

**Supplemental Information  
to the  
Programmatic Biological Assessment  
for the  
Revised Land and Resource Management Plan  
Daniel Boone National Forest**

**Effects on the Indiana Bat  
Associated with  
Prescribed Burning on the  
Daniel Boone National Forest**

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## **I. Proposed Action**

### **Programmatic Management Actions Associated with Prescribed Burning**

The use of prescribed fire is a management tool that will be utilized to attain and maintain some of the desired future conditions across the forest and may occur, depending on location and site-specific conditions, on a year-round basis. From a programmatic standpoint, the Revised Forest Plan anticipates that between 15,000 and 50,000 acres will be prescribed burned on an annual basis. It is realized that this level of prescribed burning may not occur every year. Most of the prescribed burning that will occur on the forest will be for the primary purpose of fuel reduction. Other purposes for prescribed burning include habitat improvement and site preparation. Further, it is likely that most of the burning in potential Indiana bat roosting habitat will take place during the winter-spring period with some occurring during the late summer and early fall. It is recognized that this action is likely to occur during the part of the year that Indiana bats are most actively roosting in trees (1 April thru 15 September). The Revised Forest Plan and associated Environmental Impact Statement should be considered as Appendices to this Supplemental BA.

The Revised Forest Plan EIS summarizes the anticipated prescribed burning program in Chapter 3 as follows:

*Over the planning period, it should be possible to increase the yearly average number of acres prescribed burned. As the vegetation structure within hardwood communities changes from a closed canopy with minimal fine fuel in the understory, to an open wood with a grassy understory, prescribed fires will take less time. Also, with time, less new firelines will need to be built, and more time can be devoted to burning. When the prescribed burn regime moves from restoration to maintenance, each location will require fire less frequently, allowing more acres to be entered into the program. Therefore, over the planning period, it is anticipated that more controlled fire can be applied every year.*

The EIS summarizes the anticipated acreage figures in Table 3-87 presented below. All of the types of burns shown in Table 3-87 have the potential for occurring in occupied and/or potential Indiana bat habitat.

**Table 3 - 87. Acres of yearly ecosystem management and fuel reduction prescribed burning per year, Alternatives C, C-1 and D.**

Type of burn	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Site preparation prior to planting for southern yellow pine reforestation	822	822	822	822	822	822	822	822	822	822
<b>Restoration of hardwood or mixed woodland, wooded grassland and wooded shrubland</b>										
<b>Wooded grassland/shrubland</b>	886	1,122	1,359	1,595	1,831	2,067	2,304	2,540	2,776	2,953
<b>Hardwood or mixed woodland</b>	3,775	4,782	5,788	6,795	7,802	8,808	9,815	10,822	11,828	12,583
<b>Subtotal of restoration burns</b>	4,661	5,904	7,147	8,390	9,633	10,876	12,119	13,362	14,604	15,537
<b>Understory burn for maintenance of existing fire-mediated habitat and fuel reduction*</b>										
<b>Objective per year</b>	9,517	12,274	15,031	17,788	20,545	23,302	26,059	28,816	31,574	33,641
<b>Anticipated range per year</b>	15,000	19,000	23,000	27,000	31,000	35,000	39,000	43,000	47,000	50,000
	7,500	9,500	11,500	13,500	15,500	17,500	19,500	21,500	23,500	25,000
	22,500	28,500	34,500	40,500	46,500	50,000	50,000	50,000	50,000	50,000

\*This acreage is the remainder after site preparation and restoration burn objectives.

As discussed in the Revised Forest Plan BA, the following analysis is programmatic. All future prescribed burning projects, based on Revised Forest Plan direction, are subject to second level, site-specific analysis and subsequent ESA Section 7 consultation with the USFWS through the BA/BE process (FSM 2670.31).

A prescribed burn project is typically comprised of the following operations: burn plan preparation/layout, line construction, ignition, and mop-up.

#### Burn Plan Preparation/Layout

The need for prescribed burning is determined in an area and logical boundaries are identified, using natural barriers where possible. A burn plan is developed which is a prescription for ignition of the burn. Strict parameters are developed under which the burn can take place. Boundaries are then identified and marked on the ground, generally with flagging done by a crew of 1 –3 people. The burn plan forms the foundation of the proposed action and is subject to site-specific analysis.

