



United States Department of the Interior



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June 10, 2009

Mr. David Whittekiend, Forest Supervisor
Mark Twain National Forest
401 Fairgrounds Road
Rolla, Missouri 65401

ECOLOGY

Dear Mr. Whittekiend:

This document is the U.S. Fish and Wildlife Service's (Service) programmatic biological opinion (Programmatic BO) amendment, based on our review of the proposed changes to the Mark Twain National Forest's (MTNF) Programmatic Biological Assessment (Programmatic BA) and additions to the Standards and Guidelines of the 2005 Forest Plan (USFS 2005a). The MTNF is located in the following Missouri counties: Barry, Bollinger, Boone, Butler, Callaway, Carter, Christian, Crawford, Dent, Douglas, Howell, Iron, Laclede, Madison, Oregon, Ozark, Phelps, Pulaski, Reynolds, Ripley, Saint Francois, Sainte Genevieve, Shannon, Stone, Taney, Texas, Washington, Wayne, and Wright. This programmatic BO amendment addresses the effects of the proposed action on running buffalo clover (*Trifolium stoloniferum*) and addresses updates to the status of the species for the Indiana bat (*Myotis sodalis*).

This programmatic BO amendment is based on information provided in the January 26, 2009 amendment to the June 14, 2005 Programmatic BA (USFS 2005b) for this Forest Plan Revision, telephone and electronic mail conversations with Jody Eberly of your staff, field investigations, and other sources of information. A complete administrative record of this consultation is on file at the Missouri Ecological Services Field Office. This Programmatic BO amendment tiers to the 2005 Programmatic Biological Opinion (USFWS 2005) and therefore much of the information on Indiana bats will not be repeated in this document, but instead will be supplemented with the new information. The running buffalo clover was not analyzed in the 2005 Programmatic BO.

Consultation History

The MTNF completed a Programmatic BA for the 2005 Forest Plan in June 2005. The Service issued a non-jeopardy Programmatic BO for the Indiana bat and Mead's milkweed (*Asclepias meadii*) in September 2005. In February, 2008 Jody Eberly (MTNF) and Theresa Davidson, of my staff, discussed the implications of White Nose Syndrome on Indiana bats and the analysis done for the 2005 Forest Plan programmatic BA and BO. Over the next month, the Service and Missouri Department of Conservation (MDC) conducted population surveys in Missouri caves

and discovered that Missouri's hibernating population of bats was significantly lower than the estimates used in the 2005 analyses. On June 4, 2008 the Service sent the MTNF a letter regarding White Nose Syndrome and the new Indiana bat population estimates and requested a new probability of take analysis. On July 15, 2008, the MTNF responded to that letter and agreed to undertake a new probability analysis and informally consult with the Service.

In September 2008, Jody Eberly informed Theresa Davidson and Paul McKenzie, of my staff, that during a recent Forest Plan monitoring trip on the Potosi Ranger District, running buffalo clover was re-discovered at an old introduction site. Since there were no running buffalo clover plants extant at the time of the 2005 Forest Plan revision, the MTNF made a "no effect" determination at the time. With the plants' rediscovery, the MTNF, in coordination with the Service, decided to write new Forest Plan Standards and Guidelines to protect and manage for running buffalo clover and complete an analysis of effects for the species.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The purpose of this amendment to the Programmatic BO is to analyze potential impacts to running buffalo clover and Indiana bats from activities that implement the 2005 Forest Plan. Revised population estimates for the Missouri population of Indiana bats indicate significant changes since the 2005 programmatic documents were prepared. In addition, a new threat known as White Nose Syndrome (WNS) has also affected the several bat species including the Indiana bat.

In 2005, the MTNF determined that the implementation of the Forest Plan would have "no effect" on running buffalo clover because there were no extant populations on National Forest lands in Missouri. In September 2008, monitoring after a recent prescribed burn, documented the presence of running buffalo clover at an old re-introduction site. With this re-appearance, the MTNF determined that the "no effect" determination was no longer valid.

The MTNF is proposing the addition of eight new Standards to the 2005 Forest Plan to direct management of running buffalo clover sites on the MTNF. No other changes to the original proposed action (2005 Forest Plan Revision) are proposed. A complete description of the action can be found in the 2005 Programmatic BO on pages 2 through 15. The new Standards are as follows:

- Prescribed burning at running buffalo clover sites shall only be done outside the season when plants are flowering and setting seed.
- Prescribed burning at running buffalo clover sites shall only be done at intervals of 5 years or greater unless site specific monitoring by the MTNF Botanist indicates that a shorter interval may be needed in order to maintain running buffalo clover viability at the site.
- Grazing on running buffalo clover sites shall only be done to control vegetation competing with running buffalo clover and only after consultation with the District or

MTNF wildlife biologist. A grazing schedule must be agreed to by the biologist prior to any livestock use. Do not mow, plow, or disc the running buffalo clover site, and do not graze, or otherwise disrupt plants until seed has set.

