Free Workplace (Grants). (All recipients)
- e. Subpart E - Buy American Requirements for Assistance Programs. (All recipients)
- f. Subpart F - Uniform Administrative Requirements for Grants and Agreements With Institutions of Higher Education, Hospitals, and Other Non-Profit Organizations.

**B. PROFIT ORGANIZATIONS and INDIVIDUALS**

1. 48 CFR Part 31.2 (Federal Acquisition Regulations) - Cost Principles for Contracts with Commercial Organizations.

The above is implemented by the following as indicated:

**A. NON-PROFIT ORGANIZATIONS including INSTITUTIONS OF HIGHER EDUCATION & HOSPITALS**

1. OMB Circular A-110 - Uniform Administrative Requirements for Grants and Agreements with Institutions of Higher Education, Hospitals and Other Non-Profit Organizations.
2. OMB Circular A-21 - Cost Principles for Educational Institutions.

3. OMB Circular A-I22 - Cost Principles for Non-Profit Organizations.
4. OMB Circular A-133 - Audits of Institutions of Higher Education and Other Non-Profit Organizations.

**A. STATE/LOCAL GOVERNMENT and  
INDIAN TRIBES**

1. OMB Circular A-I02 - Uniform Administrative Requirements for Grants and Agreements with State and Local Governments.
2. OMB Circular A-87 - Cost Principles for State and Local Governments.
3. OMB Circular A-I28 - Audits of State and Local Government

OMB Approval No. 0348-0040

**ASSURANCES - NON-CONSTRUCTION PROGRAMS**

Public reporting burden for this collection of information is estimated to average 15 minutes per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Office of Management and Budget, Paperwork Reduction Project (0348-0040), Washington, DC 20503.

**PLEASE DO NOT RETURN YOUR COMPLETED FORM TO THE OFFICE OF MANAGEMENT AND BUDGET. SEND IT TO THE ADDRESS PROVIDED BY THE SPONSORING AGENCY.**

NOTE: Certain of these assurances may not be applicable to your project or program. If you have questions, please contact the awarding agency. Further, certain Federal awarding agencies may require applicants to certify to additional assurances. If such is the case, you will be notified.

As the duly authorized representative of the applicant, I certify that the applicant:

- |   |   |
|---|---|
| <ol style="list-style-type: none"><li>Has the legal authority to apply for Federal assistance and the institutional, managerial and financial capability (including funds sufficient to pay the non-Federal share of project cost) to ensure proper planning, management and completion of the project described in this application.</li><li>Will give the awarding agency, the Comptroller General of the United States and, if appropriate, the State, through any authorized representative, access to and the right to examine all records, books, papers, or documents related to the award; and will establish a proper accounting system in accordance with generally accepted accounting standards or agency directives.</li><li>Will establish safeguards to prohibit employees from using their positions for a purpose that constitutes or presents the appearance of personal or organizational conflict of interest, or personal gain.</li><li>Will establish safeguards to prohibit employees from using their positions for a purpose that constitutes or presents the appearance of personal or organizational conflict of interest, or personal gain.</li><li>Will comply with the Intergovernmental Personnel Act of 1970 (42 U.S.C. 4728-4763) relating to prescribed standards for merit systems for programs funded under one of the 19 statutes or regulations specified in Appendix A of OPM's Standards for a Merit System of Personnel Administration (5 C.F.R. 900, Subpart F).</li><li>Will comply with all Federal statutes relating to nondiscrimination. These include but are not limited to: (a) Title VI of the Civil Rights Act of 1964 (P.L. 88-352) which prohibits discrimination on the basis of race, color or national origin; (b) Title IX of the Education Amendments of 1972, as amended (20 U.S.C. 1681-1683, and 1685-1686), which prohibits discrimination on the basis of sex; (c) Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. 794), which prohibits discrimination on the</li></ol> | <ol style="list-style-type: none"><li>basis of handicaps; (d) the Age Discrimination Act of 1975, as amended (42 U.S.C. 6101-6107), which prohibits discrimination on the basis of age; (e) the Drug Abuse Office and Treatment Act of 1972 (P.L. 92-255), as amended, relating to nondiscrimination on the basis of drug abuse; (f) the Comprehensive Alcohol Abuse and Alcoholism Prevention, Treatment and Rehabilitation Act of 1970 (P.L. 91-616), as amended, relating to nondiscrimination on the basis of alcohol abuse or alcoholism; (g) 523 and 527 of the Public Health Service Act of 1912 (42 U.S.C. 290 dd-3 and 290 ee-3), as amended, relating to confidentiality of alcohol and drug abuse patient records; (h) Title VII of the Civil Rights Act of 1968 (42 U.S.C. 3601 et seq.), as amended, relating to nondiscrimination in the sale, rental or financing of housing; (i) any other nondiscrimination provisions in the specific statute(s) under which application for Federal assistance is being made; and (j) the requirements of any other nondiscrimination statute(s) which may apply to the application.</li><li>Will comply, or has already complied, with the requirements of Titles II and III of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (P.L. 91-646) which provide for fair and equitable treatment of persons displaced or whose property is acquired as a result of Federal or federally-assisted programs. These requirements apply to all interests in real property acquired for project purposes regardless of Federal participation in purchases.</li><li>Will comply, as applicable, with provisions of the Hatch Act (5 U.S.C. 1501-1508 and 7324-7328) which limit the political activities of employees whose principal employment activities are funded in whole or in part with Federal funds.</li></ol> |
|---|---|

Previous Edition Usable  
Standard Form 424B (Rev 7-97)

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| <p>9. Will comply, as applicable, with the provisions of the Davis-Bacon Act (40 U.S.C. 276a to 276a-7), the Copeland Act (40 U.S.C. 276c and 18 U.S.C. 874), and the Contract Work Hours and Safety Standards Act (40 U.S.C. 327-333), regarding labor standards for federally-assisted construction subagreement.</p> <p>10. Will comply, if applicable, with flood insurance purchase requirements of Section 102(a) of the Flood Disaster Protection Act of 1973 (P.L. 93-234) which requires recipients in a special flood hazard area to participate in the program and to purchase flood insurance if the total cost of insurable construction and acquisition is \$10,000 or more.</p> <p>11. Will comply with environmental standards which may be prescribed pursuant to the following: (a) institution of environmental quality control measures under the National Environmental Policy Act of 1969 (P.L. 91-190) and Executive Order (EO) 11514; (b) notification of violating facilities pursuant to EO 11738; (c) protection of wetlands pursuant to EO 11990; (d) evaluation of flood hazards in flood plains in accordance with EO 11988; (e) assurance of project consistency with the approved State management program developed under the Coastal Zone Management Act of 1972 (16 U.S.C. 1451 et seq.); (f) conformity of Federal actions to State (Clean Air) Implementation Plans under Section 176(c) of the Clean Air Act of 1955, as amended (42 U.S.C. 7401 et seq.); (g) protection of underground sources of drinking water under the Safe Drinking Water Act of 1974, as amended (P.L. 93-523); and, (h) protection of endangered species under the Endangered Species Act of 1973, as amended (P.L. 93-205).</p> |  | <p>12. Will comply with the Wild and Scenic Rivers Act of 1968 (16 U.S.C. 1271 et seq.) Related to protecting components or potential components of the national wild and scenic rivers system.</p> <p>13. Will assist the awarding agency in assuring compliance will Section 106 of the National Historic Preservation Act of 1966, as amended (16 U.S.C. 470), EO 11593 (identification and protection of historic properties), and the Archaeological and Historic Preservation Act of 1974 (16 U.S.C. 469a-1 et seq.).</p> <p>14. Will comply with P.L. 93-348 regarding the protection of human subjects involved in research, development, and related activities supported by this award of assistance.</p> <p>15. Will comply with the Laboratory Animal Welfare Act of 1966 (P.L. 89-544, as amended, 7 U.S.C. 2131 et seq.) Pertaining to the care, handling, and treatment of warm blooded animals held for research, teaching, or other activities supported by this award of assistance.</p> <p>16. Will comply with the Lead-Based Paint Poisoning Prevention Act (42 U.S.C. 4801 et seq.) Which prohibits the use of lead-based paint in construction or rehabilitation of residence structures.</p> <p>17. Will cause to be performed the required financial and compliance audits in accordance with the Single Audit Act Amendments of 1996 and OMB Circular No. A-133, "Audits of States, Local Governments, and Non-Profit Organizations."</p> <p>18. Will comply with all applicable requirements of all other Federal laws, executive orders, regulations, and policies governing this program.</p> |
|---|--|--|

|   |       |                |
|---|-------|----------------|
| SIGNATURE OF AUTHORIZED CERTIFYING OFFICIAL | TITLE |                |
| APPLICANT ORGANIZATION                      |       | DATE SUBMITTED |

## **MASTER COOPERATIVE FIRE PROTECTION AGREEMENT**

**Between**

**NATIONAL PARK SERVICE  
INDIANA DUNES NATIONAL LAKESHORE**

**UNITED STATES FISH AND WILDLIFE SERVICE  
BIG OAKS NATIONAL WILDLIFE REFUGE**

**UNITED STATES DEPARTMENT OF AGRICULTURE  
FOREST SERVICE  
HOOSIER NATIONAL FOREST**

**STATE OF INDIANA  
DEPARTMENT OF NATURAL RESOURCES  
DIVISION OF FORESTRY-FIRE CONTROL**

**By THE FOLLOWING AUTHORITIES:**

Reciprocal Fire Protection Act of May 27, 1955 (69 Stat. 66; 42 U.S.C. 1856)(Federal Agencies)  
Economy Act of June 30, 1932 (31 U.S.C., 1535 as amended)(Federal Agencies)  
Disaster Relief Act of May 22, 1974 (42 U.S.C. 5121 as amended)(Federal Agencies)  
Robert T. Stafford Disaster Relief and Emergency Assistance Act (P.L. 93-288) (Federal Agencies)  
Taylor Grazing Act of June 28, 1934 (48 Stat. 1269; 43 U.S.C. 315)(FS)  
Granger-Thye Act of April 24, 1950 (16 U.S.C., Sec 572)(FS)  
Cooperative Funds and Deposits Act of Dec 12, 1975 (P.L. 94-148, 16 U.S.C. 565)(FS)  
Cooperative Forestry Assistance Act of July 1, 1978, as amended (16 U.S.C. 2101)(FS)  
Cooperative Funds Act of June 30, 1914 (16 U.S.C. 498)(FS)  
NPS Organic Act (16 U.S.C.1)(NPS)  
National Wildlife Refuge Administration Act of 1966 (16 U.S.C. 668dd-668ee, 80 Stat. 927, as amended)  
(FWS)  
National Wildlife Refuge System Improvement Act of 1997 (P.L. 105-57) (FWS)  
Indiana Code 14-23-3,5,67

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## **PURPOSE**

The purpose of this Master Cooperative Fire Protection Agreement (hereinafter called the Agreement) is to document the commitment of the Parties to this Agreement to improve efficiency by facilitating the exchange of personnel, equipment, supplies, services, and funds among the agencies. The Parties to this Agreement are:

The State of Indiana Division of Forestry, hereinafter called Indiana; and

The United States Department of Agriculture Forest Service, Region 9-Hoosier National Forest, hereinafter called the "USFS"; and

The United States Department of the Interior, National Park Service, Indiana Dunes National Lakeshore, hereinafter called the "NPS"; and

The United States Department of the Interior, Fish and Wildlife Service, Big Oaks National Wildlife Refuge, hereinafter called "FWS"; and

The USFS, NPS, and FWS may hereinafter be jointly called the "Federal Agencies."

The Federal Agencies and the States signatory to this Agreement will hereinafter be referred to as the "Parties to this Agreement."

Words and phrases used herein may have different meanings or interpretations for different readers. To establish a "common" understanding, words and phrases as used herein are defined in a Glossary attached as EXHIBIT A.

## **RECITALS**

1. Lands for which the States are responsible for wildland fire protection in Indiana, and the lands for which the respective Federal Agencies are responsible, are intermingled or adjacent in some areas, and wildland fires on these intermingled or adjacent lands may present a threat to the lands of the other;
2. The Parties to this Agreement maintain fire protection organizations;
3. It is to the mutual advantage of the Parties to this Agreement to coordinate efforts for the prevention, detection, and suppression of wildfires, fuels management, and cooperative projects for resource protection in and adjacent to their areas of responsibility, and to limit duplication and improve efficiency and effectiveness;
4. It is the intent of the Parties hereto that State resources be available to assist in fire management activities on all federal lands, and on other lands upon which the Federal Agencies are responsible to protect;
5. It is the intent of the Parties hereto that federal resources be available to assist in fire management activities on all state and private lands the States are responsible to protect;

6. The USFS, BLM, BIA, NPS, and FWS have entered into a national Interagency Agreement for Fire Management to cooperate in all aspects of fire management;

In consideration of the mutual commitments and conditions herein made, it is agreed as follows:

## INTERAGENCY COOPERATION

7. **National Interagency Incident Management System:** The Parties to this Agreement will operate under the concepts defined in the National Interagency Incident Management System (NIIMS) including: Incident Command System (ICS), qualifications system, training system, the management of publications, and participate in the review, exchange, and transfer of technology as appropriate for providing qualified resources, and for the management of incidents covered by this Agreement.
8. **Annual Operating Plans:** Annual operating plans may be developed at the State level and will tier to this Agreement (see Exhibit B, Operating Plan Outline Guide). The following annual operating plans are listed in descending order of precedence:
  - A. Statewide Operating Plans

Statewide Operating Plans will address issues affecting statewide cooperation. The Statewide Operating Plans will be approved by the affected State and Federal PNWCG members.

The Statewide Mobilization Guides will be identified as, and considered part of the Statewide Operating Plans.
  - B. Project Plans

Project plans are plans developed for specific projects. Such projects will be documented in local agreements, or other appropriate written documents. Documentation will include the objectives, role of each agency, and each agency's share of cost (See Exhibit D for a Supplemental Project Plan).
9. **Interagency Dispatch Centers:** The Parties to this Agreement agree to maintain, support, and participate in local Interagency Dispatch Center, as appropriate.

Staffing, funding, and level of participation will be agreed to and documented in annual operating plans and/or appropriate Mobilization Guides.
10. **Interagency Resources:** Interagency funding, staffing, and utilization of resources and facilities will be pursued whenever an interagency approach is appropriate and cost effective. Shared staffing and funding will be commensurate with each agency's use of resources and will be agreed to and documented in local operating plans.

To the extent practical, additional preparedness resource requests will be coordinated. The coordination process will be identified in the annual operating plan.
11. **Standards:** It is the goal of the Parties to this Agreement to achieve common standards within the Parties' best interest. Until common standards are achieved, each Party to this Agreement

recognizes that other agency standards are reasonable, prudent, and acceptable. Local representatives will manage situations where standards vary. This clause is not intended to affect the jurisdictional agency's land management considerations (see Clause 31, Land Management Considerations).

## PREPAREDNESS

12. **Definition of Responsibilities:** The Parties to this Agreement shall be distinguished as follows:

Jurisdictional Agency - The agency that has overall land and resource management and/or protection responsibility as provided by federal or state law. Under no circumstances will a jurisdictional agency abdicate legal requirements as provided by federal or state law.

Protecting Agency - The agency providing fire management services to a given area pursuant to this Agreement.

Supporting Agency - An agency providing assistance.

13. **Protection Planning:** Annually, before February 15, local Unit Administrators will determine efficiencies to be gained from reciprocal assistance and acquisition of protection services. Annual operating plans will document decisions. Plans should be reviewed and agreement reached concerning such items as placement of crews, engines, air tankers, helicopters, fixed and aerial detection, regulated use, closures and other joint fire suppression efforts.
14. **Protection Areas and Boundaries:** Protection areas, as defined by boundaries, will be mapped and or described, and made a part of annual operating plans.
15. **Reciprocal Fire Protection Assistance:** Reciprocal fire suppression assistance that is approximately equal between agencies will be determined and mapped where necessary for field use. Reciprocal assistance will be rendered when the Parties to this Agreement are in a position to furnish resources or services.
16. **Acquisition of Fire Management Services:** One agency may provide fire management services on lands under the jurisdiction of another. Factors to consider in establishing the fee or rate of exchange will be based upon equivalent comparable costs, acreage involved, complexity, workload, staffing, organization, performance, and/or available resources with consideration for values at risk, and other factors as may be appropriate and mutually agreed to by the affected Parties to this Agreement. If an imbalance exists, the protecting agency will bill the jurisdictional agency. The terms and conditions of such arrangements must be included in annual operating plans.

Opportunities for acquisition of services will be evaluated and mapped when necessary. Considerations may include:

A. Reimbursable

Paid assistance in the form of personnel, equipment and services.

B. Offset

Exchange of fire management services in specific locations that is anticipated to be approximately equal value between agencies.

C. Fee Basis

One agency provides fire management services on the lands under the jurisdiction of another and payment is provided for the service.

17. **Joint Projects and Project Plans:** The Parties to this Agreement may jointly conduct cooperative projects, within their authority and as authorized by law, to maintain or improve their fire management services and activities. These projects may involve such activities as prescribed fire/fuels management, presuppression, fire analysis/planning, rehabilitation, training, prevention, public affairs, and other beneficial efforts. Such projects will be documented in local operating plans, or other appropriate written documents. Documentation will include the objectives, role of each agency, and each agency's share of costs.

Project plans may be executed by Unit Administrators of agencies party to this Agreement. Bill according to Clause 45C.

18. **Fire Prevention:** The Parties to this Agreement agree to cooperate in the development and implementation of fire prevention programs. Unit Administrators will assure that fire prevention goals and activities are planned at local levels and are addressed in annual operating plans. Specific fire prevention plans should be developed by local interagency fire management personnel. The Parties to this Agreement may pool resources and share costs. Unit Administrators are encouraged to participate in local fire prevention cooperatives.
19. **Public Use Restrictions:** Guidelines for implementing restrictions and closures shall be established by a separate Memorandum of Understanding and in the Northwest Annual Operating Plan.
20. **Burning Permits:** Burning permit procedures, where applicable, will be included in local annual operating plans. Federal employees or their agents, as authorized by law, may be granted authority by the States to operate as fire wardens when it is determined to be in their mutual interest.
21. **Prescribed Fire and Fuel Management:** The Parties to this Agreement agree to cooperate in the development and implementation of prescribed fire and fuels management programs, whose primary interest is to reduce fire hazard.

Any Party to this Agreement may provide assistance to another Party as requested and agreed to for the purposes of performing prescribed fire or other fuels management work. Conditions of the assistance and details related to reimbursement will be agreed to and documented, through the procurement or project plan process (see Exhibit D, Supplemental Project Plan).

22. **Smoke Management:** Within their authorities, the Parties to this Agreement agree to cooperate in smoke management programs.

## OPERATIONS

23. **Closest Forces Concept:** The guiding principle for dispatch of initial attack suppression resources

is to use the closest available resource regardless of which agency they belong to, and regardless of which agency has protection responsibility.

24. **Fire Notifications:** Each agency will promptly notify the appropriate protecting agency of fires burning on or threatening lands for which that agency has protection responsibility. Likewise, protecting agencies will promptly inform jurisdictional agencies whenever they take action on fires for which the protecting agency is responsible. Fire reports will be sent to jurisdictional agencies within 30 days after a fire is declared out.
25. **Boundary Line Fires:** A boundary line fire, as defined in Exhibit A, will be the initial attack responsibility of the protecting agencies on either side of the boundary. Neither agency will assume the other agency is aware of the fire or that the other agency will take action. Each agency will make every reasonable effort to communicate with the other concerning the fire. The affected agency individual in charge who arrives on the fire first will act as Incident Commander. When affected agencies have arrived, the agencies will mutually agree to the designation of an Incident Command organization.
26. **Independent Action:** Except as otherwise limited in annual operating plans, nothing herein shall prohibit any agency, on its own initiative, from going upon lands known to be protected by another Party to this Agreement to engage in suppression of wildfires, when such fires are a threat to lands that are that agency's protection responsibility. These actions will be commensurate with the jurisdictional agencies land management considerations. In such instances, the party taking action will promptly notify the protecting agency.
27. **Escaped Prescribed Fires and Wildland Fire Managed for Resource Benefits:** Wildfire resulting from prescribed fire and wildland fire managed for resource benefits that were ignited by, managed at the direction of, under the supervision of, or on lands under the jurisdiction of one of the Parties to this Agreement shall be the responsibility of the Party providing protection. All suppression costs shall be billed to that responsible Party. The Parties to this Agreement will not hold each other responsible under this clause for escaped prescribed fires and wildland fire managed for resource benefits originating on private land, or on state or federal lands not protected by one of the Parties to this Agreement.

If the Parties to this Agreement conduct a cooperative prescribed fire, the responsibility for suppression costs, should it escape, shall be agreed upon and documented in the project plan.

28. **Reciprocal Suppression Operations:** As deemed appropriate, the Parties to this Agreement may establish reciprocal initial attack zones for lands of intermingled or adjoining protection responsibility. Such zones will be mapped and the maps made a part of annual operating plans.

Initial attack on all fires occurring on lands of intermingled or adjoining protection responsibility will be in accordance with the planned dispatch procedures. The plan shall provide for regular contact between field units to determine availability of reciprocal fire suppression forces.

If a fire is controlled by the planned initial attack forces within the first 24-hour period, and no additional resources are required, there shall be no claim for reimbursement.

If a fire is not controlled by the initial attack resources within the first 24-hour period, or if reinforcements or services are requested by the protecting agency, the protecting agency will reimburse the supporting agency for all reimbursable costs not identified as initial attack.

If it is determined that a fire will not be controlled in the first 24-hour period, the protecting agency

must take over the fire or request that the initial attack party continue suppression action beyond the 24-hour period.

29. **Land Management Considerations:** All fire suppression action taken by the protecting agency will be consistent with the jurisdictional agency's land management considerations and the terms of this Agreement, and will be documented in annual operating plans.
30. **Delegation of Authority:** Annual operating plans will document procedures and criteria for Unit Administrators to specify direction and authority to Incident Commanders for large incidents.
31. **Resource Advisor:** Unless otherwise agreed, the jurisdictional agency may provide a Resource Advisor to advise the protecting agency of any conditions which may influence suppression action. The Incident Commander will incorporate conditions in the incident planning process, subject to the Delegation of Authority.
32. **Preservation of Evidence:** As initial action is taken on a fire, the initial attack forces will preserve information and evidence pertaining to the origin and cause of the fire. Protecting and jurisdictional agencies shall render mutual assistance in the gathering of evidence to the fullest extent practicable. Affected agencies will meet to determine an investigation process.

#### USE AND REIMBURSEMENT OF INTERAGENCY FIRE RESOURCES

33. **Appropriated Fund Limitation:** Nothing herein shall be considered as obligating the Parties to this Agreement to expend funds, or as involving the United States or the State of Indiana in any contract or other obligation for the future payment of money in excess of funding approved and made available for payment under this Agreement and modifications thereto.
34. **Duration of Assignments:** Consideration must be given to the health and safety of personnel when assigned to fires. The Parties to this Agreement agree that Incident Commanders will release suppression resources to their primary responsibilities as soon as priorities allow. Incident Commanders shall adhere to rest and rotation policies of respective responding agencies.
35. **Supplemental Fire Suppression Agreement:** Except as otherwise provided by Clauses 28 (Independent Action), 30 (Reciprocal Suppression Operations), and 45 (Billing Procedures), a supplemental fire agreement will be prepared by the responsible Unit Administrators (as defined in EXHIBIT A, Glossary) or their authorized representatives when the incident involves lands of more than one protecting agency (see Clause 27, Boundary Line Fires, and EXHIBIT C, Supplemental Fire Suppression Agreement).

A Supplemental Fire Suppression Agreement, in order to document cost sharing, may be used for temporary support functions or facilities established during periods of high fire danger or activity.

36. **Procurement:** At the time of the incident, the affected agencies will determine which agency's procurement procedures will be utilized.
37. **Loaned Equipment and Supplies:** Equipment and supplies loaned to another agency shall become the responsibility of that agency, and shall be returned in the same condition as when received, reasonable wear and tear excepted. The receiving agency will repair or reimburse for damages in excess of reasonable wear and tear and will replace or reimburse for items lost, destroyed, or

expended.

38. **Licensing:** Drivers and equipment operators will hold appropriate operating licenses to meet state and federal laws. Employees of the Parties to this Agreement may operate each other's vehicles provided the operator meets the current operating guidelines and training requirements of their own agency.
39. **Training:** The Parties to this Agreement will cooperate to assure that training needs are provided that will produce safe and effective fire management and aviation programs. The intent is to champion high quality training, to minimize training costs by sharing resources, and to standardize training.
40. **Communication Systems:** The Parties to this Agreement may mutually agree to allow one another the use of communications systems such as radio frequencies, computer system access, data transmission lines, and communication sites when there is a mutual benefit to the parties. Such agreement shall be approved only by authorized personnel.
41. **Fire Weather Systems:** The Parties to this Agreement will cooperate in the gathering, processing, and use of fire weather data, including the purchase of compatible sensing systems and the joint use of computer software. The Parties to this Agreement will jointly evaluate and agree to any deletions or additions to the system.
42. **Aviation Operations:** The Parties to this Agreement agree to cooperate in use of aviation resources to foster effective and efficient use of aircraft and personnel. (Refer to Standards, Clause 13.)
43. **Billing Procedures:** (Refer to Reimbursable Costs, Appendix A)

A. Suppression Billings

1. Federal Billings: Federal Agencies will not bill each other for fire suppression support. Federal Agencies will submit bills for their reimbursable costs to the State whenever Indiana is the protecting agency and a billing is appropriate.
2. State Billings: When Indiana is the supporting agency and the fire is within the State of Indiana, the State will bill the protecting agency for reimbursable costs when a billing is appropriate. Anytime the State respond to a Federal Agency fire outside of Indiana, the State will bill all applicable costs to the USFS. Annual operating plans will include billing location information.
3. Billing Estimates and Time Frames: Each Party will notify the respective administrative headquarters of any reimbursable claims which they intend to make and will strive to provide an estimate of the amount involved within 60 days in each reimbursable action. The final itemized claim should be submitted to the Party owed within 120 days of the suppression action.

When mutually agreed, local fire suppression payments may be consolidated into a single statement at calendar year end, and the Party with the excess expenditures will be reimbursed by the other Party.

4. Billing Content: Bills will contain, at a minimum, fire name(s), location(s), jurisdictional unit, and appropriate incident number; and will be supported by documentation, including



applicable cost share agreements. (See Exhibit B, Operating Plan Outline Guide, for suggested additional details.) Billings for fire suppression assistance will not include indirect costs. Federal Agencies will not bill each other for indirect costs for preparedness activities.