#### Line Construction

For those sections of line that are not natural or pre-existing boundaries (e.g. creeks, roads, lakes, etc.) a fireline is constructed. This is either a handline constructed with handtools such as leaf blowers or rakes (generally a line of mineral soil that is approximately 2 feet wide), or a line constructed by a dozer that would be one dozer blade wide. Dozer lines utilize waterbars on the steeper ground and will be seeded if determined to be necessary. In either type of line, hazard trees that pose a risk to human safety or the control of the fire are sometimes felled along the line. These trees may be within or outside the fireline. In either case they would be part of the site-specific analysis associated with an individual project. The precise method and location of line construction is also determined during project design and is subject to site-specific analysis.

### Ignition

Various lighting techniques are used to obtain the desired effects described in the burn plan. Ignition operations may consist of hand lighting with drip torches that utilize a mixture of gasoline and diesel fuel, fusees, and or spreading fire with a fire rake. Prescribed burns may also utilize helicopter ignition that consists of dropping plastic spheres resembling ping-pong balls that ignite after a time delay. This type of ignition is often used to burn larger areas. The precise method and location of ignition is determined during project design and is subject to site-specific analysis.

Once ignited the prescribed burn moves through the project area driven by wind and terrain. Flame lengths are usually 2 to 3 feet high and the fire does not normally burn down to the mineral soil.

### Mop-up

After ignition operations are completed and the prescribed burn has had adequate time to move through the project area, mop-up operations extinguish those areas that are still burning and pose a threat to fire control. Mop-up usually involves putting out burning or smoldering vegetation such as tree stumps, snags or downed logs. Mop-up does not occur unless the source is likely to cause the fire to spread outside of the control lines. Control is accomplished with water spray and/or hand tools. It may include felling burning snags that would fall outside the fire line.

## **Programmatic Estimate of Ground Disturbing Activities**

Ten prescribed burns on the DBNF were selected at random in order to characterize the size and type of fireline usually associated with prescribed fires on the forest. The size of the burns ranged from 25 to 1,517 acres (average size = 611 acres and total acres burned = 6,114). Fire lines were a combination of natural barriers (roads, streams, etc), hand lines and dozer lines totaling 21,617 feet. The following is a summary of the percentages of each type of fireline used:

- Natural barriers – 66%
- Hand lines – 9%
- Dozer lines – 25%

While the type of fire line that will be used in future prescribed burns is a site specific decision, this summary does provide a programmatic estimation of the type of line construction that can be anticipated during the next planning period on the DBNF.

## **II. Forest-wide Programmatic Effects of Prescribed Burning Activities**

The DBNF conducts prescribed burns to meet several objectives including ecosystem management. From a programmatic standpoint, prescribed fire may be used to manage habitat toward desired future conditions in most of the prescription areas on the DBNF. The Revised Forest Plan provides for most of the prescribed burning to occur in the Habitat Diversity Emphasis Prescription Area (376,000 acres). Prescribed fire is to be

used as a primary tool to restore upland communities. This area is described in detail in section 1K of the Revised Forest Plan. Two other general locations on the DBNF, the Cliffline Community (111,200 acres) and the Riparian Corridor (155,370 acres) Prescription Areas, may frequently serve as natural firebreaks and, thus have portions of those areas burned.

Chapter 3 of the Revised Forest Plan EIS contains a thorough description of the fire history of the DBNF and the use of prescribed burning to attain long-term desired future conditions of the forest community. To summarize, fire is a natural part of the forest ecosystem. The use of prescribed burning as a forest management tool is essential to the long-term development of healthy forests and the biota therein. Returning prescribed fire to the forest is a goal of the Revised Forest Plan. The absence of prescribed fire in the past has allowed several forest communities to develop into a species composition and structure that does not support forest-wide management goals.

Programmatic effects of prescribed burning on the Indiana bat are discussed in the following section.

### **III. Analysis of Effects of the Interdependent and Interrelated Actions Associated with Prescribed Burning Activities on the Indiana Bat**

Prescribed burning as described in the Revised Forest Plan will range in size from a few acres to several thousand acres and have the potential to occur in any season of the year. From a programmatic standpoint some potential effects to Indiana bats could be common to all types of prescribed burning. It is the programmatic effects that are analyzed in this Supplemental BA dealing with the Indiana bat.

