SHAWNEE NATIONAL FOREST
BIOLOGICAL EVALUATION/ASSESSMENT OF FEDERAL THREATENED AND ENDANGERED SPECIES
FOR THE
FUELS TREATMENTS IN THE TORNADO BLOWDOWN AREA, MISSISSIPPI BLUFFS RANGER, SHAWNEE NATIONAL FOREST

December 4, 2008

EXECUTIVE SUMMARY

With the proper guidelines and safety measures followed, the use of prescribed fire and some mowing, chipping, and cutting of dead tree parts (woody material) to treat fuel accumulations associated with a 2006 tornado will have a beneficial affect on the flora and fauna and the cumulative effects are positive or neutral.

The proposed actions includes prescribed burning of 5,650 acres in various-sized units to reduce woody fuels that have accumulated from a tornado that struck in the private and public forests west of Kinkaid Lake on the Forest and in southern Illinois. The proposed actions are not likely to jeopardize the continued existence of any of these species on the Shawnee National Forest or range wide. Also they should be beneficial to the habitats for the Indiana bats especially in the long term. Not implementing the proposed actions in the project areas could result in a loss of both plant and animal diversity due to severe wildfires and lack of important ecological disturbances. Proposed actions also include about 25 acres of mowing, chipping, and cutting of dead trees and parts near private residences.

The following are Forest standards and guidelines for prescribed fire and tree cutting that would be implemented along with the proposed action to avoid possible negative effects on Indiana bats in the project area as part of the implementation of the proposed actions:

- FW51.1.2.4. For the protection of Indiana bat or gray bat maternity roosts or foraging habitats, no prescribed burns shall be conducted in upland forests between May 1 and September 1 and in bottomland forests between April 1 and September 1. The tornado, blow-down project area is entirely upland forest.

- All standing, dead trees would be retained unless removal is necessary for human safety or to accomplish project objectives.

- Greater than five miles from known hibernacula or maternity roosting habitats, dead trees that are potential roost trees cannot be removed between April 1-September 30 unless they are evaluated and/or surveyed to confirm non-use by

roosting bats and documented in a biological evaluation (USDA Shawnee National Forest Land and Resource Management Plan, 2006; Appendix H-p. 288).

- Greater than five miles from known hibernacula or maternity roosting habitats, potential roost-trees, including live hardwood trees with exfoliating bark, should not be removed during the roosting periods-April 1-September 30-unless necessary for human safety or to accomplish project objectives. Removal of potential roost trees during the roosting period requires evaluation and/or surveys to determine non-use by roosting bats. Surveys would be those identified in Forest Plan standards (USDA Shawnee National Forest Land and Resource Management Plan, 2006; Appendix H-p. 287).

This biological assessment is tiered to the Programmatic Biological Opinion for the Shawnee National Forest Plan (Collins 2005) and the Final Environmental Impact Statement for the 2006 Land and Resource Management Plan for the Shawnee National Forest.

INTRODUCTION

Fire has been a natural force shaping ecosystems for hundreds of thousands of years (Lyon et al. 2000a). In recent years fire has been suppressed in eastern forests. This has lead to a change of vegetative species composition in eastern forests including on the Shawnee National Forest. In some areas this has reduced the ability of fire tolerant species such as oaks (*Quercus* spp.) and hickories (*Carya* spp.) to regenerate. Additionally these forests are increasingly becoming more cluttered with a dense understory (McKenzie 1999). In the project area, a recent tornado has greatly increased the clutter. Most forest dwelling animals evolved with and are well adapted to historic fire regimes. Highly mobile animals such as birds, large mammals, and bats are able to easily escape from ground fires (Lyon et al. 2000d; Carter et al. 2000). Animals with less mobility such as small mammals and herptiles often escape from fire by seeking refuge underground and also suffer low mortality rates (Ford et al. 1999). The highest mortality is usually suffered by young animals such as bird nestlings that are unable to flee or hide (Lyon et al. 2000d).

Recently there has been a resurgence in the use of fire as a management tool for fuels, wildlife, and forest management (Ford et al. 2002 and Kapler Smith 2000). The current paradigm is that when used correctly fire can be a highly beneficial tool for reducing fuel loads and habitat management for forest ecosystems.

LOCATION

The project area includes approximately 5650 acres west of Kinkaid Lake in the path of a 2006 tornado (see attached project area maps). The project area is located entirely in Jackson County and includes both public and private lands.