5. Payment Due: Whenever this agreement provides for billing, the party receiving the bill has an obligation to pay in accordance with the terms of this agreement. All bills will be paid in accordance with the paying agency's prompt payment procedures.
  6. Contested Billings: Written notice that a bill is contested will be mailed to the billing agency within 60 days of issuance of the final bill and will fully explain the contested items. Contested items will be resolved not later than 60 days following receipt of the written notice. The uncontested portion of the bill will be paid and a new bill will be issued for the contested amount.
- B. Fee Basis Acquisition of Services:

Annual Statewide or local operating plans and procurement documents will establish billing procedures for Fee Basis Protection Services.

- C. Non-Suppression (e.g., Fuels Treatment) Billings:

The Parties to this Agreement may bill for activities not related to fire suppression within their authorities. Billing arrangements for such activities will be documented on procurement documents or project plans (see Exhibit D) and indirect charges will be applied. Provisions described above also apply to these billings. Billings will outline services performed and include a copy of, or reference, the applicable operating plan.

44. **Third Party Cost Recovery**: Agency authority to recover suppression costs and damages from parties causing a fire varies depending on contracts, agreements, permits or statutes. The Authorized Representatives of affected agencies will mutually agree as soon as possible after a fire on the strategy that will be used to recover suppression costs and damages from the party(ies) liable for such costs and damages. Such strategy may alter interagency billing procedures, timing and content as otherwise provided in this Agreement. Any agency may independently pursue civil actions against third parties to recover suppression costs and damages.

## GENERAL PROVISIONS

45. **Personnel Policy**: Employees of the Parties to this Agreement shall be subject to the personnel rules, laws and regulations of the employing agency.
46. **Mutual Sharing of Information**: In accordance with applicable state and federal rules and regulations, Parties to this Agreement may furnish to each other, or otherwise make available upon request, such maps, documents, GIS data, instructions, records, and reports including, but not limited to, fire reports, employment records, and investigation reports as either Party considers necessary in connection with the Agreement.
47. **Initial Attack Cost Recovery**: In those cases where costs have been recovered from a third party, reimbursement of initial attack, as well as suppression costs to the extent included in the recovery, will be made to the Party taking reciprocal action.

48. **Accident Investigations:** When an accident occurs involving the equipment or personnel of a supporting agency, the protecting agency shall immediately notify the jurisdictional and supporting agencies. As soon as practical, the protecting agency shall initiate an investigation of the accident. The investigation shall be conducted by a team made up of representatives from affected agencies, as appropriate.
49. **Purchaser, Contractor, Operator, Permittee, Etc., Fires:** The protecting agency will notify the jurisdictional agency of any fire suspected to have been caused by a purchaser, contractor, operator or permittee, etc., of the jurisdictional agency as soon as it becomes aware of the situation. The protecting agency will be responsible for management of the fire under the provisions of this agreement. Agencies will meet to determine a cost recovery process as outlined in Clause 46.
50. **Non-Fire Emergencies:** This Agreement provides for cooperation between the Parties to this Agreement in accordance with law for non-fire emergencies.
51. **Waiver:** It is mutually agreed that the Parties to this Agreement shall each be responsible for their own losses arising out of the performance of this Agreement and each party hereby waives any claim against any other party for any loss, damage, personal injury, or death of the Party, or its employees or agents, occurring as a consequence of the performance of this Agreement; provided, this provision shall not relieve any Party from responsibility for claims of third parties for losses for which the Party is otherwise legally liable.
52. **Amendments:** Amendments within the scope of this Agreement shall be made by mutual consent of the Parties, by the issuance of a written amendment, signed and dated by all Parties, prior to any changes being performed. No Party is obligated to fund any changes not properly approved in advance.
53. **Annual Review:** If deemed necessary, prior to February 15, representatives of the State and Federal Agencies will meet and review matters of mutual concern. Operating plans, at all levels, will be reviewed annually. If necessary, operating plans will be revised.
54. **Duration of Agreement:** The term of this Agreement shall commence on the date the last Party signs below and shall remain in effect for five (5) years from that date. A review of this Agreement will be conducted every five years for appropriateness and modified or renewed for a period of not more than five (5) years from the date the last Party signs the modification or renewal.

Any Party shall have the right to terminate their participation under this Agreement by providing one-year advance written notice to the other Parties.

55. **Previous Agreements Canceled:** This Agreement supersedes the following fire protection agreements:

Cooperative Agreement between State of Indiana, Department of Natural Resources, and Forest Service, U.S. Department of Agriculture, 1986.

Existing agreements subsidiary to those listed above remain in effect to the extent that they do not conflict with the provisions of this Agreement, but only until such time that all activities and conditions covered by those agreements can be incorporated into annual operating plans provided for under this Agreement, and not later than May 1, 1999.

## SIGNATURES

Signature block

**MASTER COOPERATIVE FIRE PROTECTION AGREEMENT  
EXHIBIT A  
GLOSSARY OF TERMS**

**Agency Representative:** An individual assigned to an incident with full authority to make decisions on all matters affecting that agency's participation at the incident.

**Agency Administrator:** Agency officials who are signatories to this Agreement, as follows: Forest Service, Forest Supervisor; National Park Service, Superintendent; Fish and Wildlife Service, Refuge Manager; State of Indiana, Indiana State Forester.

**Boundary Line Fire:** Fire occurrences on lands of intermingled and/or adjoining protection responsibilities.

**Closest Forces Concept:** See Section 25 of this Agreement.

**Escaped Fire:** A fire which has exceeded, or is anticipated to exceed, preplanned initial action capabilities or the fire management direction.

**Fee Basis Acquisition of Services:** For a given fee, one agency can become the protecting agency for the other. The fee (or cost) is the price for the work agreed to be performed on each acre of land.

**Fire Management Activities and/or Services:** Any or all activities that relate to managing fire or fuels on lands under the jurisdiction of any Party to this Agreement. Activities include, but are not limited to: suppression, prescribed fire/fuels management, fire analysis/planning, rehabilitation, training, prevention, public affairs, and other beneficial efforts.

**Geographic Area Coordination Center (GACC):** An organization which serves as the focal point within a large geographic area to provide the logistical support and intelligence needs, relative to ongoing and anticipated wildland fire and other emergency support activities.

**Indirect Cost:** A fixed percentage rate as determined by the Indirect Cost Negotiation Agreement as in OMB Circular A-87. The rate will be specified in the Statewide Operating Plan.

**Initial Attack Zone:** An identified area in which predetermined resources would normally be the initial resource to respond to an incident.

**Interagency:** Involvement of two or more agencies party to this Agreement.

**Jurisdictional Agency:** The agency which has overall land and resource management and/or protection responsibility as provided by federal or state law. Under no circumstances will a jurisdictional agency abdicate legal authorities.

**Offset:** Exchange of fire management services in specific locations that is anticipated to be approximately equal value between agencies.

**Operating Plan - Statewide:** A plan which will include all statewide considerations. This will be developed at the state level and approved by affected state and federal member agencies.

**Operating Plan - Local:** A plan generated at a local level and authorized by Unit Administrators for

implementing the Indiana Wildland Fire Agreement in their respective areas of responsibilities.

**Parties to this Agreement:** United States Department of Interior: National Park Service, Indiana Dunes N.L.; U.S. Fish and Wildlife Service, Big Oaks NWR; United States Department of Agriculture: Forest Service, Hoosier N.F.; State of Indiana DNR.

**Prescribed Fire:** The planned use of fire to accomplish specific land management objectives.

**Preparedness:** Activities in advance of fire occurrence to ensure effective suppression action. Includes training and placement of personnel, planning, procuring and maintaining equipment, development of fire defense improvements, and maintaining cooperative arrangements with other agencies.

**Prevention:** Activities directed at reducing the number of person-caused fires, including public education, law enforcement, dissemination of information, and the reduction of hazards.

**Procurement Documents:** Agency specific financial obligation documents.

**Protecting Agency:** The agency providing fire management services to a given area pursuant to this Agreement.

**Protection:** See Fire Management Activities and/or Services.

**Protection Area:** That area which, by law or identified or authorized pursuant to the terms of this Agreement, is provided wildland fire protection by a state or federal agency. This may include land protected under exchange or payment or protection.

**Protection Boundaries:** Mutually agreed upon boundaries delineated on maps, or otherwise described, identifying areas of direct fire protection responsibility.

**Protection Area Maps:** Official maps which identify areas of direct fire protection responsibility for each agency.

**Reciprocal Fire Suppression:** Reciprocal fire suppression is the act of helping the protecting agency, at no cost for the first 24 hours or by agreement, suppress wildfires. Reciprocity is attained by agreeing among one another the kind, location and numbers of firefighting resources which will automatically initial attack a wildfire, regardless of the protecting agency. The kind, locations, and numbers of resources which constitute reciprocity is defined in or through local operating plans. Reciprocity may be thought of as the implementing mechanism of the closest forces concept.

**Reimbursable Costs:** All costs associated with operations and support ordered on a resource order or project plan by or for an incident or project within the provisions of this Agreement. Such costs may include, but are not limited to, the following:

- Agency costs for transportation, salary, benefits, overtime, and per diem of individuals assigned to the incident or project.
- Additional support dispatching, warehousing or transportation services requested through a resource order.
- Cost of equipment in support of the incident, contract equipment costs and operating costs for agency equipment.

- Operating supplies for equipment assigned to the incident such as fuel, oil, and equipment repairs.
- Aircraft, airport fees, and retardant costs.
- Agency-owned equipment and supplies lost, damaged, or expended by the supporting agency.
- Cost of reasonable and prudent supplies expended in support of the incident.
- Charges from the States for state-controlled resources such as inmate crews, National Guard resources, and county and local resources.
- Indirect charges will be applied on joint state and federal non-suppression projects (see 45C).

**Supplemental Fire Suppression Agreement:** A document prepared to distribute costs on a multi-jurisdictional incident (see Exhibit C).

**Supporting Agency:** An agency providing assistance.

**Suppression:** All the work of confining and extinguishing a fire beginning with its discovery through the conclusion of the incident.

**Unit Administrator:** The individual assigned administrative responsibilities for an established organizational unit, such as Forest Supervisor for the Forest Service, Park Superintendent for the National Park Service, and Refuge Manager (Project Leader) for Fish and Wildlife Service, Fire Supervisor for State of Indiana Department of Natural Resources.

**Wildfire:** Any fire occurring on wildland that is not meeting management objectives and thus requires a suppression response.

**MASTER COOPERATIVE FIRE PROTECTION AGREEMENT  
EXHIBIT B**

**OPERATING PLAN OUTLINE GUIDE**

**PREAMBLE**

This operating plan is prepared pursuant to the Master Cooperative Fire Protection Agreement signed and dated October 14, 1998.

This operating plan supersedes:  
(List applicable local agreements and Operating Plans.)

**INTERAGENCY COOPERATION**

**Interagency Dispatch Center:** Specify staffing, funding and level of participation agreed to.

**Interagency Resources:** Identify funding and staffing of joint resources commensurate with each agency's use.

**PREPAREDNESS**

**Protection Planning:** Determine and document efficiencies from acquisition of protection services and reciprocal assistance. Include preparedness plan.

**Protection Areas and Boundaries:** Identify areas (map and/or describe).

**Reciprocal Fire Assistance:** Document reciprocal initial attack zones. Identify placement of crews, engines, air tankers, helicopters, fixed and aerial detection, regulated use, closures, and other joint fire control efforts.

**Acquisition of Services:** Identify areas for reimbursable, offset or fee basis services. Method used to establish fee or rate of exchange. Terms and conditions. Work to be done by protecting agency and their responsibilities.

**Joint Projects and Project Plans:** Document joint cooperative projects including objectives, role of each agency, and financial plan.

**Fire Prevention Policies:** Identify goals, activities, resources and cost sharing.

**Public Use Restrictions:** Implementation procedures (see Northwest Operating Plan for guidelines).

**Burning Permit Procedures:**

**Prescribed Fire and Fuels Management:** Include notification procedures.

**Smoke Management:**

## **OPERATIONS**

**Fire Notifications:** Specify notification procedures.

**Boundary Line Fires:** Specify notification procedures.

**Independent Action on Lands Protected by Another Agency:** Discuss any special land management considerations that affect independent action initial attack. Describe areas, if any, where there are exceptions to this clause and state reasons.

**Land Management Considerations:** Identify areas where there are special suppression considerations and describe.

**Delegation of Authority:** Describe procedures (delegation of authority, etc.) that local Unit Administrators will use to inform ICs.

**Resource Advisors:**

## **USE AND REIMBURSEMENT OF INTERAGENCY FIRE RESOURCES**

**Training:** Identify training needs, schedules, billing arrangements, agreed to sharing of resources. Refer to Clause 19 (Joint Projects and Project Plans) regarding needed project plans.

**Communication Systems:** Identify specific radio frequencies, computer system access, data transmission lines, communication sites, and communications equipment shared between agencies.

**Fire Weather Systems:** Specify maintenance, use and management, if any.

**Aviation Operations:** Identify and document any local aviation agreements.

### **Billing Procedures:**

**Fire Suppression Billings:** List billing forest, if different than identified in the Northwest Mobilization Guide. Provide as a minimum on each bill:

The name and dates of the incident covered by the billing, total costs by cost centers. Use incident generated cost information (such as ICARS) or standard generated cost reports generated by the agency to support the billing whenever possible.

Detailed costs by individual items will only be required when necessary to support a fire trespass billing or other billings to third parties.

If available, also include a list of resource unit numbers or agency equivalent covered by the billing.

**Fee Basis Protection Billings:** Identify billing procedures for fee basis.

Specify indirect cost rate.

**Third Party Cost Recovery:** Procedures for determining a cost recovery process will be in the Statewide Operating Plan. Investigation process is determined locally.



**SIGNATURES**

\_\_\_\_\_  
Agency Administrator

\_\_\_\_\_  
Agency

Date: \_\_\_\_\_

\_\_\_\_\_  
Agency Administrator

\_\_\_\_\_  
Agency

Date: \_\_\_\_\_

**SUPPLEMENTAL FIRE SUPPRESSION AGREEMENT  
EXHIBIT C**

Page 1

Page 2

Page 3

page 4

**Supplemental Project Plan  
EXHIBIT D**

**SUPPLEMENTAL NUMBER \_\_\_\_\_  
TO MASTER COOPERATIVE FIRE PROTECTION AGREEMENT**

**PROJECT AND FINANCIAL PLAN**

**I. INTRODUCTION**

Brief description, where located, status of environment analysis, status compliance if applicable, design/specifications status.

**II. SCOPE AND DURATION**

The description of this project is to \_\_\_\_\_. It is anticipated that this project will begin \_\_\_\_\_ and will end \_\_\_\_\_.

**III. PRINCIPAL CONTACTS**

Principle contacts for each agency for the administration of the project are:

Name  
Address  
Telephone  
FAX

**IV. DETAILED PROJECT DESCRIPTION**

- A. Specific duties and tasks to be performed. Identify desired end results.
- B. Identify tools and equipment needed and who will supply them.
- C. Identify size of crew and who will be providing transportation
- D. Other

**V. SUPERVISION AND TECHNICAL OVERSIGHT**

**VI. REIMBURSEMENT**

Describe reimbursement and billing procedures.

**VII. FINANCIAL PLAN**

List which agency is reimbursing the other and detail items to be reimbursed. Include:

Salaries  
Travel  
Supplies  
Equipment Use  
Indirect Cost

Project Total

Management code to be charged \_\_\_\_\_. Reimbursement shall be made only for actual expenses incurred. Itemized documentation in support of all expenses is required.

### **VIII. SIGNATURES**

\_\_\_\_\_  
Agency Administrator

\_\_\_\_\_  
Agency

\_\_\_\_\_  
Date

\_\_\_\_\_  
Agency Administrator

\_\_\_\_\_  
Agency

\_\_\_\_\_  
Date



## **APPENDIX C**

# **NORMAL UNIT STRENGTH EQUIPMENT & STATIONED OWNED EQUIPMENT INVENTORY & EQUIPMENT NEEDS LIST**

| ITEM  | NUS  |
|---|--|
| Shelters, Hard Hats, Head Lamps, Goggles, Packs, Line Gear, First Aid Kits, Water Bottles | 1 per qualified FFT2 individual plus 20%.  |
| Tents   | 1 per qualified FFT2 individual.   |
| Nomex Pants, Nomex Shirts, Gloves   | 1 per qualified FFT2 individual plus 20% of common sizes.  |
| Shovels, Pulaskis, McLeods, Flaps, Fire Rakes   | 2 per qualified FFT2 individual plus 10% for each type of tool. An assortment of handtools, with a minimum of 3, will be maintained for each piece of equipment (ie. Bombadier, Autocar, Fire Trucks). |
| Flight Helmets  | 2 per station.   |
| Back Pack Pumps   | 1 per 2 qualified FFT2 individual.   |
| Chain Saws  | 2 per station  |
| Portable Pumps  | 2 Floto Pumps per station.   |
| Foam  | 15 gallons per engine.   |
| Hose (per engine & portable pump)   | 1 ½ “ - 900 feet<br>1” - 900 feet  |
| Nozzles (1” & 1 ½ “ total)  | 2 - portable pump<br>4 - engine<br>Plus 20% for total number of nozzles on engines, water and foam combined.   |
| Wyes, Tees, Wrenches, Relief Valves, Hose Clamps, etc.                                    | 2 - portable pump<br>3 - engine<br>Plus 10% for each item.   |
| Adapters and Reduces  | 2 - portable pump<br>3- engine<br>Plus 10% for each item.  |

\* Equipment used to dig into the soil can not be use on the refuge due to the potential presence of UXO within the Refuge.

All Refuge staff members with firefighting training will be issued appropriate personal protective equipment (PPE)

### STATIONED FIRE EQUIPMENT

| Item           | Description                         | Quantity |
|----------------|-------------------------------------|----------|
| Engine         | Type 6 Engine-2003 F-550            | 1        |
| Engine         | Type 6 Engine-2006 F-550            | 1        |
| Vehicle        | 2001 F-250 4 X 4 pick-up truck      | 1        |
| Vehicle        | 2003 F-250 4 X 4 pick-up truck      | 1        |
| Vehicle        | 2003 F-350 4 X 4 crew cab           | 1        |
| ATV            | 2003 Honda Foreman ATV w/water tank | 2        |
| ATV            | 2003 Polaris Ranger 6 X 6 w/slip-on | 1        |
| Trailer        | ATV trailer (12ft, 14 ft & 16 ft)   | 3        |
| Trailer        | Covered Travel Trailer (14 ft)      | 1        |
| Equip.& Acces. | Chain saw -Stihl 360 (22"- bar)     | 4        |
| Equip.& Acces  | Stihl pole saw (14"-bar)            | 1        |
| Equip.& Acces  | Terra Torch                         | 1        |
| Equip.& Acces  | ATV Torch (old Style)               | 1        |
| Equip.& Acces  | Type 7 Slip-On Pumper               | 3        |

### Future Firefighting Supplies/Equipment Needs

| Item/Description                     | Quantity | Justification   |
|--------------------------------------|----------|---|
| Fold-A-Tank                          | 1        | This tank will provide Refuge firefighting personnel a means to store water at designated sites for later use.  |
| Portable Pump                        | 1        | This pump will provide Refuge firefighting personnel a means to extract water from alternate sources (e.g., ponds, streams, or lakes) into pumpers or tanks during prescribed burns and/or fire suppression activities.   |
| 4x4 ATV w/ Torch                     | 1        | These vehicles are necessary for the transport of firefighters and/or equipment through dense vegetation, serve as a means to ignite a fire with the use of a ATV drip torch, and act as another method to transport firefighters to designated sites on the Refuge during prescribed burns and/or fire suppression activities. |
| Flat bed & Tool boxes for 2001 F-250 | 1        | This platform will provide Refuge firefighting personnel an effective means to control and maintain prescribed burns and/or wildfire suppression.   |

**APPENDIX D**

**STEP-UP PLAN**

**FOR**

**BIG OAKS NATIONAL WILDLIFE REFUGE**

### BIG OAKS NATIONAL WILDLIFE REFUGE STEP-UP PLAN

| Staffing and Adjective Class | Step-Up Action  |
|------------------------------|---|
| SC-1<br>Low                  | <p>Normal Tour of Duty and operations.</p> <p>Normal number of qualified initial attack personnel on duty.</p> <p>Deputy Manager ensures that all firefighting equipment is serviced and available.</p>   |
| SC-2<br>Moderate             | <p>Normal Tour of Duty and operations.</p> <p>Normal number of qualified initial attack personnel on duty.</p> <p>Deputy Manager ensures that all firefighting equipment is serviced and available.</p>   |
| SC-3<br>High                 | <p>Normal Tour of Duty and operations.</p> <p>Normal number of qualified initial attack personnel on duty.</p> <p>Deputy Manager ensures that all firefighting equipment is serviced and available.</p> <p>Schedule routine ground patrols of Refuge Units and make daily checks of all fire management units.</p>  |
| SC-4<br>Very High            | <p>Normal Tour of Duty to include weekend coverage and possibly evening coverage to 1800 hours. Intensified road patrols for prevention and detection purposes.</p> <p>Minimum of two initial attack personnel on duty or available on 60 minutes notice.</p> <p>Refuge heavy equipment readily available with operator available on 60 minutes notice.</p> <p>Curtail all prescribed burning operations, or within prescription, seek RFMC approval.</p>                                 |
| SC-5<br>Extreme              | <p>Normal Tour of Duty to include weekend coverage and evening coverage to 1800 hours.</p> <p>Minimum of two initial attack personnel on duty or available on 60 minutes notice.</p> <p>Refuge heavy equipment operators readily available, with extended hours beyond normal Tour of Duty as necessary.</p> <p>Follow Indiana State Fire Closure restrictions, or consider temporary closures of portions of Refuge to visitation.</p> <p>No prescribed burning will be implemented.</p> |

**APPENDIX E**

**WILDLAND FIRE SITUATION ANALYSIS  
(WFSA)**

**FOR**

**BIG OAKS NATIONAL WILDLIFE REFUGE**

## WILDLAND FIRE SITUATION ANALYSIS (WFSA)

### INTRODUCTION

The WFSA is a decision process that employs a systematic and reasonable approach to determine the most appropriate strategy for a particular situation. Reasonable suppression alternatives are identified, analyzed and evaluated, and are consistent with the expected probability of success/consequences of failure. The agency administrator (Refuge Manager or acting Refuge Manager) shall approve the WFSA and any revisions. Evaluation criteria include anticipated suppression costs, resource impacts, and environmental, social, and political considerations. The evaluation of alternatives must clearly identify the point at which the failure of the alternative is imminent. This becomes the triggering mechanism for re-evaluation of the WFSA.

### WFSA GENERAL INSTRUCTIONS

- FIRE SITUATION - This portion of the analysis is intended to provide basic information on the fire, including identification of fire, dates and times of the analysis, and the location of the fire.
  - fuels: Type. Describe the fuels in the area in terms which will be useful for analysis purposes, i.e., mature sagebrush, young ponderosa pine, grass, etc.
  - Fire Behavior: Current. Briefly discuss the fire weather in terms of temperatures, wind and daily patterns. Describe the fire in non-technical terms, such as creeping, spotting, crowning, etc. Discuss the flame lengths, rates of spread, etc. Predicted. Describe what the future course of the fire will be based on the predicted weather patterns, fuels and topography in the presence of the fire, and any other pertinent factors.
- EVALUATION CRITERIA - Specify criteria which must or should be considered in the development of alternatives. Economic criteria might include closure of all or portions of the refuge, thus impacting concessionaire, or impacts to transportation or communications system. Environmental criteria might also include management objectives, air shed, water quality, etc. Social or external criteria would include any local attitudes toward fire or smoke that might affect decisions on the fire, safety, etc. Other criteria might include the legal or administrative constraints which would have to be considered in the analysis of the fire situation, such as the need to keep the fire off other agency lands, etc.
- ALTERNATIVES - Develop alternative plans to control the fire. These will be the results you expect to achieve. All alternatives may have the same general plan, but may have different specific plans. Or there may be different general plans with similar specific plans. A map must be prepared showing each alternative. The map should be based upon the "calculation of probabilities" and include other relevant information. A "no suppression" alternative is not acceptable. An alternative which does not meet all "must" criteria is not acceptable.



- Strategy. Briefly state the alternative strategies for management of the fire. Use geographic names, locations, etc. Roughly designate each strategy on a map.
    - Allow fire to play a natural role
    - Aggressive Attack
    - Sustained Attack
    - Other strategies as appropriate
  - Tactics. Briefly discuss tactical considerations, including general estimates of suppression forces required to accomplish the strategic plan.
    - Direct attack
    - Parallel attack
    - Indirect attack
    - Containment
    - Surveillance
    - Other tactics as appropriate
  - Resources. Include equipment, aircraft, and personnel resources.
  - Estimated Probability of Success. Base estimates for 0-100% for each alternative strategy.
  - Estimated Date of Control. Estimates for each alternative should be made based on predicted weather behavior factor, barriers, fuels, etc., and the effects of suppression efforts.
- ANALYSIS OF EFFECT - The analysis is based on the best estimates of the refuge, resource and fire managers. Fire effects may be negative, cause no change, or may be positive. Employ those evaluations most useful to the specific situation. Some examples: 1) a system which employs a "-" for negative effect, a "0" for no change, or a "+" for positive effect; 2) a system which uses a numeric factor for importance of the consideration (soils, watershed, political, etc.) and assigns values (such as -1 to +1, -100 to +100, etc.) to each consideration, then arrives at a weighted average. It may be that actual dollar values for resources are available. If so, these would be an especially valuable tool. Use those methods most useful to managers. Cost plus loss is the sum of losses from market elements, non-market elements, social elements, and suppression costs.
  - EVALUATION -
    - Economic. Evaluate any economic criteria against each alternative. Include improvements, visitor use, concessions, fee enhancement, etc.
    - Environmental:
      - Soils. Identify any soil problems which may occur as a result of the fire (water repellency information, etc.).
      - Water/Watershed. Indicate decreases in water quality due to vegetation loss. Consider the potential for increased water yield as a result of vegetation losses.
      - Visual/Recreation. Loss of alternative vegetation, short-term blackened and charred
      - landscape. Consider potential for more attractive views with introduction of vegetative mosaics.