- When necessary to apply herbicide within 25 feet of running buffalo clover plants, herbicide must be applied under the direct supervision of an individual who knows how to identify running buffalo clover.
- All herbicide use within 25 feet of running buffalo clover plants must be applied by hand using spot application treatments and during conditions when winds will not cause spray to drift toward running buffalo clover plants.
- Timber harvest at running buffalo clover sites will be individual tree harvest only.
- No timber harvest at a running buffalo clover site should reduce the total basal area of the site by more than 30 BA in a single harvest. Timber harvests should be done at least 10 years apart.
- Prior to any timber harvest activity, running buffalo clover sites must be delineated by a wildlife biologist or botanist. During all timber harvest activities, these sites must be protected from physical disturbance caused by heavy equipment.

A running buffalo clover site is defined as any area that contains one or more living running buffalo clover plants in close proximity to each other and which normally include all the area at least 50 feet in radius from the outermost rooted crowns. Under consultation with the MTNF botanist/ecologist, a site may be delineated with a radius other than 50 feet if site-specific conditions warrant.

STATUS OF THE SPECIES

Running buffalo clover

Running buffalo clover is a species that has shown great recovery potential if habitat is protected and managed. The species was listed in 1987 with one known population in West Virginia. Today approximately 100 populations of running buffalo clover exist (USFWS 2007). Many of these populations are very small and vulnerable and display a cyclic pattern of decline and increase over time. The Recovery Plan (USFWS 2007) indicates that even small populations are valuable for the continued existence of running buffalo clover due to high genetic diversity.

Distribution

Running buffalo clover occurs in mesic habitats with partial to filtered sunlight, where there is a prolonged pattern of moderate, periodic disturbance, such as mowing, trampling, or grazing. It is most often found in regions underlain with limestone or other calcareous bedrock, but not exclusively. It has been reported from a variety of habitats, including mesic woodlands, savannahs, floodplains, streambanks, sandbars (especially where old trails cross or parallel intermittent streams), grazed woodlots, mowed paths (e.g., in cemeteries, parks, and lawns), old logging roads, jeep trails, skidder trails, mowed wildlife openings within mature forest, and steep ravines.

Running buffalo clover has been collected historically from Arkansas, Illinois, Indiana, Kansas, Kentucky, Missouri, Ohio, and West Virginia. There were very few reports rangewide between 1910 and 1983. Prior to 1983, the most recent collection occurred in 1940 in Webster County, West Virginia (Brooks 1983). Although thought to be extinct (Brooks 1983), running buffalo clover was rediscovered in 1983 in West Virginia. At the time of listing only one population was known to exist. Soon after being listed, several additional populations were discovered in Indiana, Ohio, Kentucky, and West Virginia. Populations were not rediscovered in the wild in Missouri until 1994.

Rangewide Status

Extant populations of running buffalo clover are known from approximately 100 populations in three ecoregions: Hot Continental, Hot Continental Mountainous, and Prairie Division (Bailey 1998). For recovery purposes, the populations are divided into three regions based on proximity to each other and overall habitat similarities. These regions are Appalachian (West Virginia and Southeastern Ohio), Bluegrass (southwestern Ohio, central Kentucky, and Indiana), and Ozark (Missouri). The majority of populations occur within the Appalachian and Bluegrass regions. Kentucky has the most populations of running buffalo clover, followed by West Virginia, Ohio, Indiana, and Missouri. The largest populations of running buffalo clover occur on the Monongahela National Forest in West Virginia. In 2005, the total number of ranked populations included: 10 A-ranked, 25 B-ranked, 27 C-ranked, and 38 D-ranked. A-ranked populations are the largest (over 1,000 individuals) and occur in highly suitable habitat, while D-ranked populations are small (less than 30 individuals) and may occur in somewhat marginal habitat (USFWS 2007).