PROPOSED ACTION

The Proposed Action includes:

- Prescribed burning on about 5650 acres of Forest land and some cooperating private land. The project area will be subdivided (up to 19 units) to make burns more manageable, yet keeping unit size large enough to mimic pre-settlement fire regimes and keep per acre costs down. Burns will be lit by hand or with the aid of a helicopter.
- Fuels (~25 acres) around selected structures mostly on private lands would be mowed, chipped, or cut prior to burning, to provide defensible space and reduce intensity during prescribed burning. Only dead and down, tree and tree parts would be cut up as part of this treatment.
- Improving preexisting control features or building up to 9 miles of firelines where necessary. Approximately 1 of the 9 miles will be done with heavy equipment such as a bull dozer or tractor. Eight of the 9 miles of line will be done with a leaf-blower and/or rake.

Burns would be conducted between September 1 and May 1. First entry on all units should be made within two years. Successive burns would be made after 2-5 years. Burn frequency may be adjusted if monitoring shows that the desired future condition is already reached or is not going to be reached within 10-15 years.

The following are Forest standards and guidelines for prescribed fire and tree cutting that would be implemented are part of the proposed action to avoid possible negative effects on Indiana bats in the project area as part of the implementation of the proposed actions:

- FW51.1.2.4. For the protection of Indiana bat or gray bat maternity roosts or foraging habitats, no prescribed burns shall be conducted in upland forests between May 1 and September 1 and in bottomland forests between April 1 and September 1. The tornado, blow-down project area is entirely upland forest.

- All standing, dead trees would retained unless removal is necessary for human safety or to accomplish project objectives.

- Greater than five miles from known hibernacula or maternity roosting habitats, dead trees that are potential roost trees cannot be removed between April 1-September 30 unless they are evaluated and/or surveyed to confirm non-use by roosting bats and documented in a biological evaluation (USDA Shawnee National Forest Land and Resource Management Plan, 2006; Appendix H-p. 288).

- Greater than five miles from known hibernacula or maternity roosting habitats, potential roost-trees, including live hardwood trees with exfoliating bark, should not be removed during the roosting periods-April 1-September 30-unless necessary for human safety or to accomplish project objectives. Removal of potential roost trees during the roosting period requires evaluation and/or surveys to determine non-use by roosting bats. Surveys would be those identified in

Forest Plan standards (USDA Shawnee National Forest Land and Resource Management Plan, 2006; Appendix H-p. 287).

With inclusion of these standards and guidelines in the proposed action, it is fully compliant with the Tier 1 Programmatic Biological Opinion for the Forest Plan (Collins 2005). This biological assessment is tiered to the Programmatic Biological Opinion for the Shawnee National Forest Plan (Collins 2005) and the Final Environmental Impact Statement for the 2006 Land and Resource Management Plan (Forest Plan) for the Shawnee National Forest and the Forest plan.

CURRENT AND DESIRED FUTURE CONDITION (FOREST PLAN DIRECTION)
The Forest Plan provides management direction for the project area. This direction is described under two management prescriptions.

Even-Aged Hardwood Forest (EH) Management Prescription provides for the production of high-quality hardwoods. Management provides for the maintenance of the oak-hickory forest-type and ecological restoration of areas that have been planted with non-native pine. The desired future condition is a continuous, closed-canopy forest interspersed with permanent and temporary openings. The proposed action directly addresses the management of this prescription within the project area through the application of management actions including prescribed burning. The proposed project is designed to enhance the project area by encouraging the establishment of oaks and hickories.

Water-Supply Watershed (WW) Management Prescription provides for the protection of water quality in municipal water-supply watersheds, including Kinkaid Lake. The desired future condition is maintenance of the landscape in mature and old-growth, hardwood forests including oak-hickory forests and some larger, openlands (grasslands and shrubs) to protect water quality of important water supplies. Prescribed burning, some timber management, and invasive species control are activities that can occur in this management area. The proposed actions that would reduce the effects of severe wildfires and maintain/enhance oak-hickory forests are consistent with this prescription.

ALTERNATIVES
Alternative 1: No Action.
Under this alternative, the Forest Service would carry out no actions including no treatments of the tornado damage and no maintenance of oak-hickory forests. Fire severity risks would remain high.

Alternative 2: Proposed Federal Action
See Proposed Action Above.

SCOPING AND SURVEYS
Specific habitat surveys of the project and analysis areas were conducted in October and November of 2007. The area was surveyed many times by Steve Widowski, wildlife

biologist on the Mississippi Bluffs Ranger District in association with many district projects in the vicinities since 1992. The surveys consisted of examining habitats within the project and analysis areas as well as existing effects. Also, Ava Cave was surveyed for bats utilizing a harp trap in early October, 2007 to determine bat species in the project vicinities. No bats of any species were caught or seen during this survey during fall swarming periods at southern Illinois caves.