- Air Quality. Consider the problem of smoke in populated areas or during scenic periods of time. Analyze the vicinity of the fire for those areas where smoke could cause a hazard by obscuring highway or airport visibility. Off-site as well as on-site effects must be considered.
  - Wilderness. Values may include fire as a natural process. Does a wilderness or wilderness study area have a fire management plan allowing a fire to burn under certain conditions? Do managers want fire in the wilderness? Must fire be kept out of the wilderness to preserve wilderness characteristics?
  - Wildlife. Consider the damage done to wildlife due to loss of critical habitat or loss of cover. Positive benefits may include vegetation diversity, increased edges, and more vegetation available for wildlife because of sprouting in burning brush.
  - Fuel Reduction. If a serious hazard has built up and is identified, it may be advisable to allow the fire to remove the fuel.
  - Social:
  - Safety. No alternatives will be selected which endanger the lives of the public or of firefighters. Any fire or portion of a fire endangering human life will receive immediate, aggressive, and sustained attack.
  - Property and Improvements. Any fire or portion of a fire endangering property will receive immediate and sustained attack, consistent with public and firefighter safety.
  - Political Consideration. Designate any concerns other public agencies may have in regard to one or all of the suppression strategies, or specify areas of specific concern to the other agencies. This could include such things as use of equipment in and around refuge boundaries, areas of cultural resources, etc.
  - Other: Add any additional factors which may be unique to the area or situation, such as rare and endangered plants or animals, or by other considerations not previously mentioned.
- **DECISION TREE** - The Decision Tree is a discussion and justification as to why preferred alternative was selected based on the evaluation criteria.

#### 3.4.4. PRE-ATTACK WILDLAND FIRE SITUATION ANALYSIS

The pre-attack WFSa is an WFSa that is completed by the refuge staff during the pre-attack planning process. It translates refuge fire management objectives into a concise action document which determines initial suppression strategy. To ensure that all important decision criteria are adequately addressed during the initial stages of a fire emergency, selective use of a pre-attack WFSa is recommended. Although this process applies in any refuge with identified suppression zones, it is most useful in those refuges, or portions of refuges, with only one viable suppression alternative. The pre-attack WFSa will serve as the framework for a WFSa if the fire exceeds the parameters of the selected alternative.

***This page is completed by the Agency Administrator(s).***

**Section I, WFSA Information Page**

- A. Jurisdiction(s): Assign the agency or agencies that have or could have fire protection responsibility, e.g., USFWS, BLM, etc.
- B. Geographic Area: Assign the recognized "Geographic Coordination Area" the fire is located in, e.g., Northwest, Northern Rockies, etc.
- C. Unit(s): Designate the local administrative unit(s), e.g., Hart Mountain Refuge Area, Flathead Indian Reservation, etc.
- D. WFSA #: Identify the number assigned to the most recent WFSA for this fire.
- E. Fire Name: Self-explanatory.
- F. Incident #: Identify the incident number assigned to the fire.
- G. Accounting Code: Insert the local unit's accounting code.
- H. Date/Time Prepared: Self-explanatory.
- I. Attachments: Check here to designate items used to complete the WFSA. "Other could include data or models used in the development of the WFSA. Briefly describe the "other" items used.

|  |                           |
|--|---------------------------|
| <b>I. Wildland Fire Situation Analysis</b>   |                           |
| To be completed by the Agency Administrator(s)   |                           |
| <b>A. Jurisdiction(s)</b>  | <b>B. Geographic Area</b> |
| <b>C. Unit(s)</b>  | <b>D. WFSA #</b>          |
| <b>E. Fire Name</b>  | <b>F. Incident #</b>      |
| <b>G. Accounting Code:</b>   |                           |
| <b>H. Date/Time Prepared</b> _____ @ _____   |                           |
| <b>I. Attachments</b>  |                           |
| <ul style="list-style-type: none"> <li>- Complexity Matrix/Analysis * _____</li> <li>- Risk Assessment/Analysis * _____</li> <li style="padding-left: 20px;">Probability of Success * _____</li> <li style="padding-left: 20px;">Consequences of Failure * _____</li> <li>- Maps * _____</li> <li>- Decision Tree ** _____</li> <li>- Fire Behavior Projections * _____</li> <li>- Calculations of Resource Requirements * _____</li> <li>- Other (specify) _____</li> </ul> |                           |
| <p>* Required</p> <p>** Required by FWS</p>  |                           |

***This page is completed by the Agency Administrator(s).***

## **Section II. Objectives and Constraints**

- A. Objectives: Specify objectives that must be considered in the development of alternatives. Safety objectives for firefighter, aviation, and public must receive the highest priority. Suppression objectives must relate to resource management objectives in the unit resource management plan.

Economic objectives could include closure of all or portions of an area, thus impacting the public, or impacts to transportation, communication, and resource values.

Environmental objectives could include management objectives for airshed, water quality, wildlife, etc.

Social objectives could include any local attitudes toward fire or smoke that might affect decisions on the fire.

Other objectives might include legal or administrative constraints which would have to be considered in the analysis of the fire situation, such as the need to keep the fire off other agency lands, etc.

- B. Constraints: List constraints on wildland fire action. These could include constraints to designated wilderness, wilderness study areas, environmentally or culturally sensitive areas, irreparable damage to resources or smoke management/air quality concerns. Economic constraints, such as public and agency cost, could be considered here.

|  |
|--|
| <b>II. Objectives and Constraints</b>  |
| To be Completed by the Agency Administrator(s)   |
| <b>A. Objectives</b> (Must be specific and measurable)<br><br><div><div>1. <i>Safety</i></div><div>- Public</div><div>- Firefighter</div><div>2. <i>Economic</i></div><div>3. <i>Environmental</i></div><div>4. <i>Social</i></div><div>5. <i>Other</i></div></div><br><b>B. Constraints</b> |

***This page is completed by the Fire Manager and/or Incident Commander.***

### **Section III. Alternatives**

- A. Wildland Fire Management Strategy: Briefly describe the general wildland fire strategies for each alternative. Alternatives must meet resource management plan objectives.
- B. Narrative: Briefly describe each alternative with geographic names, locations, etc., that would be used when implementing a wildland fire strategy. For example: "Contain within the Starvation Meadows' watershed by the first burning period."
- C. Resources Needed: Resources described must be reasonable to accomplish the tasks described in Section III.B. It is critical to also look at the reality of the availability of these needed resources.
- D. Final Fire Size: Estimated final fire size for each alternative at time of containment.
- E. Estimated Contain/Control Date: Estimates of each alternative shall be made based on predicted weather, fire behavior, resource availability, and the effects of suppression efforts.
- F. Cost: Estimate all incident costs for each alternative. Consider mop-up, rehabilitation, and other costs as necessary.
- G. Risk Assessment - Probability of Success/Consequences of Failure: Describe probability as a percentage and list associated consequences for success and failure. Develop this information from models, practical experience, or other acceptable means. Consequences described will include fire size, days to contain, days to control, costs, and other information such as park closures and effect on critical habitat. Include fire behavior and long-term fire weather forecasts to derive this information.
- H. Complexity: Assign the complexity rating calculated in "Fire Complexity Analysis" for each alternative, e.g., Type II, Type I.
- I. A map for each alternative should be prepared. The map will be based on the "Probability of Success/Consequences of Failure" and include other relative information.

| <b>III. Alternatives (To be completed by FMO / IC)</b> |          |          |          |
|--|----------|----------|----------|
|  | <b>A</b> | <b>B</b> | <b>C</b> |
| <b>A. Wildland Fire Strategy</b>                       |          |          |          |
| <b>B. Narrative</b>                                    |          |          |          |
| <b>C. Resources needed</b>                             |          |          |          |
| Handcrews  |          |          |          |
| Engines  |          |          |          |
| Dozers   |          |          |          |
| Airtankers   |          |          |          |
| Helicopters  |          |          |          |
| <b>D. Final Size</b>                                   |          |          |          |
| <b>E. Est. Contain/ Control Date</b>                   |          |          |          |
| <b>F. Costs</b>  |          |          |          |
| <b>G. Risk Assessment</b>                              |          |          |          |
| - Probability of success                               | _____    | _____    | _____    |
| - Consequence of failure                               | _____    | _____    | _____    |
| <b>H. Complexity</b>                                   |          |          |          |
| <b>I. Attach maps for each alternative</b>             |          |          |          |

*This page is completed by the Agency Administrator(s), FMO and/or Incident Commander.*



## **Section IV. Evaluation of Alternatives**

- A. **Evaluation Process:** Conduct an analysis for each element of each objective and each alternative. Objectives shall match those identified in Section II.A. Use the best estimates available and quantify whenever possible. Provide ratings for each alternative and corresponding objective element. Fire effects may be negative, cause no change, or may be positive. Examples are: 1) a system which employs a "-" for negative effect, a "0" for no change, and a "+" for positive effect; 2) a system which uses a numeric factor for importance of the consideration (soils, watershed, political, etc.) and assigns values (such as -1 to +1, - 100 to +100, etc.) to each consideration, then arrives at a weighted average. If you have the ability to estimate dollar amounts for natural resource and cultural values, this data is preferred. Use those methods which are most useful to managers and most appropriate for the situation and agency. To be able to evaluate positive fire effects, the area must be included in the resource management plan and consistent with prescriptions and objectives of the fire management plan.

**Sum of Economic Values:** Calculate for each element the net effect of the rating system used for each alternative. This could include the balance of: pluses (+) and minuses (-), numerical rating (-3 and +3), or natural and cultural resource values in dollar amounts. (Again, resource benefits may be used as part of the analysis process when the wildland fire is within a prescription consistent with approved Fire Management Plans and in support of the unit's Resource Management Plan.)

|  |          |          |          |
|--|----------|----------|----------|
| <b>IV. Evaluation of Alternatives</b>  |          |          |          |
| To be Completed by the Agency Administrator(s) and Fire Manager / Incident Commander |          |          |          |
| <b>A. Evaluation Process</b>   | <b>A</b> | <b>B</b> | <b>C</b> |
| <b>Safety</b>  |          |          |          |
| Firefighter  |          |          |          |
| Aviation   |          |          |          |
| Public   |          |          |          |
| <i>Sum of Safety Values</i>  |          |          |          |
| <b>Economic</b>  |          |          |          |
| Forage   |          |          |          |
| Improvements   |          |          |          |
| Recreation   |          |          |          |
| Timber   |          |          |          |
| Water  |          |          |          |
| Wilderness   |          |          |          |
| Wildlife   |          |          |          |
| Other (specify)  |          |          |          |
| <i>Sum of Economic Values</i>  |          |          |          |
| <b>Environmental</b>   |          |          |          |
| Air  |          |          |          |
| Visual   |          |          |          |
| Fuels  |          |          |          |
| T & E Species  |          |          |          |
| Other (specify)  |          |          |          |
| <i>Sum of Environmental Values</i>   |          |          |          |

|                             |  |  |  |
|-----------------------------|--|--|--|
| <b>Social</b>               |  |  |  |
| Employment                  |  |  |  |
| Public Concern              |  |  |  |
| Cultural                    |  |  |  |
| Other (Specify)             |  |  |  |
| <i>Sum of Social Values</i> |  |  |  |
| <b>Other</b>                |  |  |  |

***This page is completed by the Agency Administrator(s) and Fire Manager and/or Incident Commander.***

## **Section V. Analysis Summary**

- A. Compliance with Objectives: Prepare narratives that summarize each alternative's effectiveness in meeting each objective. Alternatives that do not comply with objectives are not acceptable. Narrative could be based on effectiveness and efficiency. For example: "most effective and least efficient," "least effective and most efficient," or "effective and efficient." Or answers could be based on a two-tiered rating system such as "complies with objective" and "fully complies with or exceeds objective." Use a system that best fits the manager's needs.
- B. Pertinent Data: Data for this Section has already been presented, and is duplicated here to help the Agency Administrator(s) confirm their selection of an alternative. Final Fire Size is displayed in Section III.D. Complexity is calculated in the attachments and displayed in Section III.H. Costs are displayed on page 4. Probability of Success/Consequences of Failure is calculated in the attachments and displayed in Section III.G.
- C. External and Internal Influences: Assign information and data occurring at the time the WFSA is signed. Identify the Preparedness Index (1 through 5) for the National and Geographic levels. If available, indicate the Incident Priority assigned by the MAC Group. Designate the Resource Availability status. This information is available at the Geographic Coordination Center, and is needed to select a viable alternative. Designate "yes," indicating an up-to-date weather forecast has been provided to, and used by, the Agency Administrator(s) to evaluate each alternative. Assign information to the "Other" category as needed by the Agency Administrator(s).

#### Section IV. Decision

Identify the alternative selected. Must have clear and concise rationale for the decision, and a signature with date and time. Agency Administrator(s) is mandatory.

| <b>V. Analysis Summary</b>  |          |          |          |
|---|----------|----------|----------|
| To be Completed by the Agency Administrator(s) and Fire Manager / Incident Commander  |          |          |          |
| <b>Alternatives</b>   | <b>A</b> | <b>B</b> | <b>C</b> |
| <b>A. Compliance with Objectives</b><br>Safety<br><br>Economic<br><br>Environmental<br><br>Social<br><br>Other  |          |          |          |
| <b>B. Pertinent Data</b><br>Final Fire Size<br><br>Complexity<br><br>Suppression Cost<br><br>Resource Values<br><br>Probability of Success<br><br>Consequences of Failure |          |          |          |

|  |  |
|--|--|
| <b>C. External / Internal Influences</b> |  |
| National & Geographic Preparedness Level |  |
| <hr/>                                    |  |
| Incident Priority                        |  |
| <hr/>                                    |  |
| Resource Availability                    |  |
| <hr/>                                    |  |
| Weather Forecast (long-range)            |  |
| <hr/>                                    |  |
| Fire Behavior Projections                |  |
| <hr/>                                    |  |
| <b>VI. Decision</b>                      |  |
| <b>The Selected Alternative is:</b>      |  |
| <hr/>                                    |  |
| <b>Rationale:</b>                        |  |
| <br><br><br><br><br><br><br><br><br><br> |  |
| <hr/>                                    |  |
| Agency Administrator's Signature         |  |
| Date/Time                                |  |

***This Section is completed by the Agency Administrator(s) or designate.***

### **Section VII. Daily Review**

The date, time, and signature of reviewing officials are reported in each column for each day of the incident. The status of Preparedness Level, Incident Priority, Resource Availability, Weather Forecast, and WFSA validity is completed for each day reviewed. Ratings for the Preparedness Level, Incident Priority, Resource Availability, Fire Behavior, and Weather Forecast are addressed in Section V.C. Assign a "yes" under "WFSA Valid" to continue use of this WFSA. A "no" indicates this WFSA is no longer valid and another WFSA must be prepared or the original revised.

## Section VIII. Final Review

This Section is completed by the Agency Administrator(s). A signature, date, and time are provided once all conditions of the WFSA are met.

| VIII. Daily Review   |      |    |   |  |  |   |   |   |
|--|------|----|---|--|--|---|---|---|
| To be completed by the Agency Administrator(s) or Designate                            |      |    |   |  |  |   |   |   |
| Selected to be reviewed daily to determine if still valid until containment or control |      |    |   |  |  |   |   |   |
|  |      |    | P<br>R<br>E<br>P<br>A<br>R<br>E<br>D<br>N<br>E<br>S<br>S<br><br>L<br>E<br>V<br>E<br>L | I<br>N<br>C<br>I<br>D<br>E<br>N<br>T<br><br>P<br>R<br>I<br>O<br>R<br>I<br>T<br>Y | R<br>E<br>S<br>O<br>U<br>R<br>C<br>E<br><br>A<br>V<br>A<br>I<br>L<br>A<br>B<br>I<br>L<br>I<br>T<br>Y | W<br>E<br>A<br>T<br>H<br>E<br>R<br><br>F<br>O<br>R<br>E<br>C<br>A<br>S<br>T | F<br>I<br>R<br>E<br><br>B<br>E<br>H<br>A<br>V<br>I<br>O<br>R<br><br>P<br>R<br>O<br>J<br>E<br>C<br>T<br>I<br>O<br>N<br>S | W<br>F<br>S<br>A<br><br>V<br>A<br>L<br>I<br>D |
| Date   | Time | By |   |  |  |   |   |   |
|  |      |    |   |  |  |   |   |   |
|  |      |    |   |  |  |   |   |   |
|  |      |    |   |  |  |   |   |   |
|  |      |    |   |  |  |   |   |   |
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|--|--|--|--|--|-------|--|--|--|--|
|  |  |  |  |  |       |  |  |  |  |
|  |  |  |  |  |       |  |  |  |  |
| <b>If WFSA is no longer valid, a new WFSA will be completed!</b> |  |  |  |  |       |  |  |  |  |
| <b>VIII. Objectives Final Review</b>                             |  |  |  |  |       |  |  |  |  |
| The elements of the selected alternative were met on: _____      |  |  |  |  |       |  |  |  |  |
| _____  |  |  |  |  | _____ |  |  |  |  |
| Time   |  |  |  |  | Date  |  |  |  |  |
| By: _____  |  |  |  |  |       |  |  |  |  |
| (Agency Administrator(s))  |  |  |  |  |       |  |  |  |  |

## A GUIDE FOR ASSESSING FIRE COMPLEXITY

The following questions are presented as a guide to assist the Agency Administrator(s) and staff in analyzing the complexity or predicted complexity of a wildland fire situation. Because of the time required to assemble or move an Incident Management Team to wildland fire, this checklist should be completed when a wildland fire escapes initial attack and be kept as a part of the fire records. This document is prepared concurrently with the preparation of (and attached to) a new or revised Wildland Fire Situation Analysis. It must be emphasized this analysis should, where possible, be based on predictions to allow adequate time for assembling and transporting the ordered resources.

### Use of the Guide:

1. Analyze each element and check the response "yes" or "no."
2. If positive responses exceed, or are equal to, negative responses within any primary factor (A through G), the primary factor should be considered as a positive response.
3. If any three of the primary factors (A through G) are positive responses, this indicates the fire situation is, or is predicted to be, Type I.
4. Factor H should be considered after all the above steps. If more than two of these items are answered "yes," and three or more of the other primary factors are positive responses, a Type I team should be considered. If the composites of H are negative, and there are fewer than three positive responses in the primary factors (A-G), a Type II team should be considered. If the answers to all questions in H are negative, it may be advisable to allow the existing overhead to continue action on the fire.

## GLOSSARY OF TERMS

**Potential for blow-up conditions** - Any combination of fuels, weather, and topography excessively endangering personnel.

**Rate or endangered species** - Threat to habitat of such species or, in the case of flora, threat to the species itself.

**Smoke management** - Any situation which creates a significant public response, such as smoke in a metropolitan area or visual pollution in high-use scenic areas.

**Extended exposure to unusually hazardous line conditions** - Extended burnout or backfire situations, rock slide, cliffs, extremely steep terrain, abnormal fuel situation such as frost killed foliage, etc.

**Disputed fire management responsibility** - Any wildland fire where responsibility for management is not agreed upon due to lack of agreements or different interpretations, etc.

**Disputed fire policy** - Differing fire policies between suppression agencies when the fire involves multiple ownership is an example.

**Pre-existing controversies** - These may or may not be fire management related. Any controversy drawing public attention to an area may present unusual problems to the fire overhead and local management.

**Have overhead overextended themselves mentally or physically** - This is a critical item that requires judgment by the responsible agency. It is difficult to write guidelines for this judgment because of the wide differences between individuals. If, however, the Agency Administrator feels the existing overhead cannot continue to function efficiently and take safe and aggressive action due to mental or physical reasons, assistance is mandatory.



## FIRE COMPLEXITY ANALYSIS

### A. FIRE BEHAVIOR: Observed or Predicted **Yes/No**

1. Burning Index (from on-site measurement of weather conditions). Predicted to be above the 90% level using the major fuel model in which the fire is burning. \_\_\_\_\_
2. Potential exists for "blowup" conditions (fuel moisture, winds, etc.) \_\_\_\_\_
3. Crowning, profuse or long-range spotting. \_\_\_\_\_
4. Weather forecast indicating no significant relief or worsening conditions. \_\_\_\_\_
- Total** \_\_\_\_\_

### B. RESOURCES COMMITTED

1. 200 or more personnel assigned. \_\_\_\_\_
2. Three or more divisions. \_\_\_\_\_
3. Wide variety of special support personnel. \_\_\_\_\_
4. Substantial air operation which is not properly staffed. \_\_\_\_\_
5. Majority of initial attack resources committed. \_\_\_\_\_
- Total** \_\_\_\_\_

### C. RESOURCES THREATENED

1. Urban interface. \_\_\_\_\_
2. Developments and facilities. \_\_\_\_\_
3. Restricted, threatened or endangered species habitat. \_\_\_\_\_
4. Cultural sites. \_\_\_\_\_
5. Unique natural resources, special designation zones or wilderness. \_\_\_\_\_
6. Other special resources. \_\_\_\_\_
- Total** \_\_\_\_\_

### D. SAFETY

1. Unusually hazardous fire line conditions. \_\_\_\_\_
2. Serious accidents or facilities. \_\_\_\_\_
3. Threat to safety of visitors from fire and related operations. \_\_\_\_\_
4. Restricted and/or closures in effect or being considered. \_\_\_\_\_
5. No night operations in place for safety reasons. \_\_\_\_\_
- Total** \_\_\_\_\_

E. OWNERSHIP

**Yes/No**

1. Fire burning or threatening more than one jurisdiction. \_\_\_\_\_
2. Potential for claims (damages). \_\_\_\_\_
3. Conflicting management objectives. \_\_\_\_\_
4. Disputes over fire management responsibility. \_\_\_\_\_
5. Potential for unified command. \_\_\_\_\_

**Total** \_\_\_\_\_

F. EXTERNAL INFLUENCES

1. Controversial wildland fire management policy. \_\_\_\_\_
2. Pre-existing controversies/relationships. \_\_\_\_\_
3. Sensitive media relationships. \_\_\_\_\_
4. Smoke management problems. \_\_\_\_\_
5. Sensitive political interests. \_\_\_\_\_
6. Other external influences. \_\_\_\_\_

**Total** \_\_\_\_\_

G. CHANGE IN STRATEGY

1. Change in strategy to control from confine or contain. \_\_\_\_\_
2. Large amount of unburned fuel within planned perimeter. \_\_\_\_\_
3. WFSA invalid or requires updating. \_\_\_\_\_

**Total** \_\_\_\_\_

H. EXISTING OVERHEAD

1. Worked two operational periods without achieving initial objectives. \_\_\_\_\_
2. Existing management organization ineffective. \_\_\_\_\_
3. IMT overextended themselves mentally and/or physically. \_\_\_\_\_
4. Incident action plans, briefings, etc., missing or poorly prepared. \_\_\_\_\_

**Total** \_\_\_\_\_

**Signature** \_\_\_\_\_

**Date** \_\_\_\_\_ **Time** \_\_\_\_\_

## **APPENDIX F**

### **DELEGATION OF AUTHORITY FOR FIRES AT BIG OAKS NATIONAL WILDLIFE REFUGE**

## APPENDIX F

### Delegation of Authority

\_\_\_\_\_ is assigned as Area/Incident Commander on the \_\_\_\_\_ Fire. You have full responsibility for managing the fire suppression activities within the framework of law, Agency policy, and direction within the framework of law, Agency policy, and direction provided in the Overhead Briefing and/or Escaped Fire Situation Analysis.

Your primary responsibility is to organize and direct your assigned and ordered resources for efficient and effective suppression of the fire. You are accountable to the \_\_\_\_\_ or his designated representative listed below. Financial limitations will be consistent with the best approach to the values at risk.

Specific direction for the \_\_\_\_\_ Fire covering management and environmental concerns are as follows:

\_\_\_\_\_, will represent me on any occasion that I am not immediately available. This authority is effective as of \_\_\_\_\_.

\_\_\_\_\_  
Date/Time

APPENDIX G

# **APPENDIX G**

## **INDIVIDUAL FIRE REPORT AT BIG OAKS NATIONAL WILDLIFE REFUGE**

# **APPENDIX G**

## **U.S FISH AND WILDLIFE SERVICE**

### **INDIVIDUAL FIRE REPORT INSTRUCTIONS (DI-1202)**



JUNE 1997

UNITED STATES DEPARTMENT OF THE INTERIOR FISH  
AND WILDLIFE SERVICE INDIVIDUAL FIRE REPORT  
INSTRUCTIONS FOR USE WITH DI-1202

GENERAL DI-1202 INSTRUCTIONS

1. The fire reporting process will be done by data entry into the computer. A fire number will automatically be assigned to the fire.
2. Report and record each individual fire on a separate form.
3. DO NOT ENTER ZEROS to the left of significant numbers except where indicated as part of the code entry.
4. Each Fire Report is to be entered into the FMIS computer system within **20 days** after the fire has been declared out.
5. An original hard copy needs to be kept on file because FMIS cannot capture the map and signature at this time.
6. A narrative for each fire will be included in the Remarks section. Other items that require clarification are also reported in this section.
7. DO NOT use more digits than are indicated by dashes on the form.
8. Enter only the code numbers, except as specified in the Specific Instructions.
9. Enter the **MANDATORY** data for the following type fires:

FIRE TYPE 1 (SUPPRESSED FIRE)

| Item | Description        |
|------|--------------------|
| 1    | Status Code        |
| 2-3d | Header             |
| 4a-b | Fire Type          |
| 5    | Cause              |
| 6    | People             |
| *8a  | State              |
| *8b  | Owner              |
| *8c  | Vegetative Type    |
| *8d  | Acres              |
| *8d  | Acres              |
| 9a   | Fire Name          |
| 9b   | Area Name          |
| 9c   | Latitude/Longitude |

| Item    | Description   |
|---------|---|
| 9e      | Cost Code   |
| 9f      | Ownership at Origin   |
| 9g      | Fiscal Year   |
| 10a     | Discovery: date/time/type/acres   |
| 10b     | Initial Attack: date/time/type/amt/acres                                |
| 10c     | Control: date/time/acres  |
| 11 a    | Topography  |
| 11 b    | Aspect  |
| 11c     | Slope   |
| 11 d    | Elevation   |
| 11 g    | Fire Behavior   |
| * 8a-8d | Repeats (up to 8 of State.<br>Owner. Vegetative Type. Acres) as needed. |

All other items are optional.