Population Dynamics

Running buffalo clover usually acts as a perennial species, forming long stolons that root at the nodes. Plants produce erect flowering stems, 10-30cm tall that send out long basal runners (stolons). The flowering stems have two large trifoliate leaves below a 9-12mm round white flower head (Gleason and Cronquist 1991). Running buffalo clover flowers from mid-April to June; fruiting occurs from May to July (Brooks 1983).

Running buffalo clover is reported to be visited by bees (*Apis* sp. and *Bombus* sp.) and is cross pollinated under field conditions (Taylor *et al.* 1994). Franklin (1998) documented that although running buffalo clover is genetically self-compatible, it cannot self-pollinate. Self-compatibility provides plants reproductive assurance when outcrossing opportunities are limited (such as in small populations).

Genetic studies of running buffalo clover suggested that to conserve maximum levels of diversity, as many populations as possible should be preserved across its range because much of the total diversity resides among populations (Crawford *et al.* 1998). Small populations of running buffalo clover contribute as much genetic diversity as large populations and exhibit unique banding patterns, which is important for the species adaptability and genetic stability.

Long-term monitoring data indicates that running buffalo clover populations often display widely fluctuating population sizes. The cause for changes in population size may be due to disturbance, weather patterns, management strategy, or other unknown factors. Ohio's population data indicate that the numbers of rooted crowns in a given sub-population may vary widely over time, including variation within a given growing season (Becus 1993). One population in Ohio had 235 rooted crowns in 1992 and then disappeared for the next three years; in 2003, this same population had 1,157 plants.

Threats

The primary threat to running buffalo clover is habitat alteration. Factors that contribute to this threat include forest succession, and subsequent canopy closure, competition by invasive plant species, catastrophic disturbance such as development or road construction, and may include the elimination of bison and other large herbivores. Without some level of disturbance, an area will become too shaded to provide enough sunlight for the species (Cusick 1989, Homoya *et al.* 1989).

Various researchers have supported the hypotheses that during pre-settlement time, running buffalo clover habitat was likely produced through canopy gaps created by the felling of large, old-growth trees (Madarish and Schuler 2002). Current logging practices may also benefit running buffalo clover. At the Fernow Experimental Forest in north-central West Virginia, running buffalo clover is most often associated with skid trails in uneven-aged harvest areas (Madarish and Schuler 2002). A study examining running buffalo clover abundance before and after logging suggests that populations may initially decrease after disturbance, but then rebound to higher than pre-disturbance levels (Madarish and Schuler 2002).

Land development and the consequential loss of habitat is also a serious threat to running buffalo clover. Cusick (1989) notes that running buffalo clover was relatively frequent in central and southwestern Ohio, particularly in the vicinity of Cincinnati prior to urban sprawl. Remnant populations have become even more isolated, persisting in areas maintained by appropriate disturbance. Remnant habitats may lead to small population sizes, inadequate seed dispersal, and poor seed quality. It has been suggested that running buffalo clover has a limited seed dispersal mechanism (Cusick 1989). Deforestation, farming, and other human activities created many new habitats for the species, but with the loss of bison after European settlement, Cusick (1989) suggested that there were no effective means of dispersal remaining for the species.

Jacobs and Bartgis (1987) suggested that along with the destruction of habitat, the introduction of non-native species may have contributed to the decline of running buffalo clover. Non-native white clover (*Trifolium repens*) may have invaded the habitat of running buffalo clover, out-competing it for available resources (Jacobs and Bartgis 1987). Other invasive plants that currently threaten running buffalo clover include Japanese stilt grass (*Microstegium vimineum*), garlic mustard (*Alliaria petiolata*), Japanese honeysuckle (*Lonicera japonica*), Amur honeysuckle (*Lonicera maackii*), wintercreeper (*Euonymus fortunei*), and periwinkle (*Vinca minor*). Management of invasive species through manual methods (pulling and mowing) have shown to be effective in minimizing competition with running buffalo clover.

Indiana bat

Species description, life history, population dynamics, status and distribution for the Indiana bat are fully described on pages 23-32 of the Programmatic BO and are hereby incorporated by reference. New information about the status of the Indiana bat is presented below.

New Population Estimates

Table 1 provides the most recent range-wide population estimate for the Indiana bat. Range-wide, the population continues to increase. However, the impact of white nose syndrome (see discussion below) on the population in the northeast region has not been factored into this estimate. When that information becomes available a new estimate will be completed.

