

BIOLOGICAL ASSESSMENT

on the

PROPOSED ACTIVITIES ON THE FORT DRUM MILITARY INSTALLATION, FORT DRUM, NEW YORK (2012-2014)

FOR THE FEDERALLY- ENDANGERED INDIANA BAT (*Myotis sodalis*)



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**Prepared By:
U.S. Army Garrison Fort Drum
Fish & Wildlife Management Program
Environmental Division, Directorate of Public Works**

2012-2014 FORT DRUM BIOLOGICAL ASSESSMENT FOR THE INDIANA BAT (*Myotis sodalis*)

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Executive Summary

Fort Drum is a 107,000+ ac US Army installation in northern New York and is the largest military installation in the northeastern United States, serving as home to the 10th Mountain Division-Light Infantry and one of the primary training facilities for National Guard and Army Reserve units throughout the region. Military training has occurred on Fort Drum lands since 1908.

The Indiana bat (*Myotis sodalis*) is the only known federally listed threatened or endangered species that occurs on Fort Drum. This Biological Assessment (BA) identifies and analyzes potential impacts to the Indiana bat from activities that are proposed to occur on Fort Drum from January 1, 2012 – December 31, 2014. It is expected to cover approximately 85% of activities that may occur on Fort Drum within the next three years. All other activities not included in this BA will be addressed via individual consultation or by reinitiating formal consultation with the US Fish and Wildlife Service (USFWS). This BA was prepared pursuant to Section 7 of the Endangered Species Act (16 USC 1536 (c)).

Indiana bats were first confirmed on Fort Drum in 2006. The nearest known Indiana bat hibernaculum is Glen Park, where approximately 500 Indiana bats now hibernate annually. Glen Park is approximately 6.5 mi (10.5 km) from Fort Drum's Cantonment Area. When the first BA and Biological Opinion (BO) were written in 2009, there was one known maternity colony located in the Cantonment Area. Anabat echolocation detectors had also identified potential Indiana bat call sequences throughout much of the installation. Because of that evidence, a second unknown colony was assumed to exist in or adjacent to the installation in 2009.

From 2007-2011, mist net surveys have been conducted at 323 sites on Fort Drum following USFWS guidelines. Of the 323 sites 246 sites were surveyed once, while the remaining 77 sites were surveyed two or more times. Twenty-two Indiana bats were captured during protocol surveys—18 in the Cantonment Area, two in Training Area 3, one in Training Area 4, and one in Training Area 8. An additional 15 Indiana bats have been captured during other surveys, with seven captured before August 15 and eight captured after August 15. All bats captured in the Training Area were subsequently radio-tracked back to roosts in the known maternity colony use area.

Since the first BA in 2009, white-nose syndrome (WNS), a devastating disease affecting hibernating bats, has caused drastic declines in the populations of myotid bats on Fort Drum, including Indiana bats. Where it was once relatively easy to capture individual Indiana bats of the known maternity colony through traditional mistnet efforts, it is now relatively difficult. Given this development, the likelihood of finding a colony that has thus far gone undiscovered is unlikely even if it previously existed. Although the possibility exists that a second, undiscovered maternity colony is still present in the Training Area, the aforementioned information now suggests that suspected Indiana bat use within the Training Area is most likely periodic foraging or exploratory movement activity by bats from the known colony in the Cantonment Area. Therefore, we now believe there is only one maternity colony on Fort Drum primarily located in the Cantonment area, and for the purposes of this BA, only impacts to the known maternity colony will be addressed.

Section 1 provides relevant information on Fort Drum, the status of the Indiana bat, and consultation history.

Section 2 describes and assesses the potential effects of the following activities on the Indiana bat: construction; wind energy development; military training; forest management; vegetation management; prescribed burning; use of pesticides; wildlife management/vertebrate pest control; and outdoor recreation. . Conservation measures are also outlined to reduce or eliminate adverse impacts of the proposed activities.

Section 3 describes and assesses the potential effects of proposed conservation activities, including: the establishment of a 2,202 ac (891 ha) Bat Conservation Area (BCA) to protect known Indiana bat roosting and foraging areas from permanent development and habitat loss; research and monitoring efforts to provide information for future management actions; outreach efforts; and the Army Compatible Use Buffer (ACUB) program.

Section 4 describes potential cumulative effects, and Section 5 provides an overall conclusion. The 2009-2011 Fort Drum Biological Assessment and the 2009-2011 BO (references incorporated throughout this document) can be found in Appendix A and B, respectively. All conservation measures and beneficial actions mentioned throughout the document are included in Appendix K.

After reviewing all of the proposed activities, Fort Drum has determined that the small wind project and the use of smoke/obscurants is likely to adversely affect Indiana bats on Fort Drum. All other proposed activities on Fort Drum will not affect, or may affect, but should not adversely affect the Indiana bat.