## APPENDIX G FIRE TYPE 2 (NATURAL OUTS)

| Item                         | Description         | Item  | Description                     |
|------------------------------|---------------------|---|---------------------------------|
| 1                            | Status Code         | 10a   | Discovery: date/time/type/acres |
| 2-3d                         | Header              | 10d   | Declared Out: date              |
| 4a-b                         | Fire Type           | 11a   | Topography                      |
| 5                            | Cause (if known)    | 11b   | Aspect                          |
| *8a                          | State               | 11c   | Slope                           |
| *8b                          | Owner               | 11d   | Elevation                       |
| *8c                          | Vegetative Type     |   |                                 |
| *8d                          | Acres               |   |                                 |
| 9a                           | Fire Name           | <u>*8a-8d Repeats (up to 8 of State.<br/>Owner. Vegetative Type. Acres)</u> as needed |                                 |
| 9c                           | Latitude/Longitude  |   |                                 |
| 9e                           | Cost Code           |   |                                 |
| 9f                           | Ownership at Origin |   |                                 |
| 9g                           | Fiscal Year         |   |                                 |
| All other items are optional |                     |   |                                 |

## FIRE TYPE 3 (SUPPORT ACTIONS)

| Item                                 | Description                    | Item | Description     |
|--------------------------------------|--------------------------------|------|-----------------|
| 1                                    | Status Code                    | 9a   | Fire Name       |
| 2-3d                                 | Header                         | 9e   | Cost Code       |
| 4a-b                                 | Fire Type: (Must always be 37) | 9f   | Fiscal Year     |
| 8a                                   | State                          | 9h   | Fiscal Data     |
| 8b                                   | Owner                          | 10a  | Discovery: date |
| <b>All other items are optional.</b> |                                |      |                 |

## FIRE TYPE 48 (PLANNED IGNITION)

| Item | Description        | Item   | Description                  |
|------|--------------------|--------|------------------------------|
| 1    | Status Code        | 9h     | Agency Fiscal Data           |
| 2-3d | Header             | 10a    | Discovery: date/time         |
| 4a-b | Fire Type          | 10c    | Controlled: acres            |
| *8a  | State              | 10d    | Declared Out: date           |
| *8b  | Owner              | 11 a-d | Site Data                    |
| *8c  | Vegetative Type    | 11e    | NFDRS Station (if available) |
| *8d  | Acres              | 11f    | MSGC (if 11 e is completed)  |
| 9a   | Fire Name          | 11h    | BI (if 11 e is completed)    |
| 9b   | Area Name          | 13c    | Plot Objective               |
| 9c   | Latitude/Longitude | 13d    | Firing Type                  |
| 9f   | Ownership          | 13e    | Cost! Acre                   |
| 9g   | Fiscal Year        |        |                              |

**All other items are optional.**

\*8a-8d may be repeated up to 8 times if needed.



APPENDIX G  
**FIRE TYPE 49 (UNPLANNED IGNITION)**

| <b>Item</b> | <b>Description</b> | <b>Item Description</b>              |
|-------------|--------------------|--------------------------------------|
| 1           | Status Code        | 10a Discovery: date/time             |
| 2-3d        | Header             | 10c Controlled: acres                |
| 4a-b        | Fire Type          | 10d Declared Out: date               |
| *8a         | State              | 11 a-d Site Data                     |
| *8b         | Owner              | 11e NFDRS Station (if available)     |
| *8          | Vegetative Type    | 11f MSGC (if 11 e is completed)      |
| *8d         | Acres              | 11h BI (if 11 e is completed)        |
| 9a          | Fire Name          | 13c Plot Objective                   |
| 9b          | Area Name          | 13d OMIT                             |
| 9c          | Latitude/Longitude | 13e <i>Cost!</i> Acre                |
| 9f          | Ownership          |                                      |
| 9g          | Fiscal Year        |                                      |
| 9h          | Agency Fiscal Data | <b>All other items are optional.</b> |

\*8a-8d may be repeated up to 8 times if needed. Only the first set is mandatory.

**FIRE TYPE 5 (ACTION TYPE FALSE ALARMS)**

| <b>Item</b> | <b>Description</b> | <b>Item</b>  | <b>Description</b>              |
|-------------|--------------------|--|---------------------------------|
| 1           | Status Code        | 10a  | Discovery: data/time/type/acres |
| 2-3d        | Header             | 10b  | Initial Attack: type/amount     |
| 4a-b        | Fire Type          |  |                                 |
| 8a          | State              |  |                                 |
| 8b          | Owner              |  |                                 |
| 9a          | Fire Name          | <b>DO NOT PREPARE A REPORT FOR A <u>NO</u><br/>ACTION TYPE FALSE ALARM I!!</b> |                                 |
| 9e          | Cost Code          |  |                                 |
| 9g          | Fiscal Year        |  |                                 |
| 9h          | Agency Fiscal Data |  |                                 |

## APPENDIX G SPECIFIC INSTRUCTIONS

### PART I - WILDFIRES

1. REPORT STATUS CODE - (Automatic Fill)
2. REPORTING AGENCY - This refers to the Government agency submitting the report. (Automatic fill)
3.
  - a. UNIT - Enter first two digits of organization code (Automatic fill).
  - b. SUB-UNIT - Enter last three digits of organization code (Automatic fill).
  - c. CALENDAR YEAR - (Automatic fill)
  - d. FIRE NUMBER - Fire number will automatically be assigned by the computer upon data entry. The entire report does not need to be entered into the computer to receive a fire number. The header (items 1 - 3c) is all that is required. The remainder of the report will need to be completed during and at the conclusion of the fire.
4. FIRETYPE
  - a. **Fire Type** - enter one of the following codes:
    - (1) For all Fires Suppressed - Action taken by the reporting agency's employees, regardless of land ownership, or by contractors, or operators on reporting agency's land.
    - (2) Natural Outs - Fires discovered after they have been extinguished by natural causes. **NO SUPPRESSION ACTION TOOK PLACE.**
    - (3) Support Actions - Action taken at the request of a cooperator on a fire which is not threatening FWS land and no formal agreement exists which would require a FWS response. **Does not include initial attack under established mutual aid agreements.** (Protection Type 7).
    - (4) Prescribed Fires - If the fire escaped and is declared a wildfire, the narrative for the prescribed fire should indicate such and reference the new assigned number for the wildfire. A new DI-1202 will be started for the newly declared wildfire. The cause and narrative should indicate that the wildfire resulted from an escaped prescribed fire.

- (5) False Alarms - For all reported fires on which some type of response was initiated (e.g., patrol plane or crew dispatched, etc.) but **no suppression action took place**, either because the fire was not found or it was not within reporting agency's jurisdiction.

APPENDIX G

b. PROTECTION TYPE - enter one of the following codes:

- (1) For reporting agency land under reporting agency protection.
- (2) For reporting agency land protected by another Federal agency under a Memorandum of Understanding or cooperative agreements.
- (3) For reporting agency land protected by another non-Federal agency under a cooperative agreement or contract.
- (4) This is NOT a valid code for FWS.
- (5) For Other lands not under a Memorandum of Understanding, cooperative agreement or contract but where action is taken by the reporting agency to prevent fire spread to reporting agency lands.
- (6) For Other lands protected by the reporting agency under a Memorandum of Understanding, cooperative agreement or contract.
- (7) Support actions by the reporting agency under Fire Type 3.
- (8) Prescribed Fire – Planned Ignition.
- (9) Prescribed Fire – Unplanned Ignition.

## 5. CAUSE

APPENDIX G

| General Cause        | Code | Valid Combinations          |
|----------------------|------|-----------------------------|
| ■ Natural.....       | 1    | 101,131                     |
| ■ Camp Fire.....     | 2    | 208                         |
| ■ Smoking.....       | 3    | 310,330                     |
| ■ Fire Use.....      | 4    | 411,412,413,414,415,416,417 |
| ■ Incendiary.....    | 5    | 518,519,522                 |
| ■ Equipment.....     | 6    | 603,604,607,623,625         |
| ■ Railroads.....     | 7    | 704, 707                    |
| ■ Juveniles.....     | 8    | 819,826,827                 |
| ■ Miscellaneous..... | 9    | 902,924,926                 |

### Specific Cause (2nd and 3rd digit of Cause column)

|  |           |                                |
|--|-----------|--------------------------------|
| Lightning.....                         | 01        |                                |
| Aircraft.....                          | 02        |                                |
| Burning Vehicle.....                   | 03        |                                |
| Exhaust.....                           | 04        |                                |
| <b>Exhaust - Other.....</b>            | <b>05</b> | Equipment/Exhaust              |
| <b>Logging Line.....</b>               | <b>06</b> | Equipment/Other                |
| Brakes.....                            | 07        |                                |
| Cooking / Warming Fire.....            | 08        |                                |
| <b>Warming Fire.....</b>               | <b>09</b> | combined with cooking          |
| Smoking.....                           | 10        |                                |
| Trash Burning.....                     | 11        |                                |
| Burning Dump.....                      | 12        |                                |
| Field Burning.....                     | 13        |                                |
| Land Clearing.....                     | 14        |                                |
| Slash Burning.....                     | 15        |                                |
| Right-of-way Burning.....              | 16        |                                |
| *Resource Management Burning.....      | 17        |                                |
| Grudge Fire.....                       | 18        |                                |
| Pyromania.....                         | 19        |                                |
| <b>Smoking Out Bees or Game.....</b>   | <b>20</b> | Fire Use/Resource Mgmt Burning |
| <b>Insect or Snake Control.....</b>    | <b>21</b> | Fire Use/Resource Mgmt Burning |
| Job Hunting.....                       | 22        |                                |
| Blasting.....                          | 23        |                                |
| Burning Building.....                  | 24        |                                |
| Power Line.....                        | 25        |                                |
| Fireworks.....                         | 26        |                                |
| Playing with Matches.....              | 27        |                                |
| <b>Repelling Predators.....</b>        | <b>28</b> | Fire Use/Resource Mgmt Burning |
| <b>House or Stove Flue Sparks.....</b> | <b>29</b> | Miscellaneous/Burning Building |
| Other (Unknown).....                   | 30        |                                |
| Volcanic.....                          | 31        |                                |
| Other (Known).....                     | 32→       |                                |

(valid with all causes except  
smoking - 3)

\* Use cause 417<sup>A</sup> for an escaped prescribed fire.

## APPENDIX G

6. CLASS OF PEOPLE - Enter the most likely class code for the individuals involved in the ignition of the incident from the following:

| Code    | Description  |
|---------|--|
| 0.....  | For all fires where cause is lightning or unknown.   |
| 1.....  | For all individuals who own land or businesses within protection boundaries.   |
| 2.....  | For all individuals, their agents or employees, who have special use permits on reporting agency lands within protection boundaries. |
| 3.....  | For contractors, their agents or employees for purchase of products or construction of facilities.                                   |
| 4. .... | For all Federal, State, County, Municipal or other public employees.   |
| 5.....  | For all permanent residents living inside or within one mile outside the protection boundary.  |
| 6.....  | For all seasonal residents or workers residing inside or within one mile outside the protection boundary.                            |
| 7.....  | For all tourists, motorists, campers, etc., in transit through the protected area.   |

7. NET RESOURCE VALUE CHANGE PER ACRE OMIT

8. STATISTICAL DATA

a. STATE - Enter the 2-letter State designator.

b. OWNERSHIP - Enter from the following: One entry must be FWS (4).

| Ownership                | Code |
|--------------------------|------|
| BLM.....                 | 1    |
| B IA. ....               | 2    |
| NPS.....                 | 3    |
| FWS.....                 | 4    |
| USFS.....                | 5    |
| Other Federal Lands..... | 6    |
| State.....               | 7    |
| Private.....             | 8    |
| Other.....               | 9    |
| Foreign.....             | 0    |

## APPENDIX G

### c. VEGETATIVE TYPE

| Type   | Code |
|--|------|
| Commercial Forest Land.....1<br>(Land producing or capable of producing wood products such as sawtimber, posts, poles, etc., and not withdrawn from timber use.) |      |
| Noncommercial Forest Land.....2<br>(Land not capable of yielding wood products or products or commercial forest land withdrawn from timber use.)                 |      |
| Nonforest Watershed.....3<br>(Land which has never supported forests or has been developed for nonforest uses.)  |      |

### d. ACRES - Nearest tenth acre.

NOTE: Repeat Items 8a. thru 8d. for each change in State, Ownership or Vegetative Type. Items 8a. thru 8d. may be repeated up to 8 times if needed.

### 9. AGENCY DATA

a. FIRE NAME - Name is limited to 10 characters.

b. AREA NAME - Enter 2-digit Congressional District (CD) Code.

c. LATITUDE/LONGITUDE - Point of Origin. Enter latitude and longitude to the nearest minute for the point of origin. Can enter seconds.

d. LEGAL DESCRIPTION - May be used **in addition** to Latitude/Longitude. Enter Township, Range, Section and Meridian code. DO NOT USE DECIMALS OR FRACTIONS.

e. **COST CODE** - Enter from the following **Estimated Suppression**.

| Cost Dollars        | Code |
|---------------------|------|
| 0-100.....1         |      |
| 101-500.....2       |      |
| 501-1,500.....3     |      |
| 1,501-5,000.....4   |      |
| 5,001-25,000.....5  |      |
| 25,001-50,000.....6 |      |

50,001-100,00..... 7  
100,001-500,000.....8  
500,001 & over..... 9

f. OWNERSHIP - Point of Origin - (This value must also be entered in 8b).

g. FISCAL YEAR - 4-digit automatic fill.

h. AGENCY FISCAL DATA - Enter best estimate of actual costs charged to fire number, including False Alarms (nearest dollar).

i. UNIVERSAL TRANSVERSE MERCATOR - UTM - May be used in addition to Latitude/Longitude.

j. FIRE PROBLEM CLASS - Omit

#### 10. SUPPRESSION DATA

a. DATE DISCOVERED - MMDDYYYY - Enter 8-digit number for month, day, and year. (Example: October 12 = 10121997.) Enter the leading 0 (zero) if the month or day is less than 10.

TIME DISCOVERED - HHMM - Enter 4-digit number using 24-hour clock. (Example: 8:13 p.m. = 2013).

DETECTION - Enter code for detection type from following:

| Type  | Code |
|---|------|
| Agency Lookout.....   | A    |
| Other Lookout.....  | B    |
| Fire Patrolman.....   | C    |
| Other Agency Employee.....                                      | D    |
| Cooperator Employee.....  | E    |
| Agency Patrol Aircraft.....                                     | F    |
| Cooperator Patrol Aircraft.....                                 | G    |
| Other Aircraft.....   | H    |
| Permittee.....  | I    |
| (All persons holding a use permit or contract on agency lands.) |      |
| Visitor.....  | J    |
| Local Resident.....   | K    |
| (Permanent Residents on or adjacent to agency lands.)           |      |
| Other.....  | L    |
| Smokejumper Patrol Flight.....                                  | M    |
| AFS Aircraft Not on Patrol.....                                 | N    |

ACRES AT DISCOVERY - Enter to nearest tenth acre.



- b. **DATE OF INITIAL ATTACK** - MMDDYYYY - Enter 8-digit number for month, day, and year. Enter the leading 0 (zero) if the month or day is less than 10.

TIME OF INITIAL ATTACK (defined as the time the first initial attack unit arrives at the incident) - HHMM - Enter 8-digit number using 24-hour clock.

TYPE OF INITIAL ATTACK - Enter code from the following list for first, second, and third units attacking fire.

| Type   | Code |
|--|------|
| Explosives (# of Crews).....                         | A    |
| Plows or Trenchers.....                              | B    |
| Light Engines (Less than 300 gal).....               | C    |
| Medium Engines (300-500 gal/50 GPM).....             | D    |
| Heavy Engines (500 gal+/70 GPM).....                 | E    |
| Handcrew (# of Individuals).....                     | F    |
| Smokejumper (# of Individuals).....                  | G    |
| Helitack Crew (# of Individuals).....                | H    |
| Light Airtanker (800-1000 gal-Type 3).....           | I    |
| Medium Airtanker (1000-2000 gal-Type 2).....         | J    |
| Heavy Airtanker (2000 gal+-Type 1).....              | K    |
| Light Helitanker (up to 300 gal-Type 3 & 4).....     | L    |
| Medium Helitanker (300-700 gal-Type 2).....          | M    |
| Heavy Helitanker (700 gal+-Type 1).....              | N    |
| Light Dozer (D-4 or Equiv.).....                     | O    |
| Medium Dozer (D-5, D-6 or Equiv.).....               | P    |
| Heavy Dozer (D-7 and Larger or Equiv.).....          | Q    |
| Other.....   | R    |
| Monitoring Fire by Air (Not for natural out).....    | S    |
| Monitoring Fire by Ground (Not for natural out)..... | T    |
| Reconnaissance Aircraft.....                         | U    |

AMOUNT OF INITIAL ATTACK - Enter the number of persons or pieces of equipment. When type of initial attack is Airplane Tanker (I-K) or Helicopter Tanker (L-N) or Helicopter Tanker (L-N), amount is number of drops. Code actual amount up to 99 items. For more than 99 items code zero (0). Enter number of flights for monitoring by air. Enter number of persons x number of days for ground monitoring (5 people x 3 days = 15).

ACRES AT INITIAL ATTACK (defined as size of fire at time initial attack unit arrives at the incident) - Enter to the nearest tenth acre.

- c. DATE CONTROLLED - MMDDYVYY- Enter 8-digit number for month, day,

and year. Enter the leading 0 (zero) if the month or day is less than 10.

TIME CONTROLLED - HHMM - Enter 4-digit number using 24-hour clock.

ACRES AT CONTROL - Enter total acres within control lines to nearest tenth acre.

- d. DECLARED OUT - MMDDYYYY- Enter 8-digit number for month, day, and year. Enter the leading 0 (zero) if the month or day is less than 10.

# 11. SITE DATA

- a. TOPOGRAPHY - Enter topography in vicinity of fire origin from the following:

| Topographic Feature      | Code |
|--------------------------|------|
| Ridgetop.....            | 1    |
| Saddle.....              | 2    |
| Upper 1/3 of slope.....  | 3    |
| Middle 1/3 of slope..... | 4    |
| Lower 1/3.....           | 5    |
| Canyon bottom.....       | 6    |
| Valley bottom.....       | 7    |
| Mesa or plateau.....     | 8    |
| Flat or rolling.....     | 9    |

- b. ASPECT - Enter appropriate code for the vicinity of the fire origin.

| Aspect        | Code |
|---------------|------|
| Flat.....     | 0    |
| N.....        | 1    |
| N E.....      | 2    |
| E.....        | 3    |
| SE.....       | 4    |
| S.....        | 5    |
| SW.....       | 6    |
| W.....        | 7    |
| NW.....       | 8    |
| Ridgetop..... | 9    |

- c. SLOPE - Enter appropriate code for the vicinity of the fire origin.

| Percent    | Code |
|------------|------|
| 0-25.....  | 1    |
| 26-40..... | 2    |

|            |   |
|------------|---|
| 41-55..... | 3 |
| 56-75..... | 4 |
| 75+.....   | 5 |

- d. ELEVATION - Enter appropriate code for the vicinity of the fire origin.

| <b>Elevation (ft)</b> | <b>Code</b> |
|-----------------------|-------------|
| 0-500.....            | 0           |
| 501-1500.....         | 1           |
| 1501-2500.....        | 2           |
| 2501-3500.....        | 3           |
| 3501-4500.....        | 4           |
| 4501-5500.....        | 5           |
| 5501-6500.....        | 6           |
| 6501-7500.....        | 7           |
| 7501-8500.....        | 8           |
| 8500+.....            | 9           |

- e. NFDRS STATION - 6-digit NFDRS Station Number for the station describing the fire climate area in which the fire occurred, if available. Otherwise, leave blank.
- f. FUEL MODEL (MSGC) - (Required if "e" is completed.) 4-character (Model/Slope/Grass Type/Climate Class) NFDRS fuel model designator characterizing vicinity of origin.
- g. BEHAVIOR - Fire behavior characterizing vicinity of origin. (See Appendix 1 for narrative of the values.)

| <b>Fire Behavior</b>      | <b>Code</b> |
|---------------------------|-------------|
| Smoldering.....           | 1           |
| Creeping/Spreading.....   | 2           |
| Running.....              | 3           |
| Running and Spotting..... | 4           |
| Torching.....             | 5           |
| Crowning.....             | 6           |
| Erratic Behavior.....     | 8           |

- h. BURNING INDEX (Required if "e" is completed.) - NFDRS BI for the station (if any) used to determine manning for initial attack on date of fire. Otherwise, leave blank.
- i. ADJECTIVE CLASS - Reserved for Alaska use

APPENDIX G

12. PREVENTION DATA (Optional)

♦ k. DAY OF WEEK

| Day of Week    | Code |
|----------------|------|
| Sunday.....    | 1    |
| Monday.....    | 2    |
| Tuesday.....   | 3    |
| Wednesday..... | 4    |
| Thursday.....  | 5    |
| Friday.....    | 6    |
| Saturday.....  | 7    |

♦ l. WAS FIRE INVESTIGATED (Y/N):

| Value    | Code |
|----------|------|
| Yes..... | Y    |
| No.....  | N    |

♦ m. FIRE CAUSE SUSPECT: Known or Unknown (KIU):

| Value        | Code |
|--------------|------|
| Known.....   | K    |
| Unknown..... | U    |

♦ n. SUSPECT: Resident, Transient, or Unknown (RIT/U):

| Value          | Code |
|----------------|------|
| Resident.....  | R    |
| Transient..... | T    |
| Unknown.....   | U    |

## APPENDIX G

### 13. FUELS / EMISSIONS DATA

- c. PLOT OBJECTIVE - Enter the code from the following table that best describes the primary burn objective.

| <b>Cultural Scene Maintenance</b>          | <b>Code</b> |
|--|-------------|
| Historical Scene Maintenance .....         | 01          |
| Other Cultural Site Maintenance.....       | 02          |
| <b>Natural Systems</b>                     | <b>Code</b> |
| Exotic or Undesirable Species Control..... | 10          |
| Habitat Maintenance .....                  | 11          |
| Research .....                             | 12          |
| <b>Hazard Reduction</b>                    | <b>Code</b> |
| Fuel Reduction - Activity Fuels .....      | 20          |
| Fuel Reduction - Natural Fuels.....        | 21          |
| Real Property Protection .....             | 22          |
| Boundary Protection .....                  | 23          |
| Fuel Break Maintenance .....               | 24          |
| <b>Maintenance</b>                         | <b>Code</b> |
| Debris Removal .....                       | 30          |
| Vista Removal.....                         | 31          |
| Health (Insect Control).....               | 32          |
| Right-of-Way Maintenance .....             | 33          |
| <b>Silvicultural</b>                       | <b>Code</b> |
| Seed Bed Preparation .....                 | 40          |
| Vegetative Type Manipulation .....         | 41          |
| Insect and Disease Control.....            | 42          |

- d. FIRING TYPE (Planned Ignitions only) - Enter a 2-digit code from the following tables. The first digit describes the firing strategy and the second digit describes the application method.

| <b>1st position (strategy)</b> | <b>Code</b> |
|--------------------------------|-------------|
| head fire.....                 | 1           |
| backing fire.....              | 2           |
| spot fire.....                 | 3           |
| concentric fire .....          | 4           |

| 2nd position (method) | Code |
|-----------------------|------|
| hand ignition.....    | 1    |
| aerial ignition.....  | 2    |
| remote ignition       |      |

- e. COST/ACRE - Enter the average cost per acre experienced on the burn (total cost divided by total acres).
- f. FUEL MODEL - Enter the 2-digit FBPS Fire Behavior Models that best characterize the fuels in the burn area from the following codes. The first entry should represent the majority (at least 50 percent) of the fuels in the burn. The second entry should represent any lesser fuel type that occurs in the burn area. The first fuel model is required and the second fuel model is optional.

| Fuel Model                          | Code |
|-------------------------------------|------|
| <b>Herb and Herb-Dominated</b>      |      |
| Short Grass (1 foot).....           | 01   |
| Timber (Grass and Understory).....  | 02   |
| Tall Grass (2.5 feet).....          | 03   |
| <b>Chaparral and Shrub Fields</b>   |      |
| Chaparral (6 feet).....             | 04   |
| Brush (2 feet).....                 | 05   |
| Dormant Brush, Hardwood Slash.....  | 06   |
| Southern Rough.....                 | 07   |
| <b>Timber Litter</b>                |      |
| Closed Timber Litter.....           | 08   |
| Hardwood Litter.....                | 09   |
| Timber (Litter and Understory)..... | 10   |
| <b>Slash</b>                        |      |
| Light Logging Slash.....            | 11   |
| Medium Logging Slash.....           | 12   |
| Heavy Logging Slash.....            | 13   |

I. OMIT

m. OMIT

n. FUEL LOADING FOR EMISSIONS (see Table 1)

o. OMIT

NARRATIVE (optional) - Enter information about the fire.

TITLE INFORMATION (mandatory) Submitted By:

Submitted Title:  
Submitted Date:  
Entered By:  
Entered Title:  
Entered Date:

MAP (optional) - Plot the perimeter of the fire on a hard copy.

## APPENDIX G - ATTACHMENT 1

### Narrative Descriptions of Fire Behavior

1. **Smoldering** - A fire burning slowly through direct oxidation, in leaf mold, duff, peat, etc., in which there is little or no visible flame and little or no visible smoke, but some spread and definite heat output.
2. **Creeping/Spreading** - A fire burning in fuel, such as leaf mold, litter, or light grass, with both visible flame and smoke.
3. **Running** - A fire with significant output of heat such that direct attack might be impossible. Flame length could be expected to be in excess of 5 feet.
4. **Running and Spotting** - Fire behavior similar to "Running", but burning embers and firebrands are aloft and new ignitions started.
5. **Torching** - A fire in which the crowns or canopies of individual or groups of trees ignite; however, the fire does not continue into the canopy of surrounding vegetation.
6. **Crowning** - The fire tends to move through the overstory or canopy, generally keeping pace with or perhaps even preceding the surface fire.
7. **Crowning and Spotting** - The same as "Crowning", with firebrands carried aloft and starting fires some distance ahead.
8. **Erratic Behavior** - Involves fire whirls, fire storms, blowup conditions, or other fire behavior in which the fire's rate and direction of spread is largely unpredictable.