Missouri

Historically, Pilot Knob Mine in Iron County contained the largest number of hibernating Indiana bats in Missouri. An estimated 50,000 Indiana bats were reported from Pilot Knob Mine for several years. Recently, bat biologists in Missouri coordinated efforts to re-visit the mine to obtain an updated census. In February 2008, the Missouri Department of Conservation led a group of bat and caving experts into the mine to census the Indiana bat hibernating population. Approximately 2,000 Indiana bats were counted in Pilot Knob Mine during this census. Based on information gained from this census, Elliott and Kennedy (2008) revised the population estimates for Pilot Knob Mine for the past 20+ years. Elliott and Kennedy (2008) postulate that the major decline in the Indiana bat population at Pilot Knob Mine occurred in 1979 when a portion of the mine collapsed. It is unknown how this collapse caused a decline in Indiana bat use, but likely scenarios include a modified microclimate that was unsuitable for the bats and/or bats were killed during the event. When comparing the timing of decreases in Missouri's population estimates to increasing populations in nearby states, especially Illinois, the Indiana bats that occupied Pilot Knob Mine may have emigrated. Further information is needed to confirm if these Indiana bats emigrated to Illinois

Table 1. Range wide population estimate for the Indiana bat. (Compiled by Andy King, USFWS, 2008)

USFWS Region	State	2001	2003	2005	2007
Region 2	Oklahoma	0	5	2	0
Region 3	Indiana	173,076	183,337	206,610	238,009
	Missouri ¹	28,794	21,717	15,718	16,004
	Illinois	21,053	43,028	54,630	54,033
	Ohio	9,788	9,831	9,769	7,629
	Michigan	20	20	20	20
	Total		232,731	257,933	286,747
Region 4	Kentucky	49,999	48,535	63,211	70,901
	Tennessee	9,258	9,265	9,971	8,410
	Arkansas	2,475	2,228	2,067	1,779
	Alabama	173	265	296	258
	Total		61,905	60,293	75,545
Region 5	New York	29,642	32,924	41,702	52,746
	Pennsylvania	702	853	746	1,038
	W. Virginia	9,714	9,742	13,417	14,597
	Virginia	833	1,090	735	723
	New Jersey	107	644	652	659
	Vermont	159	472	297	325
	Total		41,157	45,725	57,549
Range wide Total		335,793	363,956	419,843	468,131

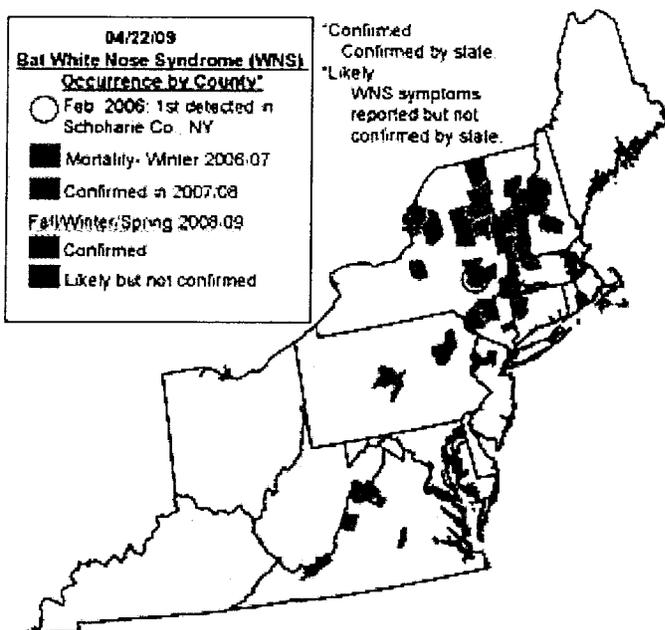
New Threats

White nose syndrome (WNS) is an unidentified agent (or agents) that is believed to be associated with the mortality of several bats species in the northeastern United States (mainly New York) (see figure 1). Current information indicates that WNS has resulted in the mortality of the following five species of bats: Indiana bats, little brown bats (*Myotis lucifugus*), northern long-eared bats (*Myotis septentrionalis*), eastern small-footed bat (*Myotis leibii*), and eastern pipistrelle (*Pipistrellus subflavus*). Approximately 50,000 Indiana bats are known to hibernate in the caves and mines affected by WNS. It is estimated that approximately 25,000 Indiana bats have died due to WNS in the northeast (USFWS May 2009).

White nose syndrome has not been documented in Missouri. The MTNF in coordination with the MDC will continue to monitor hibernating populations of Indiana bats. All winter and summer surveys will employ techniques to minimize the risk of spreading the disease as recommended by the Service. On April 24, 2009, the U.S. Forest Service Eastern Regional Forester signed a regional order to close all caves on National Forest Service lands for a period of one year to be followed by a re-evaluation of the policy.