#### **Direct and Indirect Effects**

During the non-hibernation season (April 1 thru 15 September), Indiana bats, especially females, roost in suitable trees across the forest. These trees range from live trees with exfoliating bark, hollow cavities or top damage to snags with hollow cavities or exfoliating bark. During the time period of May 1 thru July 31 young flightless bats may be present in maternity colonies.

#### **Burn Plan Preparation/Layout**

Much of the work associated with this stage of prescribed burning is administrative and, thus will have no impact on Indiana bats. However, during the actual layout of the of the future fire lines on the ground, roosting Indiana bats could be disturbed by people flagging trees. The noise associated with the human presence in the area can cause a bat to flush. This flushing activity could result in harm and harassment to the Indiana bat by altering its normal behavior pattern and possibly making it more susceptible to various predators during the daylight hours or result in mortality. The potential disturbance would only occur for a short time period while marking crews moved through the area. This activity will present a very minimal risk to either male or female bats or their young.

### Line Construction

During line construction activities, whether by hand line or dozer line, noise associated disturbance of roosting Indiana bats could occur. The noise associated with the human presence and/or dozer operation in the area can cause a bat to flush. This flushing activity could result in harm and harassment to the Indiana bat by altering its normal behavior pattern and possibly making it more susceptible to various predators during the daylight hours or result in mortality. The potential disturbance would only occur for a short time period while the fireline is being constructed. It is believed to present a very minimal risk to either male or female bats or their young.

Fireline layout and subsequent fireline construction attempt to avoid the removal of any large trees including snags. However, in some instances that are related to fire control and/or human safety, the removal of trees suitable for Indiana bat roosting, including snags, may become necessary. These individual trees could be removed during the winter when bats are not present or the tree could be monitored to determine if bats were utilizing it as a roost. However, from a programmatic standpoint, monitoring is not always 100 percent accurate and harm, harassment or mortality could result from the removal of trees closely associated with firelines. It is believed to present a very minimal risk to either male or female bats or their young due to the low probability that a tree with one or more Indiana bats would need to be removed for fireline construction.

### Ignition

As noted above, actual ignition of a prescribed burn can occur from a small crew of people using drip torches up to aerial ignition using a helicopter. The type of ignition to be used on a specific burn is a project level decision. However, programmatically, noise associated with any type of ignition activity can cause bats to be disturbed and potentially flush from their roosting tree. This flushing activity could result in harm and harassment to the Indiana bat by altering its normal behavior pattern and possibly making it more susceptible to various predators during the daylight hours or result in mortality. The potential disturbance would only occur for a short time period while the ignition activity is underway. It is believed to present a very minimal risk to either male or female bats or their young.

Fire crews will remain in the area and along the firelines for the duration of the prescribed burn. Their activity could disturb bats that were not flushed during the initial ignition activity. This flushing activity could result in harm and harassment to the Indiana bat by altering its normal behavior pattern and possibly making it more susceptible to various predators during the daylight hours or result in mortality. The potential for human disturbance along the fireline would occur periodically for the duration of the prescribed burn, usually a few hours. It is believed to present a very minimal risk to either male or female bats or their young.

Once ignition operations are complete, the prescribed fire moves through a project area according to the prescription delineated in the project level burn plan. However, programmatically both smoke and fire associated with the prescribed burn can affect roosting Indiana bats. It should be noted that fire in the forest community is part of the

natural disturbance regime for the DBNF. Other types of natural disturbance include rain and wind storms. Historically, management actions have combined to suppress the occurrence of fire on the forest. Prescribed burning is an action that attempts to restore a natural type of disturbance. Also central to the issue is the knowledge that Indiana bats have evolved with the presence of fire in their forested habitat.

However, roosting Indiana bats have the potential to be harmed by both the smoke and fire associated with prescribed burns. Roosting bats can and likely are flushed from their trees in response to smoke or the heat from the fire. This flushing activity could result in harm and harassment to the Indiana bat by altering its normal behavior pattern and possibly making it more susceptible to various predators during the daylight hours or result in mortality. It is believed to present a very minimal risk to either male or female bats. In fact, for adult bats the act of flushing from areas within an area being burned may be beneficial in that it results in the survival of the bat.