**APPENDIX G**  
**MAX AND MIN FUEL LOADINGS BY SIZE CLASS FOR FBPS FUEL MODELS**  
**DI-1202 FIELD 13n**

(TABLE 1)

| FBPS FUEL MODEL                     | Load Range | Shrub + Herb<br>T/A | 0-1"<br>T/A | 1.1"-3"<br>T/A | 3.1"-9"<br>T/A | 9"+<br>T/A   | Litter + Duff<br>Inches |
|-------------------------------------|------------|---------------------|-------------|----------------|----------------|--------------|-------------------------|
| 1 SHORT GRASS (1 foot)              | MIN<br>MAX | 0.1<br>2.0          | 0<br>1.5    | 0<br>0         | 0<br>0         | 0<br>0       | 0<br>4.0                |
| 2 TIMBER (Grass & Understory)       | MIN<br>MAX | 0.1<br>1.5          | 0<br>2.0    | 0<br>2.5       | 0<br>2.3       | 0<br>7.8     | 0<br>4.0                |
| 3 TALL GRASS (2.5 feet)             | MIN<br>MAX | 0.1<br>10.0         | 0<br>2.0    | 0<br>1.0       | 0<br>1.0       | 0<br>1.0     | 0<br>4.0                |
| 4 CHAPARRAL (6 feet)                | MIN<br>MAX | 1.1<br>21.0         | 0<br>2.0    | 0<br>1.0       | 0<br>1.0       | 0<br>1.0     | 0<br>4.0                |
| 5 BRUSH (2 feet)                    | MIN<br>MAX | 1.1<br>11.0         | 0<br>2.0    | 0<br>1.0       | 0<br>1.0       | 0<br>1.0     | 0<br>4.0                |
| 6 DORMANT BRUSH -<br>HARDWOOD SLASH | MIN<br>MAX | 1.1<br>11.0         | 0<br>2.0    | 0<br>1.0       | 0<br>1.0       | 0<br>1.0     | 0<br>4.0                |
| 7 SOUTHERN ROUGH                    | MIN<br>MAX | 0.2<br>1.5          | 0.2<br>4.0  | 0<br>2.0       | 0<br>2.0       | 0<br>2.0     | 0<br>4.0                |
| 8 CLOSED TIMBER + LITTER            | MIN<br>MAX | 0<br>1.0            | 0.1<br>4.0  | 0<br>3.0       | 0<br>12.0      | 0<br>2.0     | 0<br>4.0                |
| 9 HARDWOOD LITTER                   | MIN<br>MAX | 0<br>2.0            | 0.1<br>3.5  | 0<br>.5        | 0<br>10.0      | 0<br>10.0    | 0<br>4.0                |
| 10 TIMBER (Litter + Understory)     | MIN<br>MAX | 0.5<br>1.0          | 2.0<br>5.0  | 0.1<br>5.0     | 1.0<br>15.0    | 1.0<br>22.0  | 0<br>4.0                |
| 11 LIGHT LOGGING SLASH              | MIN<br>MAX | 0<br>2.0            | 2.0<br>7.0  | 1.0<br>6.0     | 1.0<br>15.0    | 1.0<br>50.0  | 0<br>4.0                |
| 12 MEDIUM LOGGING SLASH             | MIN<br>MAX | 0<br>3.0            | 2.0<br>18.0 | 1.0<br>16.0    | 1.0<br>20.0    | 1.0<br>100.0 | 0<br>4.0                |
| 13 HEAVY LOGGING SLASH              | MIN<br>MAX | 0<br>3.0            | 2.0<br>29.0 | 1.0<br>28.0    | 1.0<br>40.0    | 1.0<br>200.0 | 0<br>4.0                |

REF: Aids to Determining Fuel Models for Estimating Fire Behavior

Intermountain Forest and Range Experiment Station  
GTR INT-122 NFES #1574



**APPENDIX H**

**INCIDENT STATUS SUMMARY REPORT  
(ICS-209)**

**FOR**

**BIG OAKS NATIONAL WILDLIFE REFUGE**

### Incident Status Summary (ICS-209)

|   |   |                                      |   |                       |                                     |                |
|---|---|--------------------------------------|---|-----------------------|-------------------------------------|----------------|
| 1: Date   | 2: Time   | 3: Initial   Update   Final          | 4: Incident Number  | 5: Incident Name      |                                     |                |
| 6: Incident Kind  | 7: Start Date   | Time                                 | 8: Cause  | 9: Incident Commander | 10: IMT Type                        | 11: State-Unit |
| 12: County  | 13: Latitude and Longitude<br>Lat:<br>Long:<br>Ownership: |                                      | 14: Short Location Description (in reference to nearest town):            |                       |                                     |                |
| <b>Current Situation</b>  |   |                                      |   |                       |                                     |                |
| 15: Size/Area Involved  | 16: % Contained or MMA                                    | 17: Expected Containment Date: Time: | 18: Line to Build   | 19: Costs to Date     | 20: Declared Controlled Date: Time: |                |
| 21: Injuries this Reporting Period:   | 22: Injuries to Date:                                     | 23: Fatalities                       | 24: Structure Information   |                       |                                     |                |
|   |   |                                      | Type of Structure   | # Threatened          | # Damaged                           | # Destroyed    |
| 25: Threat to Human Life/Safety:<br>Evacuation(s) in progress ----<br>No evacuation(s) imminent --<br>Potential future threat -----<br>No likely threat -----                         |   |                                      | Residence   |                       |                                     |                |
|   |   |                                      | Commercial Property   |                       |                                     |                |
|   |   |                                      | Outbuilding/Other   |                       |                                     |                |
| 26: Communities/Critical Infrastructure Threatened (in 12, 24, 48 and 72 hour time frames):   |   |                                      |   |                       |                                     |                |
| 12 hours:   |   |                                      |   |                       |                                     |                |
| 24 hours:   |   |                                      |   |                       |                                     |                |
| 48 hours:   |   |                                      |   |                       |                                     |                |
| 72 hours:   |   |                                      |   |                       |                                     |                |
| 27: Critical Resource Needs (kind & amount, in priority order):   |   |                                      |   |                       |                                     |                |
| 1.  |   |                                      |   |                       |                                     |                |
| 2.  |   |                                      |   |                       |                                     |                |
| 3.  |   |                                      |   |                       |                                     |                |
| 28: Major problems and concerns (control problems, social/political/economic concerns or impacts, etc.) Relate critical resources needs identified above to the Incident Action Plan. |   |                                      |   |                       |                                     |                |
| 29: Resources threatened (kind(s) and value/significance):  |   |                                      |   |                       |                                     |                |
| 30: Current Weather Conditions<br>Wind Speed:   mph   Temperature:<br>Wind Direction:   Relative Humidity:  |   |                                      | 31: Resource benefits/objectives (for prescribed/wildland fire use only): |                       |                                     |                |

32: Fuels/Materials Involved: A drop down box with the 13 Fire Behavior Fuel Models has been added. The incident would select the predominant fuel model with the option to include additional fuels information in the text box.

33: Today's observed fire behavior (leave blank for non-fire events):

34: Significant events today (closures, evacuations, significant progress made, etc.):

### Outlook

35: Estimated  
Control  
Date and Time:

36: Projected Final  
Size:

37: Estimated Final  
Cost:

38: Tomorrow's Forecasted  
Weather  
Wind Speed:  
mph Temperature:  
Wind Direction: Relative  
Humidity:

39: Actions planned for next operational period:

40: Projected incident movement/spread during next operational period:

41: For fire incidents, describe resistance to control in terms of:

1. Growth Potential -

2. Difficulty of Terrain -

42: How likely is it that containment/control targets will be met, given the current resources and suppression/control strategy?

43: Projected demobilization start date:

44: Remarks:

### 45: Committed Resources

| Agency | CRW1 |    | CRW2 |    | HEL1 | HEL2 | HEL3 | ENGS |    | DOZR |    | WTDR | OVHD | Camp  | Total     |
|--------|------|----|------|----|------|------|------|------|----|------|----|------|------|-------|-----------|
|        | SR   | ST | SR   | ST | SR   | SR   | SR   | SR   | ST | SR   | ST | SR   | SR   | Crews | Personnel |
|        |      |    |      |    |      |      |      |      |    |      |    |      |      |       |           |
|        |      |    |      |    |      |      |      |      |    |      |    |      |      |       |           |
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| Approval Information |
|----------------------|

|                  |                  |                                 |
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| 47: Prepared by: | 48: Approved by: | 49: Sent to: by:<br>Date: Time: |
|------------------|------------------|---------------------------------|

# **APPENDIX I**

## **FIRE DISPATCH PLAN**

### **BIG OAKS NATIONAL WILDLIFE REFUGE**

## **Big Oaks National Wildlife Refuge Fire Dispatch Plan**

When report of smoke or fire is received get as much information from the caller as possible:

Location of smoke or fire: \_\_\_\_\_

Location of caller: \_\_\_\_\_

Name and telephone number of caller: \_\_\_\_\_

Color of smoke: \_\_\_\_\_

Size of Fire: \_\_\_\_\_

Type of fuel: \_\_\_\_\_

Character of the fire (running, smoldering, etc.): \_\_\_\_\_

Is anyone fighting the fire?: \_\_\_\_\_

Did they see anyone in the vicinity or vehicles leaving the area?: \_\_\_\_\_

Weather at fire location: \_\_\_\_\_

1. Check map location of fire and determine ownership/protection status.
2. Notify Kent Fire Department.
3. If fire is on Refuge or threatening Refuge, immediately dispatch appropriate personnel, fire engines, hand tools, and mobile radios to site of the fire.
4. Notify Project Leader or Acting Project Leader.
5. Maintain a log of all radio and telephone communications.
6. Remain on duty and dispatch additional assistance as ordered from the fire. See following support items.

Notify Indiana State Police (812-689-5000), Indiana Dept. of Transportation (812-273-2240), and respective county if smoke development appears to threaten visibility along area highways. Dispatch Refuge personnel to secure the area near the fire from Refuge visitors and curious onlookers.

Refuge Personnel

|  | Office       | Home         |
|--|--------------|--------------|
| Joe Robb, Refuge Manager                   | 812-273-0783 | 812-352-8737 |
| Dan Matiatos, Refuge Operations Specialist | 812-273-0783 | 812-265-8175 |
| Brian Winters, Prescribed Fire Specialist  | 812-273-0783 | 812-273-3464 |
| David Jones, Fire Program Tech.            | 812-273-0783 | 812-574-8733 |
| Jason Lewis, Wildlife Biologist            | 812-273-0783 | 812-574-1114 |
| Travis Robison, Refuge Officer             | 812-273-0783 | 812-265-3472 |
| Janet Pike, Administrative Tech.           | 812-273-0783 | 812-523-2338 |

Kent Volunteer Fire Department

|   |              |                   |
|---|--------------|-------------------|
| Reporting Fires – Jefferson County Dispatch | 812-265-2648 |                   |
| Lloyd Lamb (Kent Fire Chief)                | 812-265-8311 | 812-273-5964      |
| Greg Lamb (Kent Assistant Chief)            |              | Cell 812-529-1200 |

Regional Fire Management Coordinator (RFMC)

|                |              |                   |
|----------------|--------------|-------------------|
| Stephen Jakala | 612-713-5366 | Cell 612-817-6797 |
|----------------|--------------|-------------------|

Fire Management Officer (FMO)

|             |              |              |
|-------------|--------------|--------------|
| Steve Nurse | 989-826-1783 | 989-826-2378 |
|-------------|--------------|--------------|

Other Services

|                                   |              |
|-----------------------------------|--------------|
| Kings Daughters Hospital          | 812-265-5211 |
| IN Department of Transportation   |              |
| Versailles                        | 812-689-5788 |
| Madison                           | 812-273-2240 |
| Indiana State Police (Versailles) | 812-689-5000 |
| Ripley Co. Sheriff                | 812-689-5555 |
| Jefferson Co. Sheriff             | 812-265-2648 |
| Jennings Co. Sheriff              | 812-346-5111 |

## **APPENDIX J**

### **GO/NO GO CHECKLIST**



## APPENDIX J

### GO-NO-GO CHECKLIST

|     |     |     |    |  |
|-----|-----|-----|----|--|
| ___ | YES | ___ | NO | Do you have an APPROVED prescribed fire plan?  |
| ___ | YES | ___ | NO | Are ALL fire prescription elements met?  |
| ___ | YES | ___ | NO | Are ALL smoke management specifications met?   |
| ___ | YES | ___ | NO | Are ALL permits and clearances obtained?   |
| ___ | YES | ___ | NO | Has an area spot weather forecast been obtained and is it favorable?   |
| ___ | YES | ___ | NO | Are ALL required personnel in the Prescribed Fire Plan on-site?  |
| ___ | YES | ___ | NO | Has the contingency planning process adequately considered fuels adjacent to and within a reasonable proximity to the burn area? |
| ___ | YES | ___ | NO | Has the availability of ALL contingency resources been checked, and are they available?  |
| ___ | YES | ___ | NO | Have ALL personnel been briefed on the project objectives and their assignment?  |
| ___ | YES | ___ | NO | Have ALL personnel been briefed on their safety hazards, escape routes, and safety zones?  |
| ___ | YES | ___ | NO | Have ALL the required notification been made?  |
| ___ | YES | ___ | NO | Are the on-site holding forces adequate for containment under the expected conditions?   |
| ___ | YES | ___ | NO | In YOUR OPINION, can the prescribed fire meet the planned objectives, and can it be carried out according to the approved plan?  |

**I certify that I have reviewed the burn objectives and have reviewed, I am in agreement that the Prescribed Fire Complexity Analysis is correct, and that all the above questions were answered “YES”.**

\_\_\_\_\_  
**Prescribed Fire Burn Boss**

\_\_\_\_\_  
**Date**

\_\_\_\_\_  
**Refuge Manager**

\_\_\_\_\_  
**Date**

## APPENDIX K: LAWS, REGULATIONS, POLICIES AND EXECUTIVE ORDERS

### Federal Laws

**American Indian Religious Freedom Act of 1978 (Public Law 95-341; 42 USC §1196)** – requires the United States (US), where appropriate, to protect and preserve religious rights of the American Indian, Eskimo, Aleut, and Native Hawaiians, including but not limited to access to sites, use and possession of sacred objects, and the freedom to worship through ceremonials and traditional rites.

**Animal Damage Control Act of 1931 (7 United States Code [USC] §426 *et seq.*)** – provides broad authority for investigation, demonstrations and control of mammalian predators, rodents and birds.

**Anti-Deficiency Act of 1982 (31 USC §1341 *et seq.*)** - provides that no federal official or employee may obligate the government for the expenditure of funds before funds have been authorized and appropriated by Congress for that purpose.

**American Antiquities Act of 1906 (Public Law 59-209; 16 USC §431-433)** – authorizes the President to designate historic and natural resources of national significance, located on federal lands, as National Monuments for the purpose of protecting items of archeological significance.

**Archeological and Historical Preservation Act of 1974 (Public Law 95-96; 16 U.S.C 469 *et seq.*)** – provides for the preservation of historical and archeological data, including relics and specimens, threatened by federally funded or assisted construction projects.

**Archeological Resources Protection Act of 1979 (16 USC §470 *et seq.*)** – prohibits the excavation or removal from Federal or Indian lands any archeological resources without a permit.

**Bald Eagle Protection Act of 1940 (Public Law 87-884; 16 USC §668a-d)** – prohibits the taking or harming (i.e. harassment, sale, or transportation) of bald eagles or golden eagles, including their eggs, nests, or young, without appropriate permit.

**Clean Air Act of 1970 (42 USC §7401 *et seq.*)** – regulates air emissions from stationary, area, and mobile sources. This law authorizes the United States Environmental Protection Agency (USEPA) to establish National Ambient Air Quality Standards (NAAQS) to protect public health and the environment.

**Clean Water Act of 1972 (Public Law 92-500; 33 USC §1251 *et seq.*)** – aims to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. Under Section 401, states have authority to review federal permits that may result in a discharge to wetlands or water bodies under state jurisdiction. Under section 404, a program is established to regulate the discharge of dredged or fill material into the Nation's waters, including wetlands.

**Coastal Zone Management Act of 1972 (Public Law 92-583; 16 USC §1451 *et seq.*)** – provides incentives for coastal states to develop coastal zone management programs. Federal actions that impact the coastal zone must be consistent to the maximum extent practicable with the state program.

**Conservation and Rehabilitation Program on Military and Public Lands (Public Law 93-452; 16 USC §670 *et seq.*)** – provides for fish and wildlife habitat improvements, range rehabilitation, and control of off-road vehicles on federal lands.

**Conservation Programs on Military Reservations (Public Law 90-465; 16 USC §670 *et seq.*)** – Requires each military department to manage natural resources and to ensure that services are provided which are necessary for management of fish and wildlife resources on each installation; to provide their personnel with professional training in fish and wildlife management; and to give priority to contracting work with Federal and state agencies that have responsibility for conservation or management of fish and wildlife. In addition it authorizes cooperative agreements (with states, local governments, non-governmental organizations, and individuals) which call for each party to provide matching funds or services to carry out natural resources projects or initiatives.

**Endangered Species Act of 1973, as amended (16 USC §1531 *et seq.*)** – provides for the identification and protection of threatened and endangered plants and animals, including their critical habitats.

Requires federal agencies to conserve T&E species and cooperate with state and local authorities to resolve water resources issues in concert with the conservation of T&E species. This law establishes a consultation process involving federal agencies to facilitate avoidance of agency action that would adversely affect species or habitat. Further, it prohibits all persons subject to US jurisdiction from taking, including any harm or harassment, endangered species.

**Federal Insecticide, Fungicide, and Rodenticide Act of 1947 (Public Law 92-516; 7 USC §136 *et seq.*)** – governs the use and application of pesticides in natural resource management programs. This law provides the principal means for preventing environmental pollution from pesticides through product registration and applicator certification.

**Federal Land Policy and Management Act of 1976 (43 USC §1701)** – establishes public land policy and guidelines for its administration and provides for the management, protection, development, and enhancement of the public lands.

**Federal Noxious Weed Act of 1974 (Public Law 93-629; 7 USC §2801)** – provides for the control and eradication of noxious weeds and their regulation in interstate and foreign commerce.

**Fish and Wildlife Conservation Act of 1980 (Public Law 96-366; 16 USC §2901 *et seq.*)** – encourages management of non-game species and provides for conservation, protection, restoration, and propagation of certain species, including migratory birds threatened with extinction.

**Fish and Wildlife Coordination Act of 1934 (16 USC §661 *et seq.*)** – provides a mechanism for wildlife conservation to receive equal consideration and coordinate with water-resource development programs.

**Land and Water Conservation Act of 1965 (16 USC §4601 *et seq.*)** – assists in preserving, developing, and assuring accessibility to outdoor recreation resources.

**Migratory Bird Conservation Act of 1929 (16 USC §715 *et seq.*)** – establishes a Migratory Bird Conservation Commission to approve areas recommended by the Secretary of the Interior for acquisition with Migratory Bird Conservation Funds.

**Migratory Bird Treaty Act of 1918 (Public Law 65-186; 16 USC §703 *et seq.*)** – provides for regulations to control taking of migratory birds, their nests, eggs, parts, or products without the appropriate permit and provides enforcement authority and penalties for violations.

**National Environmental Policy Act of 1969 (Public Law 91-190; 42 USC §4321 *et seq.*)** – mandates federal agencies to consider and document environmental impacts of proposed actions and legislation. In addition it mandates preparation of comprehensive environmental impact statements where proposed action is “major” and significantly affects the quality of the human environment.

**Native American Graves Protection and Repatriation Act of 1990 (Public Law 101-601; 25 USC §3001-3013)** – addresses the recovery, treatment, and repatriation of Native American and Native Hawaiian cultural items by federal agencies and museums. It includes provisions for data gathering, reporting, consultation, and issuance of permits.

**Resource Conservation and Recovery Act of 1976 (42 USC §6901 *et seq.*)** – establishes a comprehensive program which manages solid and hazardous waste. Subtitle C, Hazardous Waste Management, sets up a framework for managing hazardous waste from its initial generation to its final disposal. Waste pesticides and equipment/containers contaminated by pesticides are included under hazardous waste management requirements.

**Sikes Act Improvement Act of 1997 (Public Law 105-85; 16 USC §670a *et seq.*)** – amends the Sikes Act of 1960 to mandate the development of an integrated natural resources management plan through cooperation with the Department of the Interior (through the US Fish and Wildlife Service [USFWS]), Department of Defense, and each state fish and wildlife agency for each military installation supporting natural resources.

**Soil Conservation Act of 1935 (16 USC §590a *et seq.*)** – provides for soil conservation practices on federal lands.

## **Federal Regulations**

**40 CFR 1500-1508** – Council on Environmental Quality Regulations on Implementing NEPA Procedures

**40 CFR 6** – USEPA Regulations on Implementation of NEPA Procedures

**40 CFR 162** – USEPA Regulations on Insecticide, Fungicide, and Rodenticide Use

**15 CFR 930** – Federal Consistency with Approved Coastal Management Programs

**50 CFR 17** – Fish and Wildlife Service List of Endangered and Threatened Wildlife

**50 CFR 10.13** – List of Migratory Birds

**32 CFR 190** – Natural Resources Management Program

## **Federal Executive Orders (EOs)**

**Environmental Safeguard for Activities for Animal Damage Control on Federal Lands (EO 11870)** - restricts the use of chemical toxicants for mammal and bird control.

**Exotic Organisms (EO 11987)** – restricts federal agencies in the use of exotic plant species in any landscape and erosion control measures.

**Energy Efficiencies and Water Conservation at Federal Facilities (EO 12902)** – federal agency use of energy and water resources is directed towards the goals of increased conservation and efficiency.

**Floodplain Management (EO 11988)** – specifies that agencies shall encourage and provide appropriate guidance to applicant to evaluate the effects of their proposals in floodplains prior to submitting applications. This includes wetlands that are within the 100-year floodplain and especially discourages filling.

**Greening the Government through Leadership in Environmental Management (EO 13148)** – requires the head of each federal agency to be responsible for ensuring that all necessary actions are taken to integrate environmental accountability into agency day-to-day decision making and long-term planning processes across all agency missions, activities, and functions.

**Indian Sacred Sites (EO 13007)** – provides for the protection of and access to Indian sacred sites.

**Invasive Species (EO 13112)** – directs federal agencies to prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts that invasive species cause.

**Protection and Enhancement of Environmental Quality (EO 11514)** – provides for environmental protection of federal lands and enforces requirements of NEPA.

**Protection of Wetlands (EO 11990)** – directs all federal agencies to take action to minimize the destruction loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands. This applies to the acquisition, management, and disposal of federal lands and facilities; to construction or improvements undertaken, financed, or assisted by the federal government; and to the conduct of federal activities and programs which affect land use.

**Responsibilities of Federal Entities to Protect Migratory Birds (EO 13186)** – directs all federal agencies taking actions that have a potential to negatively affect migratory bird populations to develop and implement a Memorandum of Understanding with the US Fish and Wildlife Service by January 2003 that shall promote the conservation of migratory bird populations.

## **Department of Defense Instructions (DoDI), Air Force Instructions (AFI), & Air Force Pamphlets (PAM)**

**DoDI 4715.03** – Natural Resources Conservation Program

**DoDI 4165.57** – Air Installations Compatible Use Zones

**DoDI 4150.07** – Pest Management Program

**DoDI 6055.06** – Fire and Emergency Services Program

**AFI 32-7064** – Integrated Natural Resources Management

**AFI 32-1053** – Integrated Pest Management Program

**AFI 32-7062** – Air Force Comprehensive Planning

**AFI 32-7065** – Cultural Resources Management

**AFPAM 91-212** – BASH Techniques

## **Memoranda**

Memorandum, Assistant Deputy Under Secretary of Defense (Environment, Safety and Occupational Health), 3 Apr 07, Subject: *Guidance to Implement the Memorandum of Understanding to Promote the Conservation of Migratory Birds.*

Memorandum, Assistant Deputy Under Secretary of Defense (Environment, Safety and Occupational Health), 14 Aug 06, Subject: *Integrated Natural Resource Management Plan (INRMP) Template*

Memorandum, Assistant Deputy Under Secretary of Defense (Environment, Safety and Occupational Health), 17 May 05, Subject: *Implementation of Sikes Act Improvement Amendments: Supplemental Guidance concerning Leased Lands*

Memorandum, Assistant Deputy Under Secretary of Defense (Environment, Safety and Occupational Health), 1 Nov 04, Subject: *Implementation of Sikes Act Improvement Amendments: Supplemental Guidance concerning INRMP Reviews*

Memorandum, Deputy Under Secretary of Defense (Installations and Environment), 10 Oct 02, Subject: *Implementation of Sikes Act Improvement Act: Updated Guidance*

Memorandum, Assistant Deputy Under Secretary of Defense (Environment), 5 Aug 02, Subject: *Access to Outdoor Recreation Programs on Military Installations for Persons with Disabilities.*

Memorandum, Assistant Secretary of Army (Environment, Safety and Occupational Health), Deputy Assistant Secretary of the Navy (Environment), Deputy Assistant Secretary of the Air Force (Environment, Safety and Occupational Health), 20 Sep 11, Subject: *Interim Policy on Management of White Nose Syndrome in Bats.*

## State

Title 13 generally is administered by and applies to Indiana Department of Environmental Management.  
Title 14 generally is administered and applies to Indiana Department of Natural Resources.

**Air Pollution Control (Indiana Code 13-17)** - maintain the purity of the air resource of Indiana, which shall be consistent with protection of the public health and welfare and the public enjoyment of the air resource, physical property and other resources, flora and fauna, maximum employment, and full industrial development of Indiana. The air pollution control board and IDEM shall safeguard the air resource through the prevention, abatement, and control of air pollution by all practical and economically feasible methods.

**Water Pollution Control (Indiana Code 13-18)** – provides for the control and prevention of pollution in waters of Indiana with any substance that is deleterious to the public health or the prosecution of any industry or lawful occupation; or by which (A) any fish life or any beneficial animal or vegetable life may be destroyed; or (B) the growth or propagation of fish life or beneficial animal or vegetable life is prevented or injuriously affected. The water pollution control board and IDEM shall safeguard the water resources through the prevention, abatement, and control of water pollution by all practical and economically feasible methods.

**State Regulated Wetlands (Indiana Code 13-18-22)** – establishes a permitting program for wetland activities in state regulated wetlands is to (1) promote a net gain in high quality isolated wetlands and (2) assure that compensatory mitigation will offset the loss of isolated wetlands allowed by the permitting program.

**Wildlife Regulation (Indiana Code 14-22-10)** - set out the definitions related to wildlife and establishes rules and liabilities associated with recreation use of land and wildlife.

**Nongame and Endangered Species Conservation (Indiana Code 14-22-34)** - set out the definitions related to endangered species and prohibit any form of possession of listed species, including taking, transporting, purchasing or selling except by permit. Listed species may be removed, captured, or destroyed if it is shown by good cause that the species are causing property damage or are a danger to human health.