The current list of Federally-listed Threatened (T), Endangered (E) and Proposed (P) Species in Illinois according to the U.S. Fish and Wildlife Service, Region 3 website (www.fws.gov/midwest/endnagered/lists/illinois-cty) was accessed on 12/20/2007 for this evaluation. This list (revised in September 2007) was reviewed for current listings, habitat and known location information for the project county. Public scoping on this project is being conducted. Internal scoping comments, species distribution records and site-specific field surveys in the project areas indicate the following (see below) Federal Threatened and Endangered species are thought to occur, or have habitat on the Shawnee National Forest in the project area vicinities.

IRREVERSIBLE EFFECTS AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Irreversible commitments of resources are those that cannot be regained, such as the extinction of a species or the removal of mined ore. Irretrievable commitments are those that are lost for a period of time, such as the temporary loss of timber productivity in normally forested areas that are kept clear for use as a power-line rights-of-way or a road. Resources analyzed in this assessment are those that could be affected by the proposed action. Given the mitigation measures planned under the proposed action, no long-term negative impacts to any of these resources are anticipated; therefore, no irretrievable or irreversible commitments of resources are associated with the proposed action.

Vegetation Resources

There are no known irreversible effects on vegetation resources from the selection of any alternative. Weed prevention practices will be followed. Overall, the effects on native, shade intolerant vegetation resources in the project areas would be positive from the proposed action as species diversity of the native flora are maintained. There would some negative effects on shade tolerant vegetation species that had invaded more xeric habitats (drier habitat) in the absence of fire in the project areas.

There would be negative effects on many native plants and communities that are xeric and fire associated and positive effects on mesic and shade dependent species from the no action alternative. No known, federal threatened or endangered plants species would be affected as none are currently known from the project areas.

Wildlife Resources

There are no known irreversible effects on wildlife resources from the selection of any alternative. Overall, direct and indirect effects on native wildlife and wildlife habitats would be positive as result of the proposed actions as native habitats are improved and

maintained. No action would have some small amounts of negative direct and indirect effects on the native wildlife and existing habitats but none of these would be irreversible and result in the loss of viability of any wildlife species during the 10-15 year project planning horizon.

EFFECTS ON FEDERAL THREATENED AND ENDANGERED SPECIES

Project and Cumulative Effects Background Information

The geographic boundary of cumulative effects for terrestrial species is primarily the uplands of western Southern Illinois in the Shawnee Hills and the watershed for Kinkaid Lake and the Big Muddy River and its floodplain south of Kinkaid Lake. These are the geographic areas where most terrestrial animal populations from the project area interact with others of their species and where habitats in the project area are affected by landscape scale habitat changes and modifications. Wildlife resources farther downstream in the Big Muddy River and Mississippi Rivers were excluded from consideration based on the resources being outside of, or isolated from measurable effects of the proposed activities due to the large amounts of agricultural land in these areas south and west of the project area and the barriers these lands presents to most forest wildlife species. The analysis for cumulative effects takes into account all known past actions, the proposed action, present actions, and reasonably foreseeable future actions, that could or will affect the analysis areas.

The temporal boundary for the cumulative effects analysis is the 15-20 year life of the Forest Plan (2006) for present and future actions. The plan actions on National Forest for the next 15-20 years are logical actions for the Forest during these timeframes. Actions on non-federal land in the project area vicinity are anticipated to be similar to present actions on these areas during this timeframe. The temporal boundaries for past actions are the 19th, 20th, and 21st centuries following European settlements where natural and man-induced disturbances and non-disturbances formed the forests and landscapes of today. This timeframe also includes all the developments of private individuals and municipal and state governments including residential and agricultural developments, transportation systems, and utility developments.

Past actions in the project area vicinities were varying amounts of farming, grazing, land clearing of forest and old fields for agriculture and residential developments, pine and hardwood plantation establishment, timber harvest, recreational facility construction and maintenance, abandoned well and cistern filling, road construction, maintenance and use, power line construction and maintenance, homesteads, user-created equestrian and hiker trails, unauthorized user-created all terrain vehicle (ATV) trails, increased equestrian trail use especially in the last ten years, mining, tree planting, and timber stand improvements including tree thinning and use of herbicides to reduce vegetative competition, ATV and off highway vehicle (OHV=4-wheel drive and sport utility vehicles (SUV) and trucks and off-road motorcycles) use, outdoor recreational uses (hunting, fishing, and hiking), wildfires, prescribed burning, fire suppression, wildlife opening construction and

maintenance, artifact hunting and collection, pond and waterhole construction, and reservoir construction and use.

Present actions in the project area vicinities include trail maintenance, construction and use of existing trails; power line maintenance, ATV (mostly unauthorized on National Forest) and OHV use, timber harvest (predominantly on private lands), agricultural management (row cropping and pasture) on private lands, fires (wild and prescribed), fire suppression, National Forest system trails and some user-created equestrian trails, road maintenance and use, tree planting, reservoir management and bank erosion control, trail rehabilitation, continued and increasing equestrian use; recreational facility management and maintenance, and outdoor recreation use (hiking, hunting and fishing). For bats, white-nose syndrome in native bats in the northeast is a disease that has a possibility of affecting native, cave and mine hibernating and roosting bats across their entire range. The Indiana bat, a species that could occur in the project area, is one of the species that has been affected in the Northeast.