1.0 Background

This section provides background information on Fort Drum and Indiana bat life history as it relates to this Biological Assessment (BA). More detailed information can be found in Appendix A and B.

1.1 Purpose

The purpose of this BA is to identify and analyze potential impacts to the federally endangered Indiana bat (*Myotis sodalis*) that may arise from activities that are likely to occur on Fort Drum Military Installation from January 1, 2012 – December 31, 2014. This BA will provide Fort Drum flexibility temporally, spatially, and functionally in planning and implementation of activities without delays resulting from sudden changes in plans, priorities, and/or funding. This BA will address activities for the next three years reducing the requirement to initiate or re-initiate Section 7 consultations for individual projects or activities. However, individual Section 7 consultations will still occur for activities not specifically identified in this BA or for other unforeseen activities.

This document was prepared in accordance with Section 7 of the Endangered Species Act (16 USC 1536 (c)). The Indiana bat is the only known federally listed threatened or endangered species that occurs on Fort Drum or within the action area. The action area is defined in Section 1.4. The activities addressed within this BA do not occur within designated Critical Habitat for the Indiana bat.

All federal agencies and tenant organizations that operate on Fort Drum were considered in the effects analysis of activities and are subject to the conservation measures prescribed in this BA. These federal agencies include the US Army; US Army Corps. of Engineers (Engineering – New York District); US Army Corps. of Engineers (Clean Water Act Section 404 Permits); US Air Force (Range 48); and all other military and law enforcement agencies training at Fort Drum. Fort Drum Mountain Community Homes (FDMCH), the Development Authority of the North County (DANC), and Verizon are currently the only private tenant organizations that actively lease Fort Drum property or have other partnership arrangements that could have potential impacts to the Indiana bat. The US Army Garrison Fort Drum is the lead federal agency for all ESA consultation on Fort Drum.

1.2 Consultation History

The following are highlights of the consultation history between Fort Drum Military Installation (Fort Drum) and the U.S. Fish & Wildlife Service-New York Field Office in Cortland, New York (USFWS) since the 2009-2011 BA was provided to the USFWS.

February 5, 2009

Fort Drum submitted the final 2009-2011 BA to the USFWS.

March 24, 2009

USFWS issued the Biological Opinion (BO) to Fort Drum.

May 28, 2009

USFWS attended ACUB biennial review.

June 1, 2009

USFWS issued an amendment to the BO to Fort Drum.

February 11, 2010

Fort Drum submitted the 2009 annual report in accordance with the BO.

June 18, 2010

Fort Drum sent a letter to USFWS regarding ACUB.

July 13, 2010

USFWS sent letter of response to Fort Drum regarding ACUB.

August 27, 2010

Fort Drum and USFWS met to discuss implementation of the BO.

February 9, 2011

Fort Drum submitted the 2010 annual report in accordance with the BO.

March 29, 2011

Fort Drum and USFWS met to discuss implementation of the BO

April 29, 2011

USFWS and Fort Drum met to discuss ACUB program.

June 23, 2011

Fort Drum and USFWS met to discuss development of the 2012-2014 BA.

June 23, 2011

USFWS attended ACUB biennial review.

August 27, 2011

Fort Drum and USFWS met to discuss implementation of the BO.

1.3 Fort Drum Military Installation

Much of the information in this document will be incorporated by reference. As such, please see the 2009-2011BA (Fort Drum 2009 or Appendix A); the 2009-2011 BO (USFWS 2009 or Appendix B); the Fort Drum Integrated Natural Resources Management Plan (Fort Drum 2011 or Appendix C); ESI 2008a (Appendix D); ESI 2008b (Appendix E); Copperhead 2009 (Appendix F); ESI 2010 (Appendix G); ESI 2011 (Appendix H); and USFS 2011 (Appendix I). Each one of these documents will be extensively referenced throughout.

1.3.1 Regional Description of Fort Drum

Please see Appendix A for the Regional Description of Fort Drum.

1.3.2 Military Mission & History

Please see Appendix A for Fort Drum's Military Mission and History.

1.3.3 General Description of Fort Drum

Please see Appendix A for the General Description of Fort Drum. See Figure 1.1 for a map of Fort Drum showing the Cantonment Area/Wheeler-Sack Army Airfield (WSAAF), Training Area, Bat Conservation Area, and Main Impact Area

1.3.4 General Habitat Information on Fort Drum

Please see Appendix A for the General Habitat Information on Fort Drum.