**Forest Firefighting (Indiana Code 14-23-5)** – establishes a firefighting organization within the Division of Forestry for the purpose of detecting, preventing, fighting and controlling fires on state forest lands. The code also provides for extending the same fire detection, prevention, fighting and control services thus established to other state lands under its supervision and control, as well as for lands not owned by the state and not lying within the corporate limits of any city or town for the purposes of protecting the forests, fields and grasslands of the state.

**Water Rights and Resources (Indiana Code 14-25)** – provides for the management of water rights and availability of water (surface and ground water) for multiple uses, including establishing minimum flows. The code also establishes that there will be continuing assessment of the availability of the water resources, an inventory of significant uses of water withdrawn from the surface or ground will be maintained and a plan will be implemented for the development, conservation, and use of the water resource for beneficial uses.

**Lakes and Reservoirs (Indiana Code 14-26)** – establishes the need to determine suitable locations for water supply reservoirs, regulating flow via reservoirs and includes the Lake Preservation Act (14-26-2) which protects natural lakes and their recreational use.

**Levees, Dams and Drainage (Indiana Code 14-27)** – establishes state responsibilities relating to identifying need for, design and maintenance and effect of levees, dams and drainage projects.

**Flood Control (Indiana Code 14-28)** – establishes state responsibilities relating to managing floodwaters, flood risk and floodplains. The code includes the Flood Control Act (14-28-1) and Flood Plain Management Act (14-28-3).

**Rivers, Streams and Waterways (Indiana Code 14-29)** – establishes state responsibilities relating to navigable waterways, sand and gravel permits, recreational streams and channel construction.

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## **APPENDIX L: INTERAGENCY COORDINATION**

|   |                  |
|---|------------------|
| INRMP Scoping Letters.....                          | 23 August 2011   |
| INRMP Task Force Meeting Minutes.....               | 31 August 2011   |
| External Draft INRMP Review Request Letters .....   | 30 May 2012      |
| USFWS Response Letter .....                         | 20 July 2012     |
| IDNR (G. Langell) Response Email.....               | 4 October 2012   |
| IDNR (C. Grauel) Response Email.....                | 5 October 2012   |
| Public Draft Availability Letters.....              | 29 October 2012  |
| Public Notice in North Vernon Plain Dealer-Sun..... | 2 November 2012  |
| Public Notice in The Madison Courier.....           | 2 November 2012  |
| SHPO Review Request Letter.....                     | 19 November 2012 |
| USFWS & IDNR Signature Request Letter.....          | 18 December 2012 |
| SHPO Response Letter.....                           | 19 December 2012 |
| Letters to Tribes.....                              | 9 January 2013   |
| USFWS Approval and Signature.....                   | 4 February 2013  |
| INDNR Approval and Signature.....                   | 7 March 2013     |



23 August 2011

Re: Task Force Meeting Invitation and Scoping Announcement, Indiana Air National Guard (INANG), Integrated Natural Resources Management Plan (INRMP) Preparation for Jefferson Range, Ripley County, Indiana

Scott Pruitt  
US Fish & Wildlife Service  
620 South Walker Street  
Bloomington, IN 47403-2121

Dear Mr. Pruitt,

The National Guard Bureau and the INANG are preparing a new INRMP for Jefferson Range located in Ripley County. This INRMP is required by the Sikes Act to reflect the mutual agreement of the U.S. Fish and Wildlife Service (USFWS) and the Indiana Department of Natural Resources (INDNR). The purpose of this effort is to better understand the natural resources and their management needs on Jefferson Range, develop a potential projects list, and identify regional data and resources of relevance to natural resources management on Jefferson Range. The final result will be an INRMP signed by INANG, USFWS and INDNR that summarizes the natural resources and their management on Jefferson Range.

The INANG is responsible for the prudent management and use of 1033-acre Jefferson Range, located just north of Madison, Indiana. Jefferson Range is located on land that was part of the former Jefferson Proving Ground (closed in 1994) and is surrounded by the Big Oaks National Wildlife Refuge. Jefferson Range is currently used by both the INANG and the US Air Force. The USFWS also has access to Jefferson Range when it is not being used by the INANG or the US Air Force.

Some baseline biological surveys have been completed on Jefferson Range and available data will be reviewed during the Task Force meeting, as well as current land management activities. For this new INRMP, we are seeking from your agency any natural resources-related information, natural resources topics or issues of concern, policies or regulations that might apply, rare flora and fauna to consider for management, identification of issues of regional concern, or other information that your agency thinks should be considered during development of this plan. Any data that your agency provides will be evaluated and used to help develop the INRMP.

In addition to your agency's involvement, the INANG is requesting information from a number of other stakeholders. If you are aware of other individuals, groups, or resource agencies that may possess additional information or knowledge to assist us in preparing this INRMP, please contact us.

A one-day agency coordination meeting (INRMP Task Force Meeting) with USFWS and INDNR has been scheduled for **10:00 a.m., 31 August 2011 in the conference room at Big Oaks National Wildlife Refuge**. We have been coordinating with Andy King from your office for this meeting. Photo identification is typically required for access to military installations. The primary purpose of the meeting will be to review the natural resources at Jefferson Range, discuss the items underlined above, and solicit your input. In addition, the natural resources issues and management objectives will be discussed in an open, constructive format to provide input into the development of the INRMP. A brief overview of an INRMP and its requirements will also be provided. An agenda and meeting location map of Jefferson Range are attached. Please bring any additional staff that you feel necessary.

We look forward to and welcome your participation in this INRMP Task Force Meeting and INRMP development process. The INANG has hired AMEC to facilitate the INRMP preparation. Please send your correspondence directly to the following physical or email address:

Dawn Johnson, Ph.D.  
AMEC  
3711 S Mopac Expressway, Bldg 1, Suite 100  
Austin, TX 78746  
[dawn.johnson@amec.com](mailto:dawn.johnson@amec.com)

If you have any questions concerning this request, please do not hesitate to contact Dr. Johnson at (805) 252-4370 or the undersigned at (812) 877-5167 or [Paul.Davis.1@ang.af.mil](mailto:Paul.Davis.1@ang.af.mil).

Sincerely,

A handwritten signature in black ink, appearing to read "Paul Davis", with a long horizontal flourish extending to the right.

Paul Davis  
181<sup>st</sup> Fighter Wing, Environmental Manager

Enclosures

23 August 2011

Re: Task Force Meeting Invitation and Scoping Announcement, Indiana Air National Guard (INANG), Integrated Natural Resources Management Plan (INRMP) Preparation for Jefferson Range, Ripley County, Indiana

Joe Robb  
US Fish & Wildlife Service  
Big Oaks National Wildlife Refuge  
1661 West JPG Niblo Road  
Madison, IN 47250

Dear Mr. Robb,

The National Guard Bureau and the INANG are preparing a new INRMP for Jefferson Range located in Ripley County. This INRMP is required by the Sikes Act to reflect the mutual agreement of the U.S. Fish and Wildlife Service (USFWS) and the Indiana Department of Natural Resources (INDNR). The purpose of this effort is to better understand the natural resources and their management needs on Jefferson Range, develop a potential projects list, and identify regional data and resources of relevance to natural resources management on Jefferson Range. The final result will be an INRMP signed by INANG, USFWS and INDNR that summarizes the natural resources and their management on Jefferson Range.

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Some baseline biological surveys have been completed on Jefferson Range and available data will be reviewed during the Task Force meeting, as well as current land management activities. For this new INRMP, we are seeking from your agency any natural resources-related information, natural resources topics or issues of concern, policies or regulations that might apply, rare flora and fauna to consider for management, identification of issues of regional concern, or other information that your agency thinks should be considered during development of this plan. Any data that your agency provides will be evaluated and used to help develop the INRMP.

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AMEC  
3711 S Mopac Expressway, Bldg 1, Suite 100  
Austin, TX 78746  
[dawn.johnson@amec.com](mailto:dawn.johnson@amec.com)

If you have any questions concerning this request, please do not hesitate to contact Dr. Johnson at (805) 252-4370 or the undersigned at (812) 877-5167 or [Paul.Davis.1@ang.af.mil](mailto:Paul.Davis.1@ang.af.mil).

Sincerely,

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Paul Davis  
181<sup>st</sup> Fighter Wing, Environmental Manager

Enclosures

23 August 2011

Re: Task Force Meeting Invitation and Scoping Announcement, Indiana Air National Guard (INANG), Integrated Natural Resources Management Plan (INRMP) Preparation for Jefferson Range, Ripley County, Indiana

Gary Langell  
Indiana Department of Natural Resources  
553 E Miller Dr  
Bloomington, IN 47401

Dear Mr. Langell,

The National Guard Bureau and the INANG are preparing a **new** INRMP for Jefferson Range located in Ripley County. This INRMP is required by the Sikes Act to reflect the mutual agreement of the U.S. Fish and Wildlife Service (USFWS) and the Indiana Department of Natural Resources (INDNR). The purpose of this effort is to better understand the natural resources and their management needs on Jefferson Range, develop a potential projects list, and identify regional data and resources of relevance to natural resources management on Jefferson Range. The final result will be an INRMP signed by INANG, USFWS and INDNR that summarizes the natural resources and their management on Jefferson Range.

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In addition to your agency's involvement, the INANG is requesting information from a number of other stakeholders. If you are aware of other individuals, groups, or resource agencies that may possess additional information or knowledge to assist us in preparing this INRMP, please contact us.

A one-day agency coordination meeting (INRMP Task Force Meeting) with USFWS and INDNR has been scheduled for **10:00 a.m., 31 August 2011 in the conference room at Big Oaks National Wildlife Refuge**. Photo identification is typically required for access to military installations. The primary purpose of the meeting will be to review the natural resources at Jefferson Range, discuss the items underlined above, and solicit your input. In addition, the natural resources issues and management objectives will be discussed in an open, constructive format to provide input into the development of the INRMP. A brief overview of an INRMP and its requirements will also be provided. An agenda and meeting location map of Jefferson Range are attached. Please bring any additional staff that you feel necessary.

We look forward to and welcome your participation in this INRMP Task Force Meeting and INRMP development process. The INANG has hired AMEC to facilitate the INRMP preparation. Please send your correspondence directly to the following physical or email address:

Dawn Johnson, Ph.D.  
AMEC  
3711 S Mopac Expressway, Bldg 1, Suite 100  
Austin, TX 78746  
[dawn.johnson@amec.com](mailto:dawn.johnson@amec.com)

If you have any questions concerning this request, please do not hesitate to contact Dr. Johnson at (805) 252-4370 or the undersigned at (812) 877-5167 or [Paul.Davis.1@ang.af.mil](mailto:Paul.Davis.1@ang.af.mil).

Sincerely,

A handwritten signature in black ink, appearing to read "Paul Davis", with a long horizontal line extending to the right.

Paul Davis  
181<sup>st</sup> Fighter Wing, Environmental Manager

Enclosures

23 August 2011

Re: Task Force Meeting Invitation and Scoping Announcement, Indiana Air National Guard (INANG), Integrated Natural Resources Management Plan (INRMP) Preparation for Jefferson Range, Ripley County, Indiana

Chris Grauel  
Indiana Department of Natural Resources  
District Biologist  
2010 S SR 3  
Mount Vernon, IN 47401

Dear Mr. Grauel,

The National Guard Bureau and the INANG are preparing a **new** INRMP for Jefferson Range located in Ripley County. This INRMP is required by the Sikes Act to reflect the mutual agreement of the U.S. Fish and Wildlife Service (USFWS) and the Indiana Department of Natural Resources (INDNR). The purpose of this effort is to better understand the natural resources and their management needs on Jefferson Range, develop a potential projects list, and identify regional data and resources of relevance to natural resources management on Jefferson Range. The final result will be an INRMP signed by INANG, USFWS and INDNR that summarizes the natural resources and their management on Jefferson Range.

The INANG is responsible for the prudent management and use of 1033-acre Jefferson Range, located just north of Madison, Indiana. Jefferson Range is located on land that was part of the former Jefferson Proving Ground (closed in 1994) and is surrounded by the Big Oaks National Wildlife Refuge. Jefferson Range is currently used by both the INANG and the US Air Force. The USFWS also has access to Jefferson Range when it is not being used by the INANG or the US Air Force.

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Sincerely,

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Paul Davis  
181<sup>st</sup> Fighter Wing, Environmental Manager

Enclosures



**Jefferson Range**  
**INRMP Task Force Meeting**  
**31 August 2011**

The Indiana Air National Guard (INANG) hosted the Jefferson Range INRMP Task Force Meeting at Jefferson Range on 31 August 2011 from approximately 1030h to 1330h. The agenda is provided as **Attachment 1**. The signed attendance sheet is provided as **Attachment 2**.

The purpose of this meeting was to review the known and potential natural resources and land management on Jefferson Range amongst the cooperating partners in order to develop an INRMP for Jefferson Range.

- Meeting started by Mrs. Mertz and introductions of all participants.
- SMSgt Todd Bass provided a brief history of Jefferson Range and summary of current usage.
  - Jefferson Range was established in 1976 as part of Jefferson Proving Ground (JPG); it was an overflow range from Camp Atterbury. When JPG was decommissioned in 1995, Jefferson Range continued and a Memorandum of Agreement between the US Army, US Air Force and US Fish & Wildlife Service (USFWS) was established in 1997.
  - Current mission is to support air-to-ground training by the Air National Guard and Air Force. Jefferson Range also supports helicopter training by the Army. There is a precision-guided munitions training area to the south of the main range. The Jefferson Range is the only range east of the Mississippi that offers this type of training. All munitions are inert with some spotting charges. Munitions are picked up annually.
  - The main range is 1,033 acres, the precision-guided area is 50 acres and there are 5 acres associated with Old Timbers Lodge that are the responsibility of the INANG.
  - INANG has agreement with Big Oaks Conservation Society for upkeep and maintenance of Old Timbers Lodge.
  - There is significant air space associated with Jefferson Range that was inherited from JPG. There are Military Operations Areas (MOAs) to the south/southwest and Air Traffic Control Associations (ATCAs) to the north/northwest. Jefferson Range currently controls the airspace up to 43,000 feet although they rarely go over 23,000 feet.
  - The Jefferson Range boundaries on the maps are slightly off. AMEC will review existing GIS data and ensure boundaries match those described in the MOA. If there are any Jefferson Range activities outside their boundary, they will require a special use permit.
  - INANG maintains firebreaks, 37 miles gravel roads, 20 miles paved roads, and 50 miles of boundary fence. Firebreaks are maintained using 4WD tractors and discs/brush hogs. The fence is inspected weekly by a Contractor.
  - Wildfires from training every spring and fall, mostly from spotting charges and tracers. Most of them are small. USFWS provides wildland fire response.
  - Unexploded Ordinance (UXO) is significant limiter of all natural resources and land management at Jefferson Range and Big Oaks National Wildlife Refuge (NWR). Many activities are simply unsafe unless EOD crew is present. No on the ground training occurs due to these concerns.
  - Recently built new range tower and headquarters and in the process of installing potable water line.
  - Access to the range is thru Big Oaks NWR and locked gates. The NWR has full time law enforcement personnel.

- **Big Oaks Natural Resources:** Joe Robb from Big Oaks NWR provided a summary of natural resources and management issues from NWR perspective.
  - Big Oaks is in the process of developing a Comprehensive Conservation Plan (CCP) and its sub-plans (wildland fire management plan, habitat management plan, hunting and fishing plan, visitor services plan). Similar to INRMP.
  - Key rare species: crawfish frogs and their ponds and grassland birds/sparrows, in particular Henslow's sparrows. There is a lot of clay, wet soils which means lots of crayfish and therefore crawfish frogs.
  - Key habitat goal: maintain open grasslands and control woody encroachment. Fire and herbicide are primary tools for managing shrubs and woody encroachment. Primary species are sweet gum and black locust.
  - There are a number of state listed plants present on Big Oaks NWR and some of those are likely on Jefferson Range. Most of these prefer open grasslands.
  - Indiana bats are documented on Big Oaks NWR. Andy King with USFWS stated we should assume Indiana bats are present on Jefferson Range. We should assume the standard Bloomington Field Office guidance for forest management activities for Indiana bats apply.
  - Big Oaks has found that forest birds are much more affected by the cowbirds coming in from the agricultural lands than the grassland birds are (lower productivity).
- **Vegetation Management:** Open grassland is also the preferred habitat to support the military mission. Big Oaks NWR would like to open up the northwest corner of Jefferson Range to connect two grasslands on their property. The most unique habitat on the range is the open grasslands associated with the target areas.
- **Wildland Fire Management:** Wildfires occur on the Jefferson Range every spring and fall due to the use of spotting charges and tracers. INANG does not fight wildfires because the range is considered an Impact Area, but they do maintain firebreaks. When a wildfire arises, they notify Big Oaks NWR. Burn units utilized by the NWR are located within the Jefferson Range property.
- **Water Resources:** It is unsafe to do wetland delineations due to UXO. Big Oaks is creating small crawfish frog ponds in suitable soils and habitat. There is a new EPA regulation (as part of NPDES program) for herbicide use over wetlands and other waterbodies that may have ramifications on natural resources management.
- **Erosion:** mostly along fences. Jefferson Range is replacing old culverts with span crossings when possible/needed along roads.
- **T&E Species:**
  - Indiana bat mostly likely roosts are above K road. They might possibly use the southeast corner of Jefferson Range. Currently revising survey guidance for Indiana bat to include acoustic surveys, which would be more viable for Jefferson Range/Big Oaks NWR due UXO concerns. Incorporate tree-cutting guidance into INRMP. USFWS not too concerned about herbicide use (fungicides/insecticides) would be a problem; however, they would be interested to know what types of herbicide are used and the approximate amount.
  - Running buffalo clover likes limestone and Jefferson Range is mostly clay soils. It likes disturbed areas with a little shade. It has not been documented on Big Oaks NWR, but it is ephemeral species and hard to document.
  - Andy King indicated the possibility of additional listing of other bat species (hibernating bats) and any surveys should include those bats. Northern long-eared bats are currently under formal review. Little brown bats are currently under informal review.
- **Invasive Species:** Japanese stiltgrass, autumn olive, bush honeysuckle, sericea lespedeza. Primary control method is herbicide. Emerald ash borer is on its way, but not on Big Oaks/Jefferson Range yet.

- **Hunting/fishing:** Some on Big Oaks and none on Range (unless they are ANG-affiliated).
- **Bird/Wildlife Aircraft Strike Hazard (BASH):** No BASH plan. Jefferson Range has personalized Avian Hazard Advisory System (AHAS) report. Turkey vultures are primary concern. Generally training is strafe pattern down to 75 ft and they use visual warnings. Occasionally golden eagles in the winter, mature bald eagles and red-tailed hawks. No take off/landings at Jefferson Range other than helicopters.
- No public access is allowed as most of Jefferson Range and the Headquarters (HQ) complex are within the safety footprint.
- Integrated Cultural Resources Management Plan (ICRMP) was completed a couple years ago. Integrated Pest Management Plan (IPMP) was recently updated for Jefferson Range.
- For reviews: CDs only to Andy, Paul, Chris and Gary. Hard copy and CD to Joe.

Action Item: Correct boundary errors in GIS.

## **Meeting Agenda**

Jefferson Range

INRMP Task Force Meeting

*August 31, 2011      10:00 AM – 12:00 PM*

### **Meeting Objectives:**

To discuss development of INRMP for Jefferson Range

To identify significant natural resources and management needs on Jefferson Range

To familiarize all parties with Jefferson Range and the INRMP process and requirements

### **Agenda:**

- 1) Introductions
- 2) Jefferson Range History and Mission Overview
- 3) INRMP Process and Required Elements
- 4) Significant Natural Resources and Land Management Activities
  - a) Review existing/known data sources
  - b) Vegetation management
  - c) Wildland fire management
  - d) Water resources (streams, ponds, wetlands and floodplains)
  - e) Erosion management
  - f) T&E species
  - g) Invasive species
  - h) Fish & wildlife management
  - i) BASH issues
  - j) Public outreach/access
- 5) Meeting Close
  - A. Review Action Items
  - B. Discuss any Outstanding Issues

### **Outcome:**

A list of significant natural resources and management activities to include in INRMP

A list of suggested projects to include in INRMP

Indiana Air National Guard  
INRMP Task Force Meeting for Jefferson Range

## SIGN IN SHEET

|    | Name                 | Agency           | SIGNATURE                                      |
|----|----------------------|------------------|--|
| 1  | Paul Davis           | ANG, 181 FW      | <i>Paul Davis</i>                              |
| 2  | Missy Mertz          | NGB              | <i>Missy Mertz</i> melissa.mertz@ang.af.mil    |
| 3  | Andy King            | USFWS            | <i>Andy King</i>                               |
| 4  | Joe Robb             | USFWS            | <i>Joe Robb</i> Joe_Robb@FWS.gov               |
| 5  | Gary Langell         | IN DNR           | <i>Gary Langell</i> glangell@dnr.in.gov        |
| 6  | Chris Grauel         | IN DNR           | <i>Chris Grauel</i> CGRAUEL@DNR.IN.GOV         |
| 7  | Dawn Johnson         | AMEC             | <i>Dawn Johnson</i>                            |
| 8  | Jennifer Warf        | AMEC             | <i>Jennifer Warf</i>                           |
| 9  | Ashley Buchanan      | USFWS            |  |
| 10 | TODD BASS            | Jefferson Range  | <i>TODD BASS</i>                               |
| 11 | <del>Andy King</del> | <del>USFWS</del> |  |
| 12 | PAUL F. DAVIS        | 181 IW/EM        | <i>Paul F. Davis</i> Paul.Davis.1@ang.af.mil   |
| 13 | Ashley Buchanan      | USFWS            | <i>Ashley Buchanan</i> ashley-buchanan@fws.gov |
| 14 |                      |                  |  |
| 15 |                      |                  |  |
| 16 |                      |                  |  |



## NATIONAL GUARD BUREAU

3501 FETCHET AVENUE  
JOINT BASE ANDREWS MD 20762-5157

Joe Robb  
US Fish & Wildlife Service  
Big Oaks National Wildlife Refuge  
1661 West JPG Niblo Road  
Madison, IN 47250

Re: *Initial Draft of Integrated Natural Resources Management Plan (idINRMP) for Jefferson Range managed by the Indiana Air National Guard*

Dear Mr. Robb,

I have enclosed one (1) bound copy and one (1) CD copy of the idINRMP for Jefferson Range. Due to the nature of the relationship between Jefferson Range and Big Oaks NWR, I have decided to include you during the internal review of the idINRMP. There are a number of details that only you or other Big Oaks NWR personnel can provide due to your intimate knowledge of the site. In particular, the idINRMP will benefit from your review and comment of the following sections:

- Section 1.3 Responsibilities
- Chapter 4 – every section
- Chapter 5 (in particular Table 10 and Section 5.4)
- Appendix D (Environmental Summary)
- Appendix E (T&E Summary)
- Appendix F (Species Lists)

We have identified priority rare species and priority invasive species based on the site visit and INRMP Task Force Meeting, but we request that you confirm that you agree with those priority species. We have drafted a list of projects and included them in Table 10 but if there are additional projects that you feel are needed or merited, please feel free to suggest additional projects. In addition, feel free to modify or add to the content of any tables to improve their accuracy.

The CD contains editable Word documents if you prefer to provide digital comments. Alternatively you can mail a marked-up hard copy. We look forward to your comments and appreciate the time you have already contributed to its development. Please send your correspondence directly to Dr. Johnson at [dawn.johnson@amec.com](mailto:dawn.johnson@amec.com) or

Dawn Johnson, Ph.D.  
AMEC  
3711 S Mopac Expressway, Bldg 1, Suite 100  
Austin, TX 78746





If you have any questions concerning this request, please do not hesitate to contact Dr. Johnson at (805) 252-4370 or the undersigned at (240) 612-8427 or [melissa.mertz@ang.af.mil](mailto:melissa.mertz@ang.af.mil).

Sincerely,

Melissa Mertz  
NGB/A7AN, Natural Resources Manager

Enclosures

I have enclosed one (1) bound copy and one (1) CD copy of the idIRMP for Jefferson Range. Due to the nature of the relationship between Jefferson Range and Big Oaks NWR, I have decided to include you during the internal review of the idIRMP. There are a number of details that only you or other Big Oaks NWR personnel can provide due to your intimate knowledge of the site. In particular, the idIRMP will benefit from your review and comment of the following sections:

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- Chapter 4 - every section
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Dawn Johnson, Ph.D.  
AMSC  
3711 S Mopac Expressway, Bldg 1, Suite 100  
Austin, TX 78746



## NATIONAL GUARD BUREAU

3501 FETCHET AVENUE  
JOINT BASE ANDREWS MD 20762-5157

30 May 2012

Re: External Review Request, Indiana Air National Guard (INANG), New Integrated Natural Resources Management Plan (INRMP) for Jefferson Range, Ripley County, Indiana

Gary Langell  
Indiana Department of Natural Resources  
553 E Miller Dr  
Bloomington, IN 47401

Dear Mr. Langell,

The National Guard Bureau and the INANG have completed a draft INRMP for Jefferson Range. This INRMP is required by the Sikes Act to reflect the mutual agreement of the U.S. Fish and Wildlife Service (USFWS) and the Indiana Department of Natural Resources (DNR). An INRMP Task Force Meeting was held in August 2011 and the minutes are included in Appendix L. As part of the mutual cooperation as required under the Sikes Act, we are seeking from your agency a review of the updated INRMP, in particular the sections relating to natural resources under your jurisdiction. The INRMP review process is described in Section 1.4, in which the Indiana DNR plays a role. Natural resources management is described in Chapter 4 with wildlife management described in Section 4.6. Threatened and endangered species are summarized in Appendix E and their management described in Section 4.7.

One hard copy with a CD is enclosed. We look forward to your comments on the external draft INRMP for Jefferson Range before 30 July 2012, which will enable us to complete this update within the scheduled timeframe. You may provide your comments on the hard copy, through track changes in the Word documents or in the errata spreadsheet included on the CD. Please email your comments to the address below or send your correspondence directly to the following address:

Melissa Mertz  
NGB/A7AN  
3501 Fetchet Avenue  
Joint Base Andrews, MD 20762

If you have any questions concerning this request, please do not hesitate to contact the undersigned at (240) 612-8427 or [melissa.mertz@ang.af.mil](mailto:melissa.mertz@ang.af.mil).