Reasonably foreseeable future actions in the project area vicinities include all of the above present actions, proposed actions including another 6000-7000 acres of prescribed burning on National Forest adjacent and primarily north of the project area, and some repeat of the past actions including residential and agricultural development on private lands.

Animals

Based upon the most current (revised September 2007) distribution list of federally-listed threatened, endangered, and proposed species for Jackson County in Illinois, the following Federal Threatened and Endangered animals are known from current and historical records from Jackson county, and the project area county is identified as unoccupied, suitable habitat or historical habitat for them: gray bat, and Indiana bat (www.fws.gov/midwest/endnagered/lists/illinois-cty). Least tern and pallid sturgeon are also known from Jackson County, Illinois but there is no habitat for either species in the project area and neither would be directly or indirectly affected by planned actions. Therefore the latter 2 species would not be included in this evaluation.

Gray Bat (*Myotis grisescens*) - Federal Endangered

Gray bats roost in caves in both winter and summer. Different caves are used in different These caves are usually located within 1-2 km of foraging habitats. Gray bats are known to forage over rivers, lakes and streams (Gardner and Hoffman l986). In Illinois, gray bats are known to occur in Pope and Hardin Counties. The only known roosts are privately owned and located in Hardin and Pope Counties (Carter 2005). The largest roost is in Hardin County near a limestone quarry. One lone gray bat was observed during winter cave surveys in 2007 in small cave in Pope County. Neither site will be affected under any of the proposed alternatives. There are some historical records of individual gray bats from silica mines in Union and Alexander counties; however none have been identified in winter and summer bat surveys in these mines since the early 1990's.

Bat surveys (mist netting) in the late 1990's in little Kinkaid Creek, north of the project area did not result in capture of any gray bats. Recent harp net trapping of the entrance of Ava Cave in fall 2007, the largest cave close to the project area also did not result in capture or observation of any bats (Widowski, personal observations 2007).

Cumulative Effects: All the locations where this species has been documented in southern Illinois are in areas outside of the proposed project area. All known gray bat locations are > 10 miles from the project area. Alternatives 1-2 will have no effect on the gray bat. With no effects there are no cumulative effects. No further analysis is needed unless additional information is brought forward prior to or during project implementation. In the case of new information, we will initiate informal consultation with the U.S. Fish and Wildlife Service.

Indiana Bat (*Myotis sodalis*) - Federal Endangered

Indiana bats have been documented currently or historically in most counties in southern Illinois (Carter 2005; Herkert, ed. 1992) including the project area county. Indiana bats hibernate in caves and mines during the winter. Maternity colonies are found primarily beneath loose tree bark on dead or dying trees during the summer months. Male Indiana bats have been documented roosting in a variety of structures including loose tree bark and abandoned mines (Menzel et. al. 2001). When roosting within the forest males are usually found solitarily. In these cases, males have been found roosting in a variety of habitats and can be considered a generalist with regards to forest type. Males and non-reproductively active females have been found gathering in large numbers in abandoned mines and caves during the summer months, often called bachelor colonies (Carter 2002). A hibernacula cavern for the species is located in southwestern Jackson County, Toothless Cave, approximately 8 miles from the project area. During the summer months, maternity colonies have been located and extensively studied at Oakwood Bottoms near the town of Grand Tower, Jackson Co., IL, approximately 8 miles from the project area.

In the Midwest including within the boundaries of the Shawnee National Forest, most maternity colonies of Indiana bats are located in bottomland or riparian type habitats. Some roosts, usually alternate roosts, have been located in upland habitats. However, these are rare and are usually in close proximity to bottomland or riparian areas where the majority of the colonies' roosts are located. Maternity colonies are known from two locations in the Mississippi River valley. One colony is located in the greentree reservoir and the surrounding forests at Oakwood Bottoms and the other is found in the Bluff Lake area and on Union County Conservation Area. Carter (2003) and Feldhamer and Carter (2005) recorded most roost trees at the Oakwood location within the greentree reservoir west of the Big Muddy Levee. Most foraging activity was recorded from the surrounding bottomland and floodplain forests. Limited foraging was recorded in the upland forest; this was the least preferred habitat.