If bats do not flush from their roosting sites, for whatever reason, they may become subject to both heavy smoke and high heat conditions. Either condition could lead to mortality and result in the take of an Indiana bat. The likelihood of harming a bat would certainly depend on how high up in a tree it was roosting and the intensity of the fire and/or smoke in that location. Radio-telemetry data indicates that Indiana bats roost at various heights ranging from as low as six feet to over fifty feet from the ground. Even higher roosting is certainly likely, depending on the physical condition of the roost tree. During the time period when Indiana bats are actively roosting in trees (April 1 thru September 15) take could occur as a result of heat and smoke associated with prescribed burning.

During the portion of the year that young Indiana bats are flightless the potential for take to occur would increase. These bats would be incapable of flushing from a roost tree and would not have the option of avoiding the effects of smoke and fire by flying away. To minimize the potential for this type of take to occur the Revised Forest Plan has a forest-wide standard designed to protect young Indiana bats during their flightless period.

***DB-FIRE-8.*** *Prescribed burning is not to occur within known Indiana bat roosting areas between May 1 and July 31.*

The actual determination of known roosting areas is part of second level, site-specific analysis associated with each prescribed burning project. Known roosting areas are determined in several ways prior to conducting burns in suitable roosting habitat during the above time period. If Indiana bats are present in the area it is assumed that they are females and, during this period of the year, have young. Methods include, but are not limited to:

1. Reviewing past research and monitoring records for Indiana bat roosting areas
2. On site review of the project area to determine if suitable roosting habitat is currently present

3. Monitoring the area according to USFWS approved protocol to determine if Indiana bats are using the area

Nevertheless, the potential still exists for maternity sites to occur within a prescribed burn project area. Thus, take could occur as a result of prescribed burning from the direct and indirect effects of smoke and/or fire and the actions related to conducting prescribed burns.

#### Mop-up

Mop-up operations occur after the fire has moved through the project area. These actions are performed by a small crew of people anywhere from immediately after the fire has passed through a specific site up to several hours after the entire prescribed burn has been completed. The noise associated with the human presence and perhaps some mechanical equipment in the area can cause a bat to flush if it had remained in the area during the burn or returned to the area immediately after the fire had moved through the area. This flushing activity could result in harm and harassment to the Indiana bat by altering its normal behavior pattern and possibly making it more susceptible to various predators during the daylight hours or result in mortality. The potential disturbance would only occur for a relatively short time period while the integrity of the fireline is being assured. It is believed to present a very minimal risk to either male or female bats or their young.

Standing snags that are on fire or smoldering could be felled during mop-up operations if they pose a threat to human safety or pose a threat to losing control of the prescribed fire outside the firelines. Any Indiana bat remaining in such a tree is unlikely due to the prior disturbance in the area and the fact that the tree would be on fire. However, the possibility does exist and the felling of a burning tree could result in harm or harassment to the Indiana bat by altering its normal behavior pattern and possibly making it more susceptible to various predators during the daylight hours or result in mortality. It is believed to present a very minimal risk to either male or female bats.

Spot fires can and do occasionally occur outside of planned firelines. These spot fires usually result from burning embers blowing across the firelines. During the prescribed burn and mop-up operations, fire crews are in the immediate area and these unplanned burn areas seldom exceed  $\frac{1}{4}$  acre. Should these spot fires continue to grow in size they are declared a wildfire and additional resources brought into the area to bring the escaped fire under control. Actions taken during wildfire control are not required to adhere to standards established in a Forest Plan. In such occurrences the loss of roost trees could cause additional harm, harassment or mortality to the Indiana bat. Indiana bats flushed from trees could result in harm and harassment by altering its normal behavior pattern and possibly making it more susceptible to various predators during the daylight hours or result in mortality. The control of spot fires is believed to present a very minimal risk to either male or female bats.

## **Cumulative Effects to the Indiana Bat**

Cumulative effects are those effects of future State, local, or private actions that are reasonably certain to occur within the action area of the DBNF. This programmatic BA addresses only those activities that are authorized by the Revised Forest Plan on lands that are under the jurisdiction of the U.S.D.A. Forest Service. Thus, any future State, local, or private actions that could potentially occur on the DBNF would require a permit from the Forest Service and will require compliance with the consultation provisions of Section 7 of the ESA as a second level, site-specific analysis of an individual project. There are no additional State, local or private actions reasonably certain to occur that result in prescribed burning on the DBNF. Therefore, cumulative effects, as defined by the ESA, will not occur.