¹ Missouri's population estimates have been revised per Elliot and Kennedy's (2008) revised population estimates for Pilot Knob Mine.

Figure 1. Occurrence of WNS in the United States as of April 2009. (Credit: Cal Butchkoski, Pennsylvania Game Commission.)



ENVIRONMENTAL BASELINE

The environmental baseline for the MTNF was established and fully described in detail on pages 12-13 and 34-45 of the Service's 2005 Programmatic BO. Since issuance of the Service's Programmatic BO, the environmental baseline on the MTNF changed only slightly.

In the early spring 2006, several tornadoes had destroyed towns and forest land within the 29 county area of the MTNF. Approximately 3,000 acres of the MTNF was affected by these events, though the entire 3,000 acres was not entirely destroyed (Jody Eberly, MTNF pers. comm.). In 2008, wind storms affected approximately 50 acres of forest land on the MTNF. In early May 2009, several storms damaged National Forest lands on the MTNF; however, estimates of the damage were not available at the time of this opinion.

Status of the Species within the Action Area

Running buffalo clover

The first survey for running buffalo clover in Missouri was conducted in 1988. A wild population was not rediscovered in Missouri until 1994. Since then, five populations were discovered, but only three persisted more than a few years.

In 1994-1995, the MTNF entered into a Challenge Cost Share agreement with Missouri Botanical Gardens and Northeast Missouri University – Kirksville to establish populations of running buffalo clover on eleven sites across the MTNF, mirroring the distribution of historical sites. Results of the project were not encouraging with seven of the sites disappearing within a few years. By 2000, none of the sites had evidence of any running buffalo clover survival. Following the disappearance of the plants, the sites were no longer actively monitored or managed.

In March, 2008, the Potosi District conducted a 5 acre prescribed burn at the site of one of the previous introductions. The purpose of this prescribed burn was to determine if running buffalo clover seed produced during the first few years after the plants had been introduced may still be viable and if it could be stimulated to germinate. Prior to this burn, no active management (e.g., burning, thinning, etc.) had occurred at the site. On a monitoring trip in September 2008, several seedlings were found at one of the plot locations. A subsequent visit to the site later that month indicated that seedlings were also present at other plots in the site. This re-appearance of running buffalo clover plants at the site indicated that seed had been present in the soil for several years since the initial introduction but was not stimulated to germinate until being subjected to prescribed burning. The bare ground and filtered sunlight provided after the prescribed burn may have provided favorable conditions for the germination and growth of running buffalo clover.

Indiana bat

The status of the species within the action area as of June 2005 can be found in the 2005 Programmatic BO pages 34-44. Mist netting and acoustic (Anabat) surveys have continued to occur on the MTNF from 2005-2008 during the non-hibernation season. There were no Indiana bats captured on the MTNF in the 2006 or 2007 seasons.

In 2008, eight Indiana bats were captured on the Poplar Bluff Ranger District, confirming the continued presence of a maternity colony first documented in 2004. Seven females and one male Indiana bat were radio-tracked to determine location of roost trees. The females were tracked to two separate roost trees within the Brown's Hollow Indiana bat Area of Use previously delineated. The primary roost had 59 bats emerging in an exit count; only a few bats emerged from the other roost tree during emergence counts (this roost is likely an alternate roost). The male was tracked to one roost tree.

In 2008, a mini-bat blitz was conducted on the Ava/Cassville/Willow Springs Ranger District. No Indiana bats were captured at the 20 sites netted. The survey effort did document the presence of nine bat species, including the endangered gray bat. Acoustic and mist-net surveys also took place on three other Districts in 2008. No Indiana bats were captured at these sites and Anabat call files are still being analyzed to accurately identify species recorded.

Indiana bat hibernating populations were monitored in 3 Indiana bat hibernacula on the MTNF in 2009. There were 30 Indiana bats hibernating in Knife Cave, 26 hibernating Indiana bats in White's Creek Cave, and approximately 3 Indiana bats hibernating in Cave Hollow Cave. This

represents a decline in the number of Indiana bats hibernating on the MTNF. The reasons for this decline in MTNF caves and caves across Missouri are unknown.

Factors Affecting the Species Environment in the Action Area

Running Buffalo Clover

Until 2008, no populations of running buffalo clover were known to occur on the MNTF. Therefore, there were no Standards and Guidelines for the clover in the 2005 Forest Plan and the species was not evaluated under section 7 of the Act for any actions proposed by the MNTF.