Bat surveys (mist netting) in the late 1990's in little Kinkaid Creek, north of the project area did not result in capture of any Indiana bats. Recent mist netting surveys in summer

of 2008 (June 4 and 5, 2008) in an area with many potential bat roost trees within the Blowdown project area did not result in the capture of any Indiana bats. A total of 5 red bats (*Lasiurus borealis*) were captured in three net sets during that survey. Recent harp net trapping of the entrance of Ava Cave in fall 2007, the largest cave close to the project area also did not result in capture or observation of any bats (Widowski, personal observations 2007).

Habitats in the project area are primarily upland, hardwood forests. There are small amounts of riparian forests in some of the lower and wider areas of the stream systems especially those that drain into Kinkaid Lake.

A good summary of the possible direct effects of burning on bats can be found in Carter et al. (2000) and in Collins (2005). Given the long history of fire in North America (Van Lear and Harlow 2002), bats have most likely evolved to co-exist with the threat of fire. Jackson (2005) examined bat activity before and after prescribed burns and found that burning had no effect on bat species diversity or abundance. He did correlate bat diversity and abundance with forest stand density (tree density). Forest stands with lower stand densities had higher bat diversity and abundance. These stands were typical of areas that had been subject to prescribed burns that resulted in less cluttered habitats with lower tree densities. Jackson (2005) found that bat diversity and abundances were highest at 9.0 m2/ha and decreased as forest stand density increased to 20 m2/ha. In recent work in Arkansas, male Indiana bats were radio tracked to roost sites within recently burned areas. Over 85% of the located roosts were in forests that were either burned or subject to timber harvests (Prescott 2005). In West Virginia, a maternity colony was discovered in an area that had been thinned 4-5 years previously and had a wildfire 3 years earlier. The timber harvest and wildfire decreased the overstory to 25% of its original density (Ford 2005). In central Indiana, an Indiana bat maternity roost tree was found in an area that was burned every 1-2 years. It is unclear if the fire created the snag, however, bats continued to use the tree each summer despite annual burning until the tree fell from natural decomposition (Schneck 2005). When burning, efforts were made to preburn or clear a ring of about 30 feet around the known roost tree to act as a fire break from the regular prescribed burn (Schneck 2005). Female evening bats (*Nycticeius humeralis*) have been radio-tracked to roosts under exfoliating bark in areas in South Carolina that were burned only a few days prior (Carter 2005).

The research that has examined the effects of fire on bats suggests that bats likely behave in a similar fashion as other highly-mobile flying animals. Birds are often observed leaving areas currently being burned with little or no mortality to adult animals. Many often return shortly after the fire has past through (Dickson 2000). Even when exposed to possibly higher predation pressures, it is highly unlikely that bats will remain in the roost if faced with fire and or smoke. While many bats are faithful to roosts, Indiana bats are quick to abandon them when faced with minimal disturbance, even during daylight hours (Carter 2005). The greatest threat to bats would be during the time when young are not volant. However, unlike birds, bats are able to carry their young while flying (Davis 1970) which minimizes this threat.

While fire has the ability to consume snags (roosting resources), often snags are not consumed or are not consumed entirely. Additionally, many new snags are created as trees are injured or killed by the heat of the fire. While there may be a short-term direct loss of snag resources, ultimately the creation of new snags should offset any loss as a result of the fire. Burning can also affect insect communities, which in turn can affect food resources for bats. However, typical burns leave pockets of unburned habitat that act as refuges and sources for insect recolonization. Given the very high reproductive potential of insects, populations should return back to preburn levels quickly. The improved habitat should further allow insect populations to increase to densities greater than those found prior to burning (Lyon et al. 2000b and 2000c). Jackson (2005) found that insects dramatically increased both in terms of density and diversity within stands that were thinned and burned. Thinned and burned stands had more open canopies allowing for greater amounts of ground cover to establish which increased the food resources for insects, ultimately increasing the insects and food resources for bats (Jackson 2005). While some recommendations call for the forests around hibernacula and maternity colonies to "not be dramatically altered" and "be maintained in as natural state as possible" (NatureServe 2005), these same recommendations do not incorporate the findings of the most recent research and also that fire was historically a natural event in eastern forest ecosystems (Carter et al. 2002; Jackson 2005; Prescott 2005).

Research has also shown that insect communities change as a result of burning. Insect densities decrease initially after the burn and then increase as new succulent vegetation emerges (Lyon et al. 2000b and 2000c, Jackson 2005). Over the long-term, densities of insects remain unchanged or even increased. Insect composition changes with the changes in the vegetation communities (Lyon et al. 2000b and 2000c); however there is no data to suggest that these changes are dramatic enough to have an effect on the foraging ability of Indiana bats.