Sincerely,

Melissa Mertz  
Natural Resources Program Manager  
National Guard Bureau

Enclosures





## NATIONAL GUARD BUREAU

3501 FETCHET AVENUE  
JOINT BASE ANDREWS MD 20762-5157

30 May 2012

Re: External Review Request, Indiana Air National Guard (INANG), New Integrated Natural Resources Management Plan (INRMP) for Jefferson Range, Ripley County, Indiana

Chris Grauel  
Indiana Department of Natural Resources  
2010 S State Hwy 3  
North Vernon, IN 47265

Dear Mr. Grauel,

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Sincerely,

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Melissa Mertz  
Natural Resources Program Manager  
National Guard Bureau

Enclosures



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3501 FETCHET AVENUE  
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30 May 2012

Re: External Review Request, Indiana Air National Guard (INANG), New Integrated Natural Resources Management Plan (INRMP) for Jefferson Range, Ripley County, Indiana

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US Fish & Wildlife Service  
Big Oaks NWR  
1661 West JPG Niblo Road  
Madison, IN 47250

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Melissa Mertz  
NGB/A7AN  
3501 Fetchet Avenue  
Joint Base Andrews, MD 20762

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Sincerely,

Melissa Mertz  
Natural Resources Program Manager  
National Guard Bureau

Enclosures





## NATIONAL GUARD BUREAU

3501 FETCHET AVENUE  
JOINT BASE ANDREWS MD 20762-5157

30 May 2012

Re: External Review Request, Indiana Air National Guard (INANG), New Integrated Natural Resources Management Plan (INRMP) for Jefferson Range, Ripley County, Indiana

Scott Pruitt  
US Fish & Wildlife Service  
Bloomington Ecological Services  
620 South Walker Street  
Bloomington, IN 47403

Dear Mr. Pruitt,

The National Guard Bureau and the INANG have completed a draft INRMP for Jefferson Range. This INRMP is required by the Sikes Act to reflect the mutual agreement of the U.S. Fish and Wildlife Service (USFWS) and the Indiana Department of Natural Resources. An INRMP Task Force Meeting was held in August 2011 and the minutes are included in Appendix L. As part of the mutual cooperation as required under the Sikes Act, we are seeking from your agency a review of the draft INRMP, in particular the sections relating to natural resources under your jurisdiction. The INRMP review process is described in Section 1.4, in which the USFWS plays a role. Natural resources management is described in Chapter 4. Threatened and endangered species are summarized in Appendix E and their management described in Section 4.7.

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Melissa Mertz  
NGB/A7AN  
3501 Fetchet Avenue  
Joint Base Andrews, MD 20762

We have also determined that the implementation of this INRMP is not likely to adversely affect federally listed species or critical habitat and request your concurrence on this determination. If you have any questions concerning this request, please do not hesitate to contact the undersigned at (240) 612-8427 or [melissa.mertz@ang.af.mil](mailto:melissa.mertz@ang.af.mil).

Sincerely,

Melissa Mertz  
Natural Resources Program Manager  
National Guard Bureau

Enclosures

Cc: USFWS Region 3



# United States Department of the Interior

## Fish and Wildlife Service



Bloomington Field Office (ES)

620 South Walker Street

Bloomington, IN 47403-2121

Phone: (812) 334-4261 Fax: (812) 334-4273

July 20, 2012

Ms. Melissa Mertz, Natural Resources Program Manager

National Guard Bureau

3501 Fetchet Avenue

Joint Base Andrews, MD 20762-5157

Dear Ms. Mertz:

This responds to your letter dated 30 May 2012 and the accompanying Integrated Natural Resources Management Plan for the Jefferson Range, Ripley County Indiana (INRMP) requesting U.S. Fish and Wildlife Service (FWS) comments on the aforementioned plan and concurrence with a determination of no-effect on federally listed species and critical habitat potentially affected by the INRMP.

These comments have been prepared under the authority of the Fish and Wildlife Coordination Act (16 U.S.C. 661 et. seq.) and are consistent with the intent of the National Environmental Policy Act of 1969, the Endangered Species Act of 1973, as amended, and the U. S. Fish and Wildlife Service's Mitigation Policy.

The INRMP is the Indiana Air National Guard's (INANG) primary document for managing the natural resources on Jefferson Range. The Sikes Act Improvement Act (SAIA) of 1997, as amended requires federal military installations with adequate wildlife habitat develop a long-range management plan and implement agreements with other agencies. INRMPs require review on a regular basis, at least every five years, by the FWS, state conservation agency, and the military proponent. The primary goal of the INRMP at Jefferson Range is to manage natural resources in a manner that is compatible with and supports the military mission while complying with applicable federal and state laws and USAF regulations and policies. Military training is the primary purpose of natural resources management at Jefferson Range.

Jefferson Range and the encircling Big Oaks National Wildlife Refuge (Big Oaks) were formerly part of the US Army's Jefferson Proving Ground (JPG). The land underlying both is still owned by the US Army. JPG was established in 1940 as an approximately 55,000 acre facility for the production, acceptance, and specification testing of multiple types of munitions and carried out this function until its decommissioning in the mid-1990s. The mission at JPG left significant amounts of unexploded ordnance and depleted uranium contamination across the facility including at Jefferson Range.



Jefferson Range comprises approximately 1,038 acres in three separate parcels. The primary range is 983 acres and includes the headquarters buildings and range tower; the second parcel is a 50 acre precision guided missile range approximately six miles south of the primary range, and the third parcel is five acres surrounding the Old Timbers Lodge. The habitat is a combination of open grassland maintained in the impact areas of both ranges and wooded areas particularly in the southeast and southwest corners of the primary range. The INANG is also responsible for management of the 55 miles of perimeter fence that surrounds the former JPG. The fence, as well as, the perimeter road, and several internal roads are included in the INRMP. The current mission at Jefferson Range is to support air-to-ground training by the Air National Guard and US Air Force and helicopter training by the US Army and Army National Guard.

Big Oaks consists of approximately 50,000 acres surrounding the Jefferson Range and managed by the FWS. Habitat management activities at Big Oaks are designed to benefit populations of native wildlife species, especially the declining species of grassland, shrubland, and forest dwelling birds and animals. Goals for the refuge include preserving, conserving, and restoring a natural diversity and abundance of wildlife species by protecting and managing large blocks of forest, grassland, and shrubland habitats. Prescribed burning is a major component of grassland habitat management at Big Oaks. Wildlife managers use fire as a tool to maintain healthy stands of native grasses and eliminate invasive species.

The history of the JPG as a testing site for live munitions, the physical juxtaposition with Big Oaks and memorandum of agreement (MOA) with the FWS, and the current mission of Jefferson Range as a training facility all affect the management of its natural resources.

The INRMP was developed using an interdisciplinary approach with staff of Big Oaks and the Indiana Department of Natural Resources (IDNR). The INRMP states that natural resources at Jefferson Range will be managed using an ecosystem management approach that includes an adaptive management plan. The INRMP is organized by key management areas that include: **Programmatic Management; Soil Conservation and Sediment Management; Water Resources Management; Vegetation Management; Fish and Wildlife Management; Threatened and Endangered Species Management; Wildland Fire Management; and Invasive Species and Integrated Pest Management.** Tables 9 and 10 of the INRMP list Recurring Natural Resources Management Activities and Projects Identified to Implement INRMP (Subject to Funding Availability) respectively.

The goals and objectives within most of these areas are generally consistent with the conservation of fish and wildlife resources within the constraints of the overall goal of Jefferson Range. For example, one objective within **Programmatic Management** is continued cooperation with Big Oaks and other agencies; **Soil Conservation and Sediment Management** includes the objective of minimizing non-point source pollution; a **Water Resource Management** objective is to maintain or enhance riparian corridors; and **Invasive Species and Integrated Pest Management** includes the goal of controlling invasive plant and animal species. There are also, however, some apparent inconsistencies among the goals and objectives of the key management areas. For example: managing for open grasslands by continuing the wildland fire program is an objective within the **Vegetation Management** area that appears inconsistent



with the **Threatened and Endangered Species Management** area objective of maintaining populations of Indiana bat, cerulean warbler and other forest dependent rare species by managing for large tracts of forest. Similarly an objective under the **Wildland Fire Management** area is to maintain the diversity of spatial and temporal fire regimes to create a habitat mosaic that maximizes habitat diversity, which is similarly inconsistent with managing for large tracts of forest (or grassland). These examples highlight the FWS's main criticism of the plan, which is that it suggests landscape scale (ecosystem) management is possible on the approximately one thousand acres that comprise Jefferson Range.

#### Endangered Species

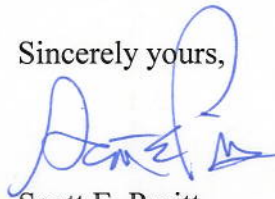
The proposed project is within the range of the Federally endangered Indiana bat (*Myotis sodalis*). If BFO Forest Management Guidelines (included as part of Appendix E of the INRMP) are adhered to, we concur that the proposed project is not likely to adversely affect the Indiana bat.

There is no designated critical habitat on Jefferson Range or the surrounding Big Oaks National Wildlife Refuge.

This precludes the need for further consultation on this project as required under Section 7 of the Endangered Species Act of 1973, as amended. However, should new information arise pertaining to INRMP development or implementation that could affect Indiana bat, or a revised species list be published (e.g., identification of running buffalo clover on areas covered by the INRMP) it will be necessary to reinitiate consultation.

We appreciate the opportunity to comment at this stage of INRMP development. If you have any questions about our comments, please call Forest Clark at (812) 334-4261 (Ext. 206).

Sincerely yours,



Scott E. Pruitt  
Field Supervisor

cc: Big Oaks National Wildlife Refuge  
Indiana Division of Fish and Wildlife, Indianapolis, IN



-----Original Message-----

From: Langell, Gary [<mailto:glangell@dnr.in.gov>]

Sent: Thursday, October 04, 2012 3:20 PM

To: Mertz, Melissa M Civ USAF ANG NGB/A7AN; Grauel, Chris

Subject: RE: Jefferson Range INRMP

Melissa,

I have reviewed the Jefferson Range INRMP and have no comments or concerns.  
Thank you.

Gary Langell

Private Lands Program Manager/Wildlife Research Supervisor

TWS Certified Wildlife Biologist

Bloomington Field Office

553 E. Miller Drive

Bloomington, IN 47401

Work: 812.334.1137

Mobile: 812.360.3627

Fax: 812.339.4807

[glangell@dnr.IN.gov](mailto:glangell@dnr.IN.gov)

WSFR75-your highresThe Indiana Division of Fish and Wildlife is funded by fishing and hunting license revenue, as well as, through the Wildlife and Sport Fish Restoration programs. These programs collect excise taxes on shooting, archery, and fishing equipment and motor boat fuel. This user-pay, everyone-benefits system has resulted in millions of acres of habitat saved and near-miraculous population increases in many species of fish and wildlife over the last 75 years. For more information on Fish and Wildlife Management in Indiana visit: [wildlife.IN.gov](http://wildlife.IN.gov)  
<<http://www.in.gov/dnr/fishwild/>> .



-----Original Message-----

From: Grauel, Chris [<mailto:CGrauel@dnr.in.gov>]

Sent: Friday, October 05, 2012 8:27 AM

To: Mertz, Melissa M Civ USAF ANG NGB/A7AN

Subject: RE: Jefferson Range INRMP

Melissa,

I have reviewed the plan and I haven't any questions, concerns or comments. Thank you.

Chris Grauel,

District 14 Wildlife Biologist

IDNR/Division of Fish & Wildlife

2010 S. State Hwy. 3

North Vernon, IN 47265-7950

29 October 2012

Re: Public Review of Draft Integrated Natural Resources Management Plan (INRMP) for Jefferson Range, Ripley County, Indiana

Yvette Hayes  
US Army Jefferson Proving Ground  
JPG Site Manager  
1661 W. JPG Niblo Road  
Madison, IN 47250

Dear Ms. Hayes,

The National Guard Bureau and the Indiana Air National Guard (INANG) have completed a Draft INRMP for Jefferson Range. Part of the process of finalizing this INRMP requires providing this document for public review and comment. Thank you for agreeing to host one of the hard copies and making it available to interested parties. Another hard copy will be located at the Madison-Jefferson County Public Library. The public notices will appear in the Madison Courier and Plain Dealer-Sun starting on 2 November 2012. The public comment period will close on 2 December 2012.

One hard copy with a CD is enclosed. Immediately inside the cover page is a copy of the public notice, which indicates the contact information (email, phone and mailing address) for individuals interested in providing comments. The CD includes a pdf of the complete Draft INRMP and the appendices that were not printed out with the hard copy. Interested parties may copy the pdf file. At the end of the public comment period, you may dispose of the hard copy or mail it back with the enclosed FedEx label.

If you have any questions or issues during this public comment period, please do not hesitate to contact the undersigned at (240) 612-8427 or [melissa.mertz@ang.af.mil](mailto:melissa.mertz@ang.af.mil).

Sincerely,

A handwritten signature in blue ink, appearing to read "Melissa M. Mertz".

Melissa Mertz  
Natural Resources Program Manager  
National Guard Bureau

Enclosures

29 October 2012

Re: Public Review of Draft Integrated Natural Resources Management Plan (INRMP) for Jefferson Range, Ripley County, Indiana

Madison-Jefferson County Public Library  
420 West Main Street  
Madison, IN 47250

Dear Librarian,

The National Guard Bureau and the Indiana Air National Guard (INANG) have completed a Draft INRMP for Jefferson Range. Part of the process of finalizing this INRMP requires providing this document for public review and comment. Thank you for agreeing to host one of the hard copies and making it available to interested parties. Another hard copy will be located at the Madison-Jefferson County Public Library. The public notices will appear in the Madison Courier and Plain Dealer-Sun starting on 2 November 2012. The public comment period will close on 2 December 2012.

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If you have any questions or issues during this public comment period, please do not hesitate to contact the undersigned at (240) 612-8427 or [melissa.mertz@ang.af.mil](mailto:melissa.mertz@ang.af.mil).

Sincerely,

A handwritten signature in blue ink, appearing to read "Melissa M. Mertz".

Melissa Mertz  
Natural Resources Program Manager  
National Guard Bureau

Enclosures

29 October 2012

Re: Notice of Availability of Public Draft Integrated Natural Resources Management Plan (INRMP)  
for Jefferson Range, Ripley County, Indiana

Big Oaks Conservation Society  
P.O. Box 935  
Madison, IN 47250

To Whom It May Concern,

The National Guard Bureau and the Indiana Air National Guard (INANG) have completed a Draft INRMP for Jefferson Range. The INANG is responsible for the prudent management and use of 1,033-acre Jefferson Range, located just north of Madison, Indiana. Jefferson Range is located on land that was part of the former Jefferson Proving Ground (closed in 1994) and is surrounded by the Big Oaks National Wildlife Refuge. Jefferson Range is currently used by both the INANG and the US Air Force. The USFWS also has access to Jefferson Range when it is not being used by the INANG or the US Air Force.

Part of the process of finalizing this INRMP requires providing this document for public review and comment. As an interested party, we are providing you with notice of availability of the Draft INRMP for your review and comment. One hard copy is being hosted at the Madison-Jefferson County Public Library and another at the Jefferson Proving Ground office, co-located with the Big Oaks National Wildlife Refuge Office. In conjunction with the hard copy is a digital copy that you may copy if you prefer. If you would like to provide comments, please do so by 3 December 2012.

Please send your comments directly to the email below or the following address:

Melissa Mertz  
NGB/A7AN  
3501 Fetchet Avenue  
Joint Base Andrews, MD 20762

If you have any questions during this public comment period, please do not hesitate to contact the undersigned at (240) 612-8427 or [melissa.mertz@ang.af.mil](mailto:melissa.mertz@ang.af.mil).

Sincerely,



Melissa Mertz  
Natural Resources Program Manager  
National Guard Bureau



29 October 2012

Re: Notice of Availability of Public Draft Integrated Natural Resources Management Plan (INRMP)  
for Jefferson Range, Ripley County, Indiana

James A. Glass, PhD  
Indiana Department of Natural Resources  
Division of Historic Preservation & Archaeology  
402 W. Washington Street, W274  
Indianapolis, Indiana 46204-2739

To Dr. Glass,

The National Guard Bureau and the Indiana Air National Guard (INANG) have completed a Draft INRMP for Jefferson Range. The INANG is responsible for the prudent management and use of 1,033-acre Jefferson Range, located just north of Madison, Indiana. Jefferson Range is located on land that was part of the former Jefferson Proving Ground (closed in 1994) and is surrounded by the Big Oaks National Wildlife Refuge. Jefferson Range is currently used by both the INANG and the US Air Force. The USFWS also has access to Jefferson Range when it is not being used by the INANG or the US Air Force. The Draft INRMP is currently available for public review and comment through 2 December 2012.

Part of the process of finalizing this INRMP requires providing an opportunity for review and comment to any additional agencies that might have a regulatory role in the implementation of the INRMP. The US Fish and Wildlife Service and Indiana Department of Natural Resources have been involved with the development of this INRMP since its initiation. Although we have not identified any potential impacts to cultural resources or any activities that might require Section 106 consultation, we would still like to provide you the opportunity to request a Draft INRMP.

If you would like a complete Draft INRMP to review, please send your request directly to the email below or the following address:

Melissa Mertz  
NGB/A7AN  
3501 Fetchet Avenue  
Joint Base Andrews, MD 20762

If you have any questions, please do not hesitate to contact the undersigned at (240) 612-8427 or [melissa.mertz@ang.af.mil](mailto:melissa.mertz@ang.af.mil).

Sincerely,



Melissa Mertz  
Natural Resources Program Manager  
National Guard Bureau

**State of Indiana, County of Jennings, SS:**

**PUBLIC NOTICE**

**NOTICE OF AVAILABILITY OF  
DRAFT INTEGRATED NATURAL  
RESOURCES MANAGEMENT PLAN**  
Jefferson Range, Ripley County, Indiana  
The Indiana Air National Guard and the  
National Guard Bureau propose to imple-  
ment an Integrated Natural Resource Man-  
agement Plan (INRMP) for Jefferson  
Range in Ripley County, Indiana. The  
INRMP helps manage and enhance the nat-  
ural resources and is consistent with the  
military mission of Jefferson Range. Jeffer-  
son Range is surrounded by Big Oaks Na-  
tional Wildlife Refuge, on the former Jeffer-  
son Proving Ground. The INRMP has  
been developed in coordination with the  
US Fish and Wildlife Service and the Indi-  
ana Department of Natural Resources and  
meets the requirements of Air Force Policy  
and the National Environmental Policy Act.  
A Draft INRMP has been prepared for Jeffer-  
son Range and is now available for pub-  
lic comment.

The public is invited to review the draft  
INRMP from 2 November through 2 De-  
cember 2012. The Draft INRMP may be re-  
viewed at:

a) Madison-Jefferson County Public Li-  
brary, 420 West Main Street, Madison, IN  
47250, (812) 265-2744. Hours of Operation  
are Mon-Thu 9:00 am - 9:00 pm, Fri 9:00  
am - 6:00 pm, Sat 9:00 am - 5:00 pm, Sun  
1:00 pm - 5:00 pm

b) Jefferson Proving Ground Office, 1661  
West JPG Niblo Road, Madison, IN 47250,  
(812) 273-2551. Hours of Operation are  
Mon-Thurs 6:00 am - 4:30 pm, closed Fed-  
eral holidays.

Comments on the Draft INRMP should be  
mailed before 3 December 2012 to: Nation-  
al Guard Bureau, ATTN: Melissa Mertz,  
National Resources Program Manager,  
NGB/A7AN, 3501 Fetchet Avenue, Joint  
Base Andrews, MD 20762.

For more information, contact Mrs. Melissa  
Mertz at (240) 612-8427 or melissa.mertz  
@ang.af.mil.

--PD, Nov. 1, 8, 2tc

Personally appeared before me the undersigned

Publisher of THE NORTH VERNON PLAIN DEALER,

A Public Weekly Newspaper of general circulation, printed and  
published in North Vernon, in the county aforesaid, who being  
duly sworn upon his oath saith that the notice of which the at-  
tached is a true copy was duly published in said paper for

..... 2 ..... weeks successively, the first of which publica-  
tion was on the 1st day of November 2012,  
and the last on the 8th day of November 2012.

.....  
Subscribed and sworn to before me this 9th ..... day of

November, 2012  
.....  
My Schaff ..... Notary Public

My commission expires 11-19-2014

**PUBLIC NOTICE**  
**NOTICE OF AVAILABILITY OF**  
**DRAFT INTEGRATED NATURAL**  
**RESOURCES MANAGEMENT PLAN**  
 Jefferson Range, Ripley County, Indiana  
 The Indiana Air National Guard and the National Guard Bureau propose to implement an Integrated Natural Resource Management Plan (INRMP) for Jefferson Range in Ripley County, Indiana. The INRMP helps manage and enhance the natural resources and is consistent with the military mission of Jefferson Range. Jefferson Range is surrounded by Big Oaks National Wildlife Refuge, on the former Jefferson Proving Ground. The INRMP has been developed in coordination with the US Fish and Wildlife Service and the Indiana Department of Natural Resources and meets the requirements of Air Force Policy and the National Environmental Policy Act. A Draft INRMP has been prepared for Jefferson Range and is now available for public comment.  
 The public is invited to review the draft INRMP from 2 November through 2 December 2012. The Draft INRMP may be reviewed at:  
 a) Madison-Jefferson County Public Library, 420 West Main Street, Madison, IN 47250, (812) 265-2744. Hours of Operation are Mon-Thu 9:00 am - 9:00 pm, Fri 9:00 am - 6:00 pm, Sat 9:00 am - 5:00 pm, Sun 1:00 pm - 5:00 pm  
 b) Jefferson Proving Ground Office, 1661 West JPG Niblo Road, Madison, IN 47250, (812) 273-2551. Hours of Operation are Mon-Thurs 6:00 am - 4:30 pm, closed Federal holidays.  
 Comments on the Draft INRMP should be mailed before 3 December 2012 to: National Guard Bureau, ATTN: Melissa Mertz, National Resources Program Manager, NGB/A7AN, 3501 Fetchet Avenue, Joint Base Andrews, MD 20762.  
 For more information, contact Mrs. Melissa Mertz at (240) 612-8427 or melissa.mertz@ang.af.mil.  
 --PD, Nov. 1, 8; 2tc

**State of Indiana, County of Jennings, SS:**

**Personally appeared before me the undersigned**

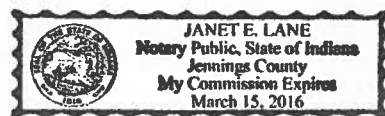
**Publisher of THE NORTH VERNON SUN,**

**A Public Weekly Newspaper of general circulation, printed and published in North Vernon, in the county aforesaid, who, being duly sworn upon his oath saith that the notice of which the attached is a true copy was duly published in said paper for**

2 weeks successively, the first of which publication was on the 6th day of November 2012, and the last on the 13th day of November 2012.

Schrock  
 Subscribed and sworn to before me this 14th day of

November 2012  
Janet E. Lane Notary Public



RECEIVED NOV 15 2012

RECEIVED NOV 15 2012

# Advertising Receipt

North Vernon Plain Dealer and Sun

P.O. Box 988  
528 E. O & M Avenue  
North Vernon, IN 47265  
Phone: (812) 346-3973  
Fax: (812) 346-8368

Dawn Johnson  
AMEC  
201 S. Capitol Ave., Suite 200  
INDIANAPOLIS, IN 46225

**Cust#:** 01112680-000  
**Ad#:** 01564260  
**Phone:** (805)252-4370  
**Date:** 10/25/12

**Ad taker:** DS      **Salesperson:**      **Classification:** 180

| Description                  | Start    | Stop     | Ins. | Cost/Day | Surcharges | Total |
|------------------------------|----------|----------|------|----------|------------|-------|
| 01 North Vernon Sun          | 11/06/12 | 11/13/12 | 2    |          |            | 29.58 |
| 02 North Vernon Plain Dealer | 11/01/12 | 11/08/12 | 2    |          |            | 29.58 |

**Payment Reference:****Total:** 59.16**Tax:** 0.00**Net:** 59.16**Prepaid:** 59.16**Total Due** 0.00**PUBLIC NOTICE****NOTICE OF AVAILABILITY OF****DRAFT INTEGRATED NATURAL****RESOURCES MANAGEMENT PLAN**

Jefferson Range, Ripley County, Indiana

The Indiana Air National Guard and the National Guard Bureau propose to implement an Integrated Natural Resource Management Plan (INRMP) for Jefferson Range in Ripley County, Indiana. The INRMP helps manage and enhance the natural resources and is consistent with the military mission of Jefferson Range. Jefferson Range is surrounded by Big Oaks National Wildlife Refuge, on the former Jefferson Proving Ground. The INRMP has been developed in coordination with the US Fish and Wildlife Service and the Indiana Department of Natural Resources and meets the requirements of Air Force Policy and the National Environmental Policy Act. A Draft INRMP has been prepared for Jefferson Range and is now available for public comment.

The public is invited to review the draft INRMP from 2 November through 2 December 2012.

The Draft INRMP may be reviewed at:

a) Madison-Jefferson County Public Library, 420 West Main Street, Madison, IN 47250, (812) 265-2744. Hours of Operation are Mon-Thu 9:00 am - 9:00 pm, Fri 9:00 am - 6:00 pm, Sat



**PUBLIC NOTICE**

NOTICE OF AVAILABILITY OF  
DRAFT INTEGRATED  
NATURAL RESOURCES  
MANAGEMENT PLAN  
Jefferson Range,  
Ripley County, Indiana

The Indiana Air National Guard and the National Guard Bureau propose to implement an Integrated Natural Resource Management Plan (INRMP) for Jefferson Range in Ripley County, Indiana. The INRMP helps manage and enhance the natural resources and is consistent with the military mission of Jefferson Range. Jefferson Range is surrounded by Big Oaks National Wildlife Refuge, on the former Jefferson Proving Ground. The INRMP has been developed in coordination with the US Fish and Wildlife Service and the Indiana Department of Natural Resources and meets the requirements of Air Force Policy and the National Environmental Policy Act. A Draft INRMP has been prepared for Jefferson Range and is now available for public comment. The public is invited to review the Draft INRMP from 2 November through 2 December 2012. The Draft INRMP may be reviewed at: Madison-Jefferson County Public Library, 420 West Main Street, Madison, IN 47250, (812) 265-2744. Hours of Operation are Mon-Thurs 9:00 am-9:00 pm, Fri 9:00 am-6:00 pm, Sat 9:00 am-5:00 pm, Sun 1:00 pm-5:00 pm. Jefferson Proving Ground Office, 1661 West JFG Niblo Road, Madison, IN 47250, (812) 273-2551. Hours of Operation are Mon-Thurs 6:00 am-4:30 pm, closed Federal holidays. Comments on the Draft INRMP should be mailed before 3 December 2012 to: National Guard Bureau, ATTN: Melissa Mertz, Natural Resources Program Manager, NGB/A7AN, 3501 Fitch Avenue, Joint Base Andrews, MD 20762. For more information, contact Mrs. Melissa Mertz at (240) 612-8427 or melissa.mertz@ang.af.mil.