State agencies, in cooperation with the Service are monitoring and managing running buffalo clover sites in Missouri. Some activities occurring on private lands within the action area could adversely affect undiscovered populations of running buffalo clover. Activities occurring within the action area that potentially could impact the species and its habitat include: forest conversion, timber harvest, road construction and off-highway vehicle (OHV) use.

Indiana bat

Standards and Guidelines for the Indiana bat have been in place since the finalization of the 2005 Forest Plan. Prior to that, the MTNF implemented projects under the June 1999 Programmatic Biological Opinion with Terms and Conditions similar to the 2005 Plan Standards and Guidelines. A tiered consultation approach has been implemented since 1999 between the MTNF and the Service that allows for concurrences with “may affect, not likely to adversely affect” project determinations or tiered biological opinions for projects where a “may affect, likely to adversely affect” determination was made. Site specific incidental take statements are issued with tiered biological opinions.

The following amount of anticipated incidental take for the Indiana bat was addressed in the 2005 Programmatic BO: 15,000 acres of habitat for salvage sales; 4,000 acres of hazard tree removal; and 240 miles of fireline per year for 10 years. It was anticipated that up to one occupied roost tree could be removed per year on the MTNF. In FY 2006, 1,863 acres of salvage harvest was implemented, 9.46 miles of firelines were constructed, and 135 hazard trees were removed. In FY 2007, 3,281 acres of salvage harvest was implemented and 158 hazard trees were removed. In FY 2008, 5,303 acres of salvage harvest was implemented and 284 acres of hazard trees were removed (USDA Forest Service 2006). These are well below the annual anticipated levels of incidental take in the 2005 Programmatic BO.

Forest Plan monitoring has not resulted in the documentation of incidental take occurring on the MTNF. Two gates on two hibernacula have been repeatedly tampered with on the MTNF, but it is unclear what effect this may have had on the Indiana bat. No activity-caused vegetation changes have occurred within the 150-acre buffer areas surrounding each hibernacula entrance. No potential night roosts have been removed.

On March 27, 2007, the Service issued a no jeopardy biological opinion to the Federal Highway Administration for the U.S. Route 67 Corridor Improvement Project in Wayne County, Missouri.

This project would eliminate approximately 209 acres of suitable Indiana bat maternity habitat. The Reasonable and Prudent Measures to minimize incidental take of the action on the Indiana bat involved restoring and maintaining Indiana bat maternity habitat outside the boundaries of the highway project. The Missouri Department of Transportation has been implementing these Reasonable and Prudent Measures.

No other biological opinions or Habitat Conservation Plans for running buffalo clover or Indiana bats have been issued within the action area.

EFFECTS OF THE ACTION

Running Buffalo Clover

Timber management activities (i.e., even-aged and uneven-aged timber harvests, intermediate treatments, and improvement cuts) and their associated activities (i.e., skid trails, temporary roads, and log landings) could have both beneficial and adverse effects to running buffalo clover. Running buffalo clover plants and seeds could be exposed to these activities. Running buffalo clover is a disturbance dependant species and some level of timber harvest may be beneficial to the species (Madarish and Schuler 2002). With the implementation of the proposed Standards and Guidelines, the response to the activities could range from no response to increased germination of seeds; to decreased growth, and mortality of individual plants if a population of running buffalo clover was not properly identified and protected prior to work being conducted.

Prescribed fire and the creation of firelines could have both beneficial and adverse effects to running buffalo clover. The only extant population of running buffalo clover on the MTNF reappeared and was rediscovered after the old reintroduction site was treated with prescribed fire. If undetected plants are exposed to prescribed fire (or wildfire), individual plants may be killed, however, if there is a seed bank available, the fire may benefit the species and elicit a positive response through increased germination due to reduction in plant competition and increased light levels on the ground. The proposed Standards and Guidelines provide for prescribed fire at running buffalo clover sites only when the plants have set seed and only at intervals of five years or greater in order to maintain optimal site conditions for the species.

Livestock grazing occurs on the MTNF. The extant site is not suitable under the 2005 Forest Plan for grazing and, therefore, will not be affected by grazing. However, the other old reintroduction sites were within open fields in grazing allotments. Should those populations reappear, the Service believes that implementation of the proposed Standards and Guidelines would adequately protect them from adverse grazing pressures.