Collins (2005) identified the effects of prescribed burning and timber harvest or cutting (includes thinning and timber stand improvement) on Indiana bats. Fire-line construction, smoke from burns, and the actual prescribed burning that include implementation of Indiana bat standards and guidelines that identify seasonal cutting and burning periods to avoid affects on roosting and hibernating bats would result in little if any real effects on individuals or populations of Indiana bats in the project area. These standards would reduce the size and overall possibility of negative effects of prescribed fire on individuals and the overall population of Indiana bats in the project area. It is anticipated that the prescribed burning within the proposed action should result in a net increase in the foraging and roosting habitats for Indiana bats in project area in both the short and long term (Collins 2005).

Maternity Colony and Bottomland and Floodplain Forest Foraging Habitat:
In the proposed project, burning would not be done in areas where maternity roosts are likely to be found. Burning would not be done during periods when some tree roosting bats would be non-volant and unable to fly. Past work on the Shawnee National Forest suggests this period is from late May through early July (Carter 2005) and most planned work would be October 1 through mid-April. Most of this time, bats would not be present

in tree roosts and/or would be able to fly out of and/or into burned areas during and after burns. In the fall, bats have started accumulation of fat reserves for winter and their ability to travel vast distances allows them to relocate to alternate areas such as swarming habitat if needed (Kurta and Murry 2002; Carter 2005).

Summer Male and Bottomland and Upland, Floodplain Forest Foraging Habitat: Virtually any forest habitat with some snags present can be considered suitable for male Indiana bats. Therefore, burns within any forested or partially forests habitat have the potential for impacting male Indiana bats. Mist net surveys of the Shawnee National Forest from 1999 through 2004 resulted in a very limited number of male Indiana bats captured on the majority of the forest – none outside of maternity or bachelor colony areas. The densities of male Indiana bats outside of maternity or bachelor colony areas (see below) are likely to be very low. None are known from the project area from past surveys. Burning in these areas would likely impact very few animals if any. Historically fire was a frequent event in these landscapes. Hotter fires that could scar trees are documented to have occurred in pre-settlement periods about every 12.4 years in the Missouri Ozarks of the Midwest (Guyette and Cutter 1991) and at least about every 23.0 years in a barrens-forest mosaic in southern Indiana (Guyette et. al. 2003). The pre-settlement fire frequency in the oak forests of the Shawnee should fall within this range (Fralish et. al. 2002).

It is unlikely that this highly-volant species has survived for 100's of thousands of years without adapting to co-exist with fire (Carter et al. 2002). Even in the unlikely event that male Indiana bats are killed as a result of management activities, it will have no effect on the reproductive potential of the species and would not decrease genetic diversity. Indiana bats follow a random promiscuous mating pattern that takes place during large gatherings (swarms) prior to hibernation. Males mate with multiple females and visa-versa (Whitaker and Hamilton 1998). Additionally, the large distances that Indiana bats have been recorded migrating prior to mating and hibernation suggests in the unlikely event of a reduction in the number of local males, females would still find plenty of males for reproduction (Kurta and Murry 2002). There is no data to suggest that burning or activities related to burning have a negative effect on male Indiana bats and recent anecdotal data suggests that burning may in fact benefit male Indiana bats. Additionally, opening the mid story, promoting regeneration of the oak/hickory community, and other benefits of burning far outweigh the possible effects that might happen to a few male Indiana bats.

Alternatives 1 (No Action) will have a long-term, negative, indirect effect on unoccupied, suitable habitat for the Indiana bat in the project areas as forests succeed to communities dominated by thin-barked trees in the absence of fire. Unoccupied, suitable Indiana bat roosting and foraging habitats such as oak/hickory forests would be replaced by beech/maple forests and both suitable roosting and foraging habitats for the species would be reduced in unoccupied, suitable habitats within the project area and in southern Illinois. Without fire many forests suffer from poor regeneration and tree species composition dramatically changes (Wade et al. 2000). Suppressing fire allows maples, beech and other thin barked species to establish. This reduces the thick barked species

such as oak and hickory. With regards to Indiana bat roosting habitat, tree species is probably not as important as bark characterizes when trees die. Thick barked species such as oaks and hickories commonly become excellent roost trees after death. Thin barked species are not used as often because the bark does not maintain the large sheets needed to shelter Indiana bats.

Cavern Roosting – Bachelor Colonies and Hibernacula:
No Indiana bat hibernacula or bachelor roosting caverns are known from the project area or are within 5 miles of the project area boundaries. Therefore, the proposed action should not have any affects on cavern roosting Indiana bats.