## **Interrelated and Interdependent Effects on the Indiana Bat**

Activities associated with prescribed burning projects are listed in the first section of this supplement. The size, location, intensity and duration of individual prescribed burns depend on the site-specific conditions and needs associated with a specific project. From a project level, site-specific standpoint, actions associated with prescribed burning projects, other than the direct effects associated with smoke and heat, will generally be designed into a project in such a way so that the Indiana bat is not negatively affected by the project action or so that adverse effects to Indiana bats are minimized.

Programmatically, long-term benefits to Indiana bat habitat are likely to be a result of prescribed burning. Prescribed fire will be a major tool utilized during the next planning period to return forest habitat to more natural conditions. These conditions have been thoroughly discussed with the Prescription Area descriptions in the Revised Forest Plan. Perhaps of most benefit to the Indiana bat will be a more open forest condition brought about as a result of prescribed burning. Flight areas will be less restricted by excessive mid-story vegetation. More sunlight exposure of the forest floor will allow understory vegetation to become reestablished along with its insect compliment. Thus, the foraging food base for Indiana bats is expected to increase as natural diversity is increased throughout the forest community. Prescribed fire will also result in the creation of snags and/or trees with bark conditions suitable for Indiana bats. While some snags will be created others will be consumed as a result of prescribed burning. Prescribed burning for fuel reduction purposes will help to minimize the occurrence of catastrophic wild fires which are much more likely to consume existing snags. With or without fire on the landscape snags are, by their very nature, ephemeral. The average standing time for a snag on the DBNF is five years (M. Angel, personal communication). Indiana bats usually have several roosting trees at any one time and certainly must be adapted to finding new roosting sites. Thus, as snags are created, in part as a result of prescribed burning activities, Indiana bats will continue to have this vital roosting habitat present on the forest.

The fall swarming period (September 1 thru December 1) is a time of year that the Indiana bat is particularly sensitive to disturbance. The Revised Forest Plan designates a

Significant Bat Cave Prescription Area for all Indiana bat caves on the forest with 50 or more Indiana bats. The prescription area itself is a ¼ mile radius around the cave opening that remains relatively undisturbed by management activities, year round. An objective within this Prescription Area specifically pertains to prescribed burning and is designed to minimize this type of disturbance during the fall swarming season. Known swarming areas on the forest occur in conjunction with the significant Indiana bat hibernacula. The Revised Forest Plan provides direction, in the form of an Objective, limiting the occurrence of prescribed burning within five miles of these cave openings during the fall swarming period.

*1.J-Objective 1.B. Generally avoid prescribed burning within five miles of significant Indiana bat hibernacula between September 1 and December 1.*

It is possible that prescribed burning on other areas of the forest could disturb Indiana bats during the swarming season. This disturbance could occur from smoke drifting into the area of a significant Indiana bat cave. However, the general avoidance of burning within five miles of these locations minimizes the likelihood of this risk.

All known swarming areas occur in conjunction with significant Indiana bat caves. It is possible that Indiana bats swarm in areas at unknown locations and these could be disturbed by prescribed burning activities. If and when new swarming areas are identified, they will be addressed during project level, site-specific analysis. However, the possibility does exist that prescribed burning could result in harm or harassment to the Indiana bat during the fall swarming season by altering its normal behavior pattern and possibly making it more susceptible to various predators during the daylight hours or result in mortality. It is believed that prescribed burning would present only a very minimal risk to disturbing swarming behavior of the bats.

#### **IV. Determination of Effects for the Indiana Bat**

From a programmatic standpoint, prescribed burning may occur on between 15,000 to 50,000 acres annually during the planning period. Prescribed burning is an important forest management tool that will be utilized in the attainment of desired future conditions on the DBNF. In the long term the implementation of the Revised Forest Plan should result in improved habitat conditions for the Indiana bat through the attainment of prescription area desired future conditions.

Fire is a natural part of the disturbance regime on the DBNF and Indiana bats have likely adapted to these conditions. For example, Indiana bats may roost high enough in trees to avoid the heat, smoke and disturbance effects of fire. However, Indiana bats may be flushed from their roosting trees by activities associated with prescribed burning. The probability of negatively impacting these bats, although small, does exist as previously discussed in the analysis section.

Thus, the potential remains for Indiana bats to be harmed, harassed, or killed by the direct and indirect effects of heat and smoke and the related actions associated with prescribed