Control of non-native invasive plant species (NNIS) is an important part of managing for running buffalo clover. There are no known NNIS at the one running buffalo clover site currently known on the MTNF, and therefore, no impact to the species from NNIS management would be expected. However, NNIS could become a problem in the future at this site and at the other reintroduction sites. Manual pulling by people familiar with running buffalo clover would have the least potential impact on the species. Running buffalo clover may respond favorable to mechanical methods of NNIS control such as mowing or manual pulling by exhibiting increases

in germination, growth, and reproduction. The use of herbicides could adversely affect the species if applied to the plant or the area immediately surrounding it. The implementation of the proposed Standards and Guidelines would reduce the potential for adverse effects resulting from any control of NNIS occurring.

Feral hogs are a problem in Missouri and on the MTNF they could potentially impact the known running buffalo clover site. The MTNF has been cooperating with the Animal and Plant Health Inspection Service (APHIS) to trap and remove feral hogs. However, it is likely that feral hogs will continue to be a problem in the action area for the foreseeable future. If feral hogs were to become a problem at known running buffalo clover sites, MTNF may need to implement additional measures such as fencing the site or using other methods to exclude feral hogs from the site.

Indiana bat

Proposed management under the 2005 Forest Plan has not changed on the MTNF since its finalization, with the exception of additional standards and guidelines for the running buffalo clover. Anticipated effects to Indiana bat roosting, foraging, swarming/staging, and hibernation habitat remain unchanged and are described fully in the 2005 Programmatic BO (pages 45-60).

The cause of Indiana bat declines in Missouri is unknown and needs to be further studied. Despite the decline, monitoring of Indiana bat maternity colonies on the MTNF have shown continuous use of designated "Area's of Use" or adjacent forested areas. No physical changes to the cave (hibernacula) environment from management activities have occurred on the MTNF. Therefore, we do not believe management of the MTNF has been a factor in the decline of the species in the state.

With the recently revised census information for Pilot Knob mine (resulting in a lower Indiana bat population estimate for Missouri), the Service and MTNF decided to conduct a new probability of take analysis. The results of this analysis reflect that the probability of cutting/destroying an occupied roost tree is four times less than in the original 2005 analysis (see page 229 of the 2005 Programmatic BA). The probability of cutting an occupied roost tree during timber harvest across the MTNF is 1 in 1.45 million. The probability of destroying an occupied roost tree during prescribed burning across the MTNF is 1 in 12.6 million. The probability analysis looks at timber/burning data Forest wide and might not capture the effects at a site specific scale. For this reason, the MTNF and the Service determined that with the implementation of the Standards and Guidelines, the activities most likely to kill, harm or harass individual Indiana bats would be salvage harvest and hazard tree removal during fireline construction, trail maintenance, road construction/reconstruction, temporary roads, and skid trail construction.

CUMULATIVE EFFECTS

Cumulative effects include the effects of State, tribal, local, or private actions that are reasonably certain to occur within the action area considered in this biological opinion. Future federal

actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Reasonably foreseeable actions on other ownerships in the action area are difficult to predict since there are numerous landowners within the 29 county area. Other state and federal landowners include the Missouri Department of Conservation, Missouri Department of Natural Resources, the U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, National Park Service, U.S. Department of Defense, and state, local, and federal Highway Departments. Each of these agencies have different missions and objectives for management of their lands. Land management on these other agency lands can be reasonably predicted on past practices and planning documents. Types of management activities that may occur include: forest and openland management through prescribed burning, various types of timber harvest, limited herbicide use, providing recreational experiences, flood control, hydropower production, livestock grazing, and military training. Activities on other federal lands are also subject to section 7 consultation and thus would not be included in the discussion of cumulative effects as defined by the ESA.

The Missouri Department of Transportation and local road departments regularly conduct road and highway maintenance, as well as various road construction and relocation projects across the action area. This type of work is expected to continue throughout the project period.

Activities on private lands that potentially could adversely impact the Indiana bat or running buffalo clover habitat include:

- Commercial use of Indiana bat caves;
- Non-commercial, recreational use of occupied Indiana bat caves resulting in disturbance of bats and possible spread of White Nose Syndrome;
- Land clearing, road construction, and other uses that may result in permanent loss of forest cover, and large, dead trees, and potential sedimentation of water sources;
- Agricultural use of insecticides and herbicides;
- Lead and zinc mining activities;
- OHV use; and
- Livestock grazing and other agricultural activities.

In addition, private landowners also conduct prescribed burns on their lands and wildfires occur on both National Forest and private lands within the proclamation boundary.