Snag Removal:
The project area has a great abundance of large, dead hardwood trees as a result of the tornado damage, many of which should be suitable roost trees. Activities related to burning include the possibility of cutting of a few dead trees near firelines during their construction when it is impossible to go around and/or clear around them. These actions would include management guidelines to protect Indiana bats and other tree roosting bats during tree removals. These management guidelines are as follows: Greater than 5 miles from known hibernacula or maternity-roosting habitats, dead trees that are potential roost trees (those with exfoliating bark) cannot be removed between April 1 and September 30, unless they are evaluated and/or surveyed to confirm non-use by roosting bats and documented in a biological evaluation (Shawnee National Forest Plan 2006, Appendix H, p. 288). If any dead Indiana bats are found, care must taken in handling them and notification must be made to the U.S. Fish and Wildlife Service (Shawnee National Forest Plan 2006, Appendix H, p. 291). Dead bat specimens should be placed in a plastic bag and refrigerated as soon as possible following discovery (Shawnee National Forest Plan 2006, Appendix H, p. 291).

In summation, no caves or mines with known Indiana bat populations will be affected in any way by these projects, so hibernation habitat will not be directly or indirectly affected. Foraging habitat will not be negatively affected by the proposed projects. The foraging habitat in the project area will be raised in quality by opening the canopy and maintaining or improving forest diversity.

Cumulative effects

In southern Illinois, forest acreage had increased from 1985 to 1998 (Schmidt et al. 2000) but oak/hickory forest is being replaced by sugar maple and American beech forests in the Illinois Ozarks (Fralish et. al. 2002 and Parker and Ruffner 2004). White-nose syndrome has not been identified to date in native bats in Illinois (Kath, personal communication to Steve Widowski about recent surveys in Magazine Mine, Mine 30, and Griffith Cave, 2/2008). At this point in time, we do not know if the disease will spread to bats hibernating or roosting in mines and caves in Illinois.

Responding to an unprecedented die-off of thousands of bats in New York, biologists and researchers from around the country are working to identify a fungus found on

hibernating bats, and to assess the threat to bat populations nationwide. The disease, dubbed "white-nosed syndrome" because of the presence of a white fungus around the muzzles of some affected bats, is a major concern to the bat conservation community (USFWS Ecological Services 2008). White-nose syndrome was first detected at caves and mines in New York in 2007, where it is believed to be associated with the deaths of approximately 8,000 to 11,000 bats. This winter (2008) the disease has again been found at the previously infected New York sites, and has spread to several other sites there as well as one site in Vermont and Massachusetts. Wildlife managers, including the US Fish and Wildlife Service, the Illinois Department of Natural Resources , and the US Forest Service are concerned about the outbreak because bats congregate by the thousands in caves and mines throughout the eastern US to hibernate during winter months. This behavior, and the fact that many species of bats migrate considerable distances from summer habitats to winter hibernation sites, increases the potential that the disease could spread to hibernation sites in Illinois.

Biologists from the Illinois Department of Natural Resources examined many of the larger Indiana bat hibernacula in southern Illinois during January and February of 2008, and have thus far found no presence of this new and potential damaging infectious agent (Forest Service email 2008). The Shawnee National Forest has been in communication with the Marion Office of the US Fish and Wildlife Service to discuss the implications of this new disease. The USFWS has indicated that at the present time, there is no evidence that white-nosed syndrome is currently posing a risk to the Indiana bat in southern Illinois. Mortality to Indiana bats appears at this time to be confined to New York, Vermont, and Massachusetts. The mortality that has thus far been documented does not warrant modifications in "reasonable and prudent measures" issued by the USFWS to the Forest in the December 2005 BO.

Taking into account all known, present, past, and future actions in or immediately adjacent to the project areas including farming, timber harvesting, grazing, residential developments, and the future additional prescribed burning of up to 6,800 additional acres adjacent to the project area; there would be no short term cumulative effects on Indiana bats from the no action alternative as trees and understories are not disturbed during bat use periods. There would be no short term changes in Indiana bat populations in the project area. However, there would be long term, negative, indirect cumulative effects on unoccupied, suitable habitats for Indiana bats as oak/hickory forests decline in diversity and abundance in the project areas as a result of no management actions or disturbances. Associated with these, longer term, negative, indirect effects on Indiana bats and their roosting and foraging habitats, no increases in Indiana bat populations in the project area would be predicted from the no action alternative. There is a possibility that there could be some future declines in populations if white-nose syndrome disease spreads to native bats that hibernate and/or roost in mines and caves in Illinois regardless of the vegetation management; however no declines associated with this disease are predicted to date for the project area vicinities.