C112-11/15

General Form No. 99P (Rev. 2009A)

ATTACH COPY OF ADVERTISEMENT HERE

AMEC Environment & Infrastructure

(Governmental Unit)

To: The Madison Courier

Jefferson

County, Indiana

Madison, IN 47250

**PUBLISHER'S CLAIM**

**LINE COUNT**

Display Master (Must not exceed two actual lines, neither of which shall total more than four solid lines of the type in which the body of the advertisement is set) -- number of equivalent lines

Head -- number of lines

Body -- number of lines

Tail -- number of lines

Total number of lines in notice

60

**COMPUTATION OF CHARGES**

60 lines, 1 columns wide equals 60 equivalent lines at 1.9511 cents per line

\$ 117.07

Additional charges for notices containing rule or tabular work (50 per cent of above amount)

Charge for extra proofs of publication (\$1.00 for each proof in excess of two)

TOTAL AMOUNT OF CLAIM

\$ 117.07

**DATA FOR COMPUTING COST**

Width of single column in picas 7.6

Size of type 7 point.

Number of insertions 12

Pursuant to the provisions and penalties of IC 5-11-10-1, I hereby certify that the foregoing account is just and correct, that the amount claimed is legally due, after allowing all just credits, and that no part of the same has been paid.

I also certify that the printed matter attached hereto is a true copy, of the same column width and type size, which was duly published in said paper 12 times. The dates of publication being as follows:

November 2nd, 2012 thru November 15th, 2012

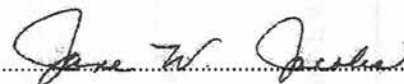
Additionally, the statement checked below is true and correct:

..... Newspaper does not have a Web site.

☒ Newspaper has a Web site and this public notice was posted on the same day as it was published in the newspaper.

..... Newspaper has a Web site, but due to technical problem or error, public notice was posted on .....

..... Newspaper has a Web site but refuses to post the public notice.



Date November 15, 2012

Title Publisher

-----Original Message-----

From: Padgett, Kim Marie [<mailto:KPadgett@dnr.in.gov>]

Sent: Friday, November 09, 2012 5:35 PM

To: Mertz, Melissa M Civ USAF ANG NGB/A7AN

Subject: Draft INRMP for Jefferson Range, Indiana

Hi Melissa,

The Indiana SHPO requests a copy of the Draft INRMP for Jefferson Range, Indiana. Hard copy would be preferable, if possible.

Thank you!

Kim

Kim Marie Padgett

Review Coordinator

Division of Historic Preservation and Archaeology Indiana Department of  
Natural Resources

402 W. Washington St., Rm W274

Indianapolis, IN 46204

Phone: (317) 234-6705

Fax: (317) 232-0693

Email: [KPadgett@dnr.in.gov](mailto:KPadgett@dnr.in.gov)



## NATIONAL GUARD BUREAU

3501 FETCHET AVENUE  
JOINT BASE ANDREWS MD 20762-5157

19 November 2012

Re: Public Draft Integrated Natural Resources Management Plan (INRMP) for Jefferson Range,  
Ripley County, Indiana

Kim Marie Padgett  
Indiana Department of Natural Resources  
Division of Historic Preservation & Archaeology  
402 W. Washington Street, W274  
Indianapolis, Indiana 46204-2739

To Ms. Padgett,

The National Guard Bureau and the Indiana Air National Guard (INANG) have enclosed a hard copy of the Public Draft INRMP for Jefferson Range as you requested. There is also a CD included with all the appendices and a complete digital version of the Public Draft INRMP. The INANG is responsible for the prudent management and use of 1,033-acre Jefferson Range, located just north of Madison, Indiana. Jefferson Range is located on land that was part of the former Jefferson Proving Ground (closed in 1994) and is surrounded by the Big Oaks National Wildlife Refuge. Jefferson Range is currently used by both the INANG and the US Air Force. The USFWS also has access to Jefferson Range when it is not being used by the INANG or the US Air Force. The Draft INRMP is currently available for public review and comment through 2 December 2012.

The US Fish and Wildlife Service and Indiana Department of Natural Resources have been involved with the development of this INRMP since its initiation. Although we have not identified any potential impacts to cultural resources or any activities that might require Section 106 consultation, we appreciate your interest and look forward to your comments. It is important to note that there is very little ground disturbance at Jefferson Range due to concerns about unexploded ordinance.

Please provide your comments by 31 December directly to the email below or the following address:

Melissa Mertz  
NGB/A7AN  
3501 Fetchet Avenue  
Joint Base Andrews, MD 20762

If you have any questions, please do not hesitate to contact the undersigned at (240) 612-8427 or [melissa.mertz@ang.af.mil](mailto:melissa.mertz@ang.af.mil).

Sincerely,

Melissa Mertz  
Natural Resources Program Manager  
National Guard Bureau

-----Original Message-----

From: Draeger-Williams, Cathy [<mailto:CDraeger-Williams@dnr.in.gov>]

Sent: Wednesday, December 19, 2012 4:12 PM

To: Mertz, Melissa M Civ USAF ANG NGB/A7AN

Subject: Jefferson Proving Grounds

Thank you for providing our office a copy of the Draft Integrated Natural Resource Management Plan for the Jefferson Proving Ground. Our office looks forward to assisting you with future projects. It is our understanding that the management of projects in regard to cultural resources will follow the ICRMP (2011) for the property. If there are any questions, please feel free to call or email.

Cathy Draeger-Williams

Archaeologist

Indiana Department of Natural Resources

Division of Historic Preservation and Archaeology

(317) 234-3791





## INDIANA AIR NATIONAL GUARD

JFAC-IN-DET2  
1661 WEST NIBLO ROAD  
MADISON IN 47250

09 January 2013

MEMORANDUM FOR: Absentee-Shawnee Tribe of Indians of Oklahoma  
Scott Miller, Governor  
2025 South Gordon Cooper Drive  
Shawnee, OK 74801

FROM: JFAC-IN-DET2

SUBJECT: Notice of Availability from Indiana Air National Guard (INANG) of Draft Integrated Natural Resources Management Plan (INRMP) for Jefferson Range

Jefferson Range in Ripley County, Indiana is in the process of developing its INRMP. The plan, drafted in accordance with the provisions of the Sikes Act (16 U.S.C. §670a et seq.) and Air Force Instruction 32-7064 (*Integrated Natural Resources Management*) covers management of natural resources on Jefferson Range, Madison, Indiana. The INRMP also provides guidance on compliance with federal laws and regulations governing natural resources. The purpose of the INRMP is to document the policies and desired future of the natural resources at Jefferson Range.

The Indiana Air National Guard (INANG) is responsible for the prudent management and use of 1,038 acres comprising Jefferson Range, which is located immediately north of the City of Madison, Indiana and approximately 30 miles northeast of Louisville, Kentucky. This land is federally owned by the US Army but is managed by the INANG. Jefferson Range is surrounded by Big Oaks National Wildlife Refuge, which are both on land previously occupied by the Jefferson Proving Ground. A site location map is enclosed.

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KENITH L. STONE, LtCol, IN ANG  
Commander

Enclosure



## INDIANA AIR NATIONAL GUARD

JFAC-IN-DET2  
1661 WEST NIBLO ROAD  
MADISON IN 47250

09 January 2013

MEMORANDUM FOR: Cherokee Nation  
Chadwick Smith, Principal Chief  
P.O. Box 948  
Tahlequah, OK 74465

FROM: JFAC-IN-DET2

SUBJECT: Notice of Availability from Indiana Air National Guard (INANG) of Draft Integrated Natural Resources Management Plan (INRMP) for Jefferson Range

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Commander

Enclosure





## INDIANA AIR NATIONAL GUARD

JFAC-IN-DET2  
1661 WEST NIBLO ROAD  
MADISON IN 47250

09 January 2013

MEMORANDUM FOR: Citizen Potawatomi Nation  
John A. Barrett, Chairman  
1601 South Gordon Cooper Drive  
Shawnee, OK 74801

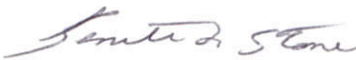
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KENITH L. STONE, LtCol, IN ANG  
Commander

Enclosure



## INDIANA AIR NATIONAL GUARD

JFAC-IN-DET2  
1661 WEST NIBLO ROAD  
MADISON IN 47250

09 January 2013

MEMORANDUM FOR: Delaware Nation  
P.O. Box 825  
Anadarko, OK 73005

FROM: JFAC-IN-DET2

SUBJECT: Notice of Availability from Indiana Air National Guard (INANG) of Draft Integrated Natural Resources Management Plan (INRMP) for Jefferson Range

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KENITH L. STONE, LtCol, IN ANG  
Commander

Enclosure





## INDIANA AIR NATIONAL GUARD

JFAC-IN-DET2  
1661 WEST NIBLO ROAD  
MADISON IN 47250

09 January 2013

MEMORANDUM FOR: Eastern Shawnee Tribe of Oklahoma  
Glenna J. Wallace, Chief  
P.O. Box 350  
Seneca, MO 64865

FROM: JFAC-IN-DET2

SUBJECT: Notice of Availability from Indiana Air National Guard (INANG) of Draft Integrated Natural Resources Management Plan (INRMP) for Jefferson Range

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Commander

Enclosure



## INDIANA AIR NATIONAL GUARD

JFAC-IN-DET2  
1661 WEST NIBLO ROAD  
MADISON IN 47250

09 January 2013

MEMORANDUM FOR: Forest County Potawatomi Community of Wisconsin  
Philip Shopodock, Chairman  
P.O. Box 340  
Crandon, WI 54520

FROM: JFAC-IN-DET2

SUBJECT: Notice of Availability from Indiana Air National Guard (INANG) of Draft  
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KENITH L. STONE, LtCol, IN ANG  
Commander

Enclosure





## INDIANA AIR NATIONAL GUARD

JFAC-IN-DET2  
1661 WEST NIBLO ROAD  
MADISON IN 47250

09 January 2013

MEMORANDUM FOR: Hannahville Indian Community  
Kenneth Meshigaud, Chairperson  
N14911 Hannahville B-1 Rd.  
Wilson, MI 49896

FROM: JFAC-IN-DET2

SUBJECT: Notice of Availability from Indiana Air National Guard (INANG) of Draft Integrated Natural Resources Management Plan (INRMP) for Jefferson Range

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Enclosure



## INDIANA AIR NATIONAL GUARD

JFAC-IN-DET2  
1661 WEST NIBLO ROAD  
MADISON IN 47250

09 January 2013

MEMORANDUM FOR: Kickapoo Tribe in Kansas  
Arlan Whitebird, Chairman  
P.O. Box 271  
Horton, KS 66439

FROM: JFAC-IN-DET2

SUBJECT: Notice of Availability from Indiana Air National Guard (INANG) of Draft Integrated Natural Resources Management Plan (INRMP) for Jefferson Range

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Commander

Enclosure





## INDIANA AIR NATIONAL GUARD

JFAC-IN-DET2  
1661 WEST NIBLO ROAD  
MADISON IN 47250

09 January 2013

MEMORANDUM FOR: Kickapoo Tribe of Oklahoma  
Marlon E. Frye, Chairman  
P.O. Box 70  
McCloud, OK 74851

FROM: JFAC-IN-DET2

SUBJECT: Notice of Availability from Indiana Air National Guard (INANG) of Draft Integrated Natural Resources Management Plan (INRMP) for Jefferson Range

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Enclosure



## INDIANA AIR NATIONAL GUARD

JFAC-IN-DET2  
1661 WEST NIBLO ROAD  
MADISON IN 47250

09 January 2013

MEMORANDUM FOR: Kickapoo Traditional Tribe of Texas  
Juan Garza, Jr., Chairman  
HC 1 Box 9700  
Eagle Pass, TX 78852


FROM: JFAC-IN-DET2

SUBJECT: Notice of Availability from Indiana Air National Guard (INANG) of Draft Integrated Natural Resources Management Plan (INRMP) for Jefferson Range

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## INDIANA AIR NATIONAL GUARD

JFAC-IN-DET2  
1661 WEST NIBLO ROAD  
MADISON IN 47250

09 January 2013

MEMORANDUM FOR: Miami Tribe of Oklahoma  
Thomas E. Gamble, Chief  
P.O. Box 1326  
Miami, OK 74255

FROM: JFAC-IN-DET2

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Commander

Enclosure



## INDIANA AIR NATIONAL GUARD

JFAC-IN-DET2  
1661 WEST NIBLO ROAD  
MADISON IN 47250

09 January 2013

MEMORANDUM FOR: Peoria Tribe of Indians of Oklahoma  
John P. Froman, Chief  
P.O. Box 1527  
Miami, OK 74355

FROM: JFAC-IN-DET2

SUBJECT: Notice of Availability from Indiana Air National Guard (INANG) of Draft Integrated Natural Resources Management Plan (INRMP) for Jefferson Range

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## INDIANA AIR NATIONAL GUARD

JFAC-IN-DET2  
1661 WEST NIBLO ROAD  
MADISON IN 47250

09 January 2013

MEMORANDUM FOR: Pokagon Band of Potawatomi Indians  
John Miller, Tribal Chairman  
58620 Sink Road  
Dowagiac, MI 49047

FROM: JFAC-IN-DET2

SUBJECT: Notice of Availability from Indiana Air National Guard (INANG) of Draft Integrated Natural Resources Management Plan (INRMP) for Jefferson Range

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Commander

Enclosure



## INDIANA AIR NATIONAL GUARD

JFAC-IN-DET2  
1661 WEST NIBLO ROAD  
MADISON IN 47250

09 January 2013

MEMORANDUM FOR: Prairie Band of Potawatomi Nation  
Steve Ortiz, Chairperson  
16281 Q. Road  
Mayetta, KS 66509

FROM: JFAC-IN-DET2

SUBJECT: Notice of Availability from Indiana Air National Guard (INANG) of Draft Integrated Natural Resources Management Plan (INRMP) for Jefferson Range

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## INDIANA AIR NATIONAL GUARD

JFAC-IN-DET2  
1661 WEST NIBLO ROAD  
MADISON IN 47250

09 January 2013

MEMORANDUM FOR: Stockbridge-Munsee Community Band of Mohican Indians  
Robert Chicks, President  
P.O. Box 70  
Bowler, WI 54416

FROM: JFAC-IN-DET2

SUBJECT: Notice of Availability from Indiana Air National Guard (INANG) of Draft Integrated Natural Resources Management Plan (INRMP) for Jefferson Range

Jefferson Range in Ripley County, Indiana is in the process of developing its INRMP. The plan, drafted in accordance with the provisions of the Sikes Act (16 U.S.C. §670a et seq.) and Air Force Instruction 32-7064 (*Integrated Natural Resources Management*) covers management of natural resources on Jefferson Range, Madison, Indiana. The INRMP also provides guidance on compliance with federal laws and regulations governing natural resources. The purpose of the INRMP is to document the policies and desired future of the natural resources at Jefferson Range.

The Indiana Air National Guard (INANG) is responsible for the prudent management and use of 1,038 acres comprising Jefferson Range, which is located immediately north of the City of Madison, Indiana and approximately 30 miles northeast of Louisville, Kentucky. This land is federally owned by the US Army but is managed by the INANG. Jefferson Range is surrounded by Big Oaks National Wildlife Refuge, which are both on land previously occupied by the Jefferson Proving Ground. A site location map is enclosed.

The INANG would like to provide your tribal council with the opportunity to review and comment on the Jefferson Range INRMP being developed. Consultation with Native American tribes or nations is required under the provisions of the National Historic Preservation Act regulations, Executive Order 13175 and Department of Defense Instruction 4710.02. If you would like to review the Jefferson Range INRMP, please request a copy from the Air National Guard Natural Resources Program Manager, Ms. Melissa Mertz via email [melissa.mertz@ang.af.mil](mailto:melissa.mertz@ang.af.mil) or phone 240-612-8427 to request a hard copy of the document within 30 days of receipt of this letter. With your advice and assistance, we hope to develop a cooperative relationship between your nation and the INANG.

A handwritten signature in dark ink, appearing to read "Ken Stone", is positioned above the typed name.

KENITH L. STONE, LtCol, IN ANG  
Commander

Enclosure



**The Delaware Nation**  
**Cultural Preservation Office**  
P.O. Box 825 - 31064 State Highway 281- Anadarko, OK 73005  
Phone: 405/247-2448 – Fax: 405/247-8905

NAGPRA ext. 1180  
Section 106 ext. 1181  
Museum ext. 1181  
Library ext. 1196  
Clerk ext. 1182

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February 12, 2013

RE:  
FROM: JFAC-IN-DET2

Dear Mr. Kenith L. Stone,

Thank you for consulting with the Delaware Nation. We appreciate your willingness to conduct proper consultation with our nation. We received your letter regarding the Notice of Availability from Indiana Air National Guard (INANG) of Draft Integrated Natural Resources Management Plan (INRMP) for Jefferson Range on February 12, 2013. However, this project does not lie within the Delaware Nation area of interest for the state of Oklahoma. Therefore, we will not be a consulting party.

Should you have any questions regarding this email or future consultation feel free to contact our offices at 405-247-2448 or by email [tfrancis@delawarenation.com](mailto:tfrancis@delawarenation.com).

Sincerely,

Tamara Francis Fourkiller  
Cultural Preservation Director

CC: Nikki Ahtone (Assistant Director)  
[nikkahtone@hotmail.com](mailto:nikkahtone@hotmail.com)  
405-247-2448



## NATIONAL GUARD BUREAU

3501 FETCHET AVENUE  
JOINT BASE ANDREWS MD 20762-5157

18 December 2012

To: Robert E. Carter, Jr.  
Director, Indiana Department of Natural Resources (IDNR)  
402 West Washington Street  
Indianapolis, IN 46204

Re: Concurrence and Signature Request, Indiana Air National Guard (INANG), Integrated Natural Resources Management Plan (INRMP) for Jefferson Range, Ripley County, Indiana

Dear Mr. Carter,

The National Guard Bureau and the INANG have completed the INRMP for Jefferson Range. The INRMP was provided as an 'External Draft' to your office, Big Oaks National Wildlife Refuge, and multiple offices within the Indiana Department of Natural Resources (IDNR). In addition, the 'Public Draft' was provided to the Indiana State Historical Preservation Office for review, and input from Native American tribes has been requested. We have enclosed the Draft Final INRMP, which incorporates the comments received during these reviews. We have also enclosed an errata sheet summarizing the comments and our response to them. All comments have been incorporated into the INRMP.

We appreciate your involvement and input on the INRMP and look forward to continuing to work together to manage the natural resources at Jefferson Range. One hard copy and one digital copy are enclosed. The hard copy has all the comments incorporated, while the digital files include both a version with all comments incorporated and a version with all the comments highlighted to facilitate your review. Please send a concurrence letter and/or completed signature page directly to the following address:

Melissa Mertz  
NGB/A7AN  
3501 Fetchet Avenue  
Joint Base Andrews, MD 20762  
[Melissa.mertz@ang.af.mil](mailto:Melissa.mertz@ang.af.mil)

If you have any questions concerning this request, please do not hesitate to contact Mrs. Mertz at (240) 612-8427 or [melissa.mertz@ang.af.mil](mailto:melissa.mertz@ang.af.mil).

Sincerely,

Melissa Mertz  
Natural Resources Program Manager  
National Guard Bureau

Enclosures





## NATIONAL GUARD BUREAU

3501 FETCHET AVENUE  
JOINT BASE ANDREWS MD 20762-5157

18 December 2012

To: Scott Pruitt  
US Fish & Wildlife Service  
620 South Walker Street  
Bloomington, IN 47403-2121

Re: Concurrence and Signature Request, Indiana Air National Guard (INANG), Integrated Natural Resources Management Plan (INRMP) for Jefferson Range, Ripley County, Indiana

Dear Mr. Pruitt,

The National Guard Bureau and the INANG have completed the INRMP for Jefferson Range. The INRMP was provided as an 'External Draft' to your office, Big Oaks National Wildlife Refuge, and multiple offices within the Indiana Department of Natural Resources (IDNR). In addition, the 'Public Draft' was provided to the Indiana State Historical Preservation Office for review, and input from Native American tribes has been requested. We have enclosed the Draft Final INRMP, which incorporates the comments received during these reviews. We have also enclosed an errata sheet summarizing the comments and our response to them. All comments have been incorporated into the INRMP.

We appreciate your involvement and input on the INRMP and look forward to continuing to work together to manage the natural resources at Jefferson Range. One hard copy and one digital copy are enclosed. The hard copy has all the comments incorporated, while the digital files include both a version with all comments incorporated and a version with all the comments highlighted to facilitate your review. Please send a concurrence letter and/or completed signature page directly to the following address:

Melissa Mertz  
NGB/A7AN  
3501 Fetchet Avenue  
Joint Base Andrews, MD 20762  
[Melissa.mertz@ang.af.mil](mailto:Melissa.mertz@ang.af.mil)

If you have any questions concerning this request, please do not hesitate to contact Mrs. Mertz at (240) 612-8427 or [melissa.mertz@ang.af.mil](mailto:melissa.mertz@ang.af.mil).

Sincerely,

Melissa Mertz  
Natural Resources Program Manager  
National Guard Bureau

Enclosures

Cc: USFWS Region 3



## United States Department of the Interior Fish and Wildlife Service



Bloomington Field Office (ES)  
620 South Walker Street  
Bloomington, IN 47403-2121  
Phone: (812) 334-4261 Fax: (812) 334-4273

February 4, 2013

Ms. Melissa Mertz, Natural Resources Program Manager  
National Guard Bureau  
3501 Fetchet Avenue  
Joint Base Andrews, MD 20762-5157

Dear Ms. Mertz:

This responds to your letter dated 18 December 2012 transmitting the Draft Final Integrated Natural Resources Management Plan for the Jefferson Range, Ripley County Indiana (INRMP) and requesting U.S. Fish and Wildlife Service (FWS) concurrence.

These comments have been prepared under the authority of the Fish and Wildlife Coordination Act (16 U.S.C. 661 et. seq.) and are consistent with the intent of the National Environmental Policy Act of 1969, the Endangered Species Act of 1973, as amended, and the U. S. Fish and Wildlife Service's Mitigation Policy.

Our letter of 20 July 2012 provided an overview of the INRMP, the Indiana Air National Guard's (INANG) primary document for managing the natural resources on Jefferson Range, and the coordination among INANG, the FWS, and the Indiana Department of Natural Resources (IDNR) under the Sikes Act Improvement Act (SAIA) of 1997, as amended. We also discussed the military mission at Jefferson Range and the relationship between Jefferson Range and the encircling Big Oaks National Wildlife Refuge (Big Oaks). Finally, we discussed some of the management goals and objectives proposed in the INRMP as they would affect the 1,038 acres in three separate parcels at Jefferson Range and the surrounding 50,000 acres that comprise Big Oaks.

We stated that the goals and objectives within the INRMP generally were consistent with the conservation of fish and wildlife resources within the constraints of the overall goal of Jefferson Range, but raised questions primarily about potential conflicts in landscape level management and management for multiple goals at Jefferson Range. We expressed particular concern that the wildland fire program appeared inconsistent with the management of large forest blocks for Indiana bat and other forest interior species. The Draft Final INRMP clarifies that landscape level management goals in the INRMP are designed to apply to Jefferson Range in conjunction with Big Oaks, and that existing forest blocks on Jefferson Range will be maintained.



## Endangered Species

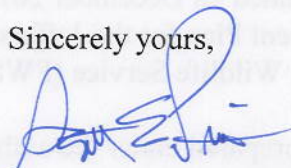
The proposed project is within the range of the Federally endangered Indiana bat (*Myotis sodalis*). If BFO Forest Management Guidelines (included as part of Appendix E of the INRMP) are adhered to, we concur that the proposed project is not likely to adversely affect the Indiana bat.

There is no designated critical habitat on Jefferson Range or the surrounding Big Oaks National Wildlife Refuge.

This precludes the need for further consultation on this project as required under Section 7 of the Endangered Species Act of 1973, as amended. However, should new information arise pertaining to INRMP development or implementation that could affect Indiana bat, or a revised species list be published (e.g., identification of running buffalo clover on areas covered by the INRMP) it will be necessary to reinitiate consultation.

We appreciate the opportunity to comment on the Draft Final INRMP. If you have any questions about our comments, please call Forest Clark at (812) 334-4261 (Ext. 206).

Sincerely yours,



Scott E. Pruitt  
Field Supervisor

cc: Big Oaks National Wildlife Refuge  
Indiana Division of Fish and Wildlife, Indianapolis, IN



# INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

## JEFFERSON RANGE

## RIPLEY COUNTY, INDIANA

### SIGNATURE PAGE

This Integrated Natural Resources Management Plan (INRMP) is a new INRMP for Jefferson Range and has been developed due to the presence of significant natural resources on Jefferson Range. These resources include the assumed presence of a federally listed endangered species (i.e., Indiana bat) and an active wildland fire management program. It meets the requirements for INRMPs per National Guard Bureau and Air Force policy, meets the intent of the Sikes Act, as amended (16 United States Code [USC] §670a et seq.), and contributes to the management of natural resources on military installations.

To the extent that resources permit, the US Fish and Wildlife Service, Indiana Department of Natural Resources, and the Indiana Air National Guard by signature of their agency representative, do hereby enter into a cooperative agreement for the conservation, protection, and management of natural resources present on Jefferson Range, Indiana. The intention of this agreement is to maintain sustainable ecological communities on Jefferson Range that integrate the interests and mission of the agencies charged with conservation, protection, and management of natural resources in the public interest. This agreement may be modified and amended by mutual agreement of the authorized representatives of the three agencies. This agreement will become effective upon the date of the last signatory and shall continue in full force until terminated by written notice to the other parties, in whole or in part, by any of the parties signing this agreement.

By their signatures below, or an enclosed letter of concurrence, all parties grant their concurrence with and acceptance of the following document.

### Approving Officials:

Lt Col Kenith Stone  
Indiana Air National Guard  
Range Commander

\_\_\_\_\_  
Date

Scott Pruitt  
US Fish and Wildlife Service  
Field Supervisor, Bloomington Field Office

\_\_\_\_\_  
Date

Robert E. Carter, Jr  
Indiana Department of Natural Resources  
Director

\_\_\_\_\_  
Date

02-15-13

3-7-13