Any of these activities would have varying degrees of effects on Indiana bats and running buffalo clover, ranging from no effect to adverse effects. Permanent conversion of forested habitat to unsuitable habitat would have the greatest potential impacts to Indiana bat and running buffalo clover habitat. Other activities would have the same general effects as MTNF actions, providing they are implemented with similar methods and protective measures. We anticipate that suitable habitat for Indiana bat and running buffalo clover within the action area will increase (due to MTNF habitat management) or will remain at similar levels as currently present over the remaining project period.

CONCLUSION

Running buffalo clover

After reviewing the current status of running buffalo clover, the environmental baseline for the action area, the effects of the new proposed Standards and Guidelines for the MTNF Forest Plan, and the cumulative effects, **it is the Service's biological opinion that the 2005 Forest Plan, as proposed, is not likely to jeopardize the continued existence of running buffalo clover.** Critical habitat has not been designated for this species, therefore, none will be affected.

The proposed Standards and Guidelines for the MTNF Forest Plan provide protection and habitat enhancement (through available management tools) for running buffalo clover where it occurs now and if it should be discovered in other areas of the MTNF. Only one small population currently occurs on the MTNF, although not anticipated, the loss of this one population would not appreciably hinder the recovery of the species as a whole. Thus, we do not anticipate any detectable reductions in reproduction, numbers, or distribution for the species.

Indiana bat

After reviewing the current status of the Indiana bat, the environmental baseline for the action area, the effects of the new proposed Standards and Guidelines for the MTNF Forest Plan, and the cumulative effects, **it is the Service's biological opinion that the 2005 Forest Plan, as proposed, is not likely to jeopardize the continued existence of Indiana bats.** Critical habitat for this species has been designated at several major hibernacula, however, this action does not affect those areas and no destruction or adverse modification of that critical habitat will occur.

As explained in the 2005 Programmatic BO effects section, and in light of the small probability for take on the MTNF, we anticipate that there may be individual fitness consequences but do not expect any colony or population level fitness implications. We anticipate that over the long-term, the implementation of the 2005 Forest Plan will benefit Indiana bats by maintaining or improving habitat conditions within the action area. We do not anticipate any appreciable reductions in reproduction, numbers, or distribution for the species.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation under section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species, to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not

intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the MTNF so that they become binding conditions of any grant or permit issued to any applicants, as appropriate, for the exemption of section 7(o)(2) to apply. The MTNF has a continuing duty to regulate the activity covered by this incidental take statement. If the MTNF (1) fails to assume and implement the terms and conditions or (2) fails to require any applicants to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the MTNF must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 CFR §402.14(i)(3)].

Running Buffalo Clover

Sections 7(b)(4) and 7(o)(2) of the Act do not apply to listed plant species. However, limited protection of listed plants from take is provided to the extent that the Act prohibits the removal and reduction to possession of Federally listed endangered plants or the malicious damage of such plants on areas under Federal jurisdiction, or the destruction of endangered plants on non-Federal areas in violation of State law or regulation or in the course of any violation of a State criminal trespass law.

Indiana bat

No changes to the incidental take statement in the 2005 Programmatic BO (see pages 66-69) for the Indiana bat are necessary at this time. The likelihood for take remains low, though not absent, and no incidental take (mortalities or injuries) has been documented through monitoring on the MTNF since the implementation of the 2005 Forest Plan. No additional reasonable and prudent measures or terms and conditions are necessary.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to use their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help carry out recovery plans, or to develop information.

The Service recommends that the MTNF implement the following conservation measures to benefit the running buffalo clover:

1. Conduct regular monitoring of the current population and conduct surveys during the proper seasons at the old re-introduction sites to determine the current status of those

populations. Provide the Service with any reports or results of these monitoring and survey efforts.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION NOTICE

This concludes formal consultation of the actions outlined in the amended biological assessment for the 2005 Forest Plan for the Mark Twain National Forest. As written in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Forest Service involvement or control over the action has been retained (or is authorized by law) and if (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the MTNF action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the MTNF action is later modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operation causing such take must cease until reinitiation.

If you have any questions or concerns about this consultation or the consultation process in general, please feel free to contact me at (573)234-2132 extension 104.

Sincerely,

Andrew D. Roberts

for

Charles M. Scott
Field Supervisor

Cc: USFWS, Region 3 Consultation Coordinator (Jennifer Szymanski), La Crosse, WI
USFWS, Endangered Species Coordinator, Indiana ESFO, Bloomington, IN
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