Taking into account all known, past, present and future actions identified above, the proposed action that includes approximately 5,650 acres of prescribed burning and the

cutting of approximately 25 acres of down and dead tree parts on private lands for fuels reduction would have no short term, negative effects on a few individual bats and their prey and no effects on overall bat populations in the project area. Forest Plan standards and guidelines would protect and greatly reduce any negative effects on Indiana bat roosting or foraging habitats. Implementation of standards and guidelines would reduce the chances of direct bat encounters resulting from any reductions of unknown, roost trees and from smoke disturbances of roost trees and any known or unknown cave and mine hibernacula in the project areas. Implementation of standards and guidelines that limit the season of burning in alternative two would also reduce the amount of any, short term, indirect, negative effects on Indiana bat prey and their habitats. Cumulative effects would be no measurable changes in Indiana bat populations in the project areas in the short term and an increase in populations in the long term as oak/hickory forest is improved and maintained with positive indirect effects on bat foraging and roosting habitats and no negative effects on hibernation habitats. This predicted increase in populations could change and there could be possible declines in populations in the future if white-nose syndrome disease spreads to native bats that hibernate and/or roost in mines and caves in Illinois regardless of the vegetation management. However, no declines associated with this disease are predicted to date for the project area vicinities.

Alternative 2 (Proposed Action) should not have any effects on known or highly likely, potential foraging and roosting resources for Indiana bats since none are known from the project area or close vicinity. Prescribed fire may temporarily result in a reduction in snag abundance (Lyon et al. 2000a). However, while burns may consume some snags, others are created in the process (Widowski, 31 years of post-burn observations). Except for immediate snag removal, fire should not have a long-term effect on snag densities.

The proposed action (Alternative 2) would maintain oak/hickory forests in the project area vicinities. This should result in a corresponding increase in unoccupied, suitable foraging and roosting habitats for the species, and slight, positive cumulative effects on the species in the project areas and in southern Illinois.

Determination

Implementation of prescribed burning with application of standards and guidelines would have positive direct and indirect effects on habitats and on Indiana bats through the improvement of foraging habitats and therefore would have a MAY AFFECT, NOT LIKELY TO ADVERSELY AFFECT determination on Indiana bat habitat and populations in the project area and on the Forest.

Rationale:
No Indiana bat winter habitat will be affected. There will be improvements to foraging habitat in both the short and long term in Alternative 2. There will generally be no or very minor direct impacts to Indiana bats from these proposed projects with implementation of standards and guidelines. With the overall positive effects on foraging habitats, the proposed actions will not likely adversely affect Indiana bats. No overall negative effects on populations of Indiana bats are predicted from the proposed actions as

cumulative effects would be overall positive for the species and its habitat in the project area vicinity.

Table 2. Summary of the effects on federally-listed threatened, endangered, or candidate species.

Species	Federal Status of the Species (E=endangered)	Habitat	Alternative 1. No Action	Alternative 2 Proposed Action
Gray Bat	E	Caves and mines; rivers & reservoirs adjacent to forests	No direct, indirect, or cumulative effects.	No direct, indirect, or cumulative effects.
Indiana Bat	E	Caves, mines (hibernacula); small stream corridors with well developed riparian woods; upland forests (foraging)	No direct, or indirect effects. Possible negative cumulative effect of lack of forest regeneration/openings = reduced roosting and foraging habitats.	No direct effects on the species with burning only from 9/1-5/1 allowed. Indirect positive effects = creation of new roost trees and improvement (reductions in forest stand densities) of foraging habitats. Overall, positive cumulative effects on habitat.

Plants

No federal endangered or threatened plant species are listed (USFWS revised list of Federal endangered, threatened or candidate species September 2007) or are currently known from the project area county. Floristic surveys and/or threatened, endangered, and sensitive plant surveys have been performed in the proposed project areas at various times over the last several decades by botanists, ecologists and others including most recently by Beth Shimp and Susan Corey, botanists on the Shawnee National Forest.. Available literature and current information were also reviewed in addition to the field visits. The field visits helped in determining whether or not potential habitat existed at

these sites for federal threatened and endangered plant species. No Federal Threatened or Endangered plant species are known from historical records from the project area.

CONCLUSIONS

Alternatives 1-2 would have no effects on the gray bat because neither the species nor any habitat for the species would be affected by any of the planned alternative actions. There is a possibility of indirect, positive effects and positive cumulative effects on one terrestrial T&E animal (Indiana bats). There maybe some possible, negative effects on a few Indiana bats from the cutting of some small amounts of standing, dead trees and live trees with broken tops for fuel reduction purposes around some private residences. However, the proposed actions are not likely to jeopardize the continued existence of any of the species on the Shawnee National Forest or range wide. Additionally, the proposed actions are likely to improve forest conditions for Indiana bats in the long-term.

This evaluation makes a determination of No Effect for Least Tern, Gray Bat, and Pallid Sturgeon and a determinations of May Effect, Not Likely to Adversely Affect (Prescribed burning) for the Indiana bat.

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LIST OF PREPARERS INCLUDING CONSULTATION AND COORDINATION

Stephen Widowski, Wildlife Biologist, Shawnee National Forest

The above Biological Evaluation of Federal Threatened and Endangered Species prepared for the proposed Natural Areas Burn Project has been reviewed by the U.S. Fish and Wildlife Service and their concurrence noted.

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