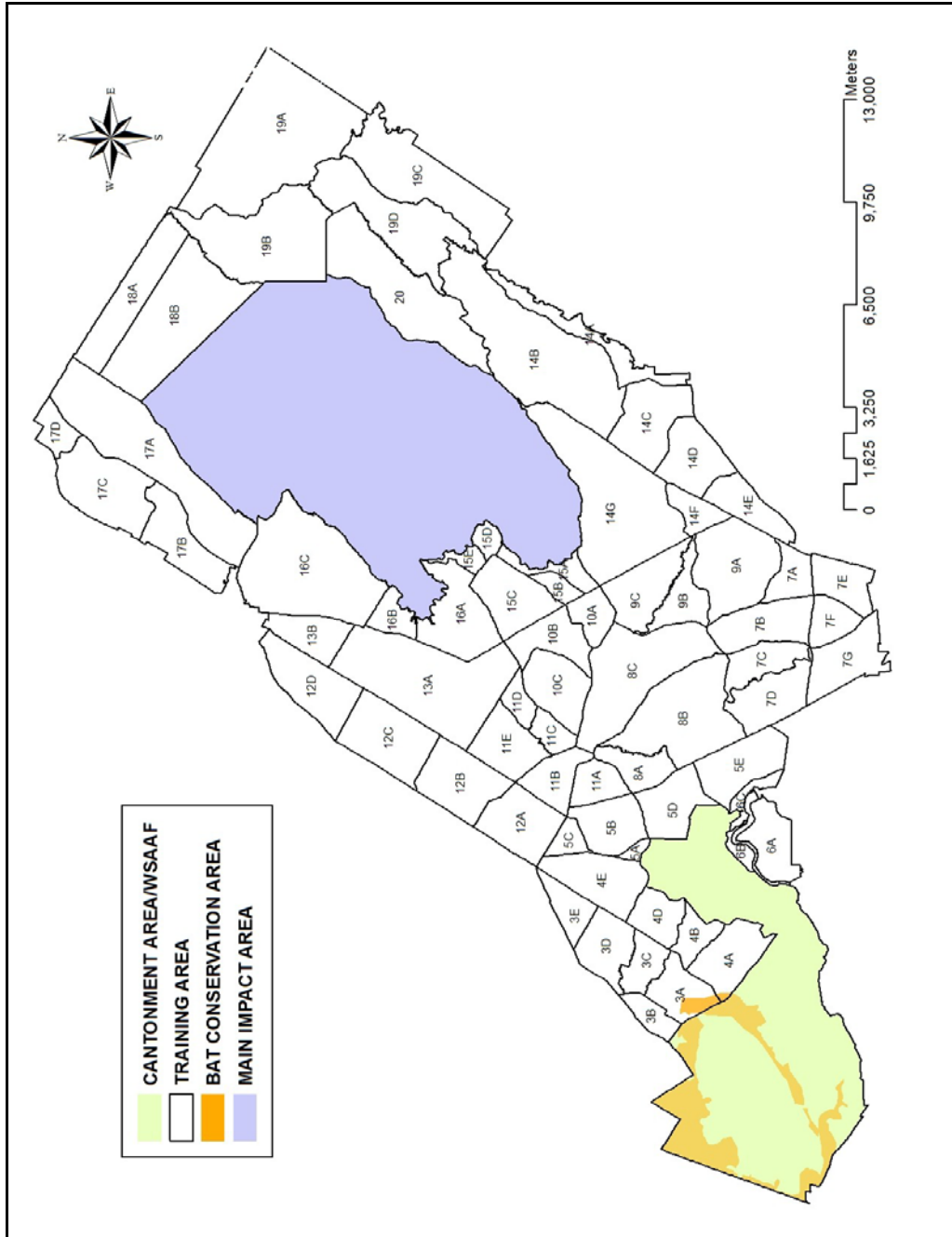


Figure 1.1. Fort Drum Military Installation.

1.4 Action Area

The action area is defined by regulation as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR §402.02). Hence, this analysis is not limited to the "footprint" of the action nor is it limited by the Federal agency's authority; it is a biological determination of the reach of the proposed action on listed species.

For this BA, the "action area" is the area where all direct and indirect effects of implementing and sustaining the mission of Fort Drum may impact the Indiana bat.

Therefore, the Fort Drum action area includes all of Fort Drum, with some exceptions related to the Main Impact Area. Although the Main Impact Area in Fort Drum's Training Area will be considered in some of the proposed actions, there is no access into the area and no way to adequately or appropriately assess any potential impacts to Indiana bats. Because there has been no documented use by Indiana bats in the Main Impact Area in the last five years and the above considerations, Fort Drum will exclude the Main Impact Area from most analysis.

The Fort Drum action area also includes those lands currently, or proposed to be, part of the Army Compatible Use Buffer (ACUB) program (i.e., those areas Fort Drum has third party interest in).

Because Indiana bats from the Glen Park hibernaculum are known to utilize Fort Drum, as well as, lands adjacent to Fort Drum in the Town of LeRay and north, these areas are also considered part of the action area. However, although impacts (specifically lighting pollution and noise) from Fort Drum's actions may affect the Indiana bat off the installation in these areas, there is currently no way to accurately determine those impacts.

Figure 1.2 shows the known Indiana bat use within and adjacent to the action area during the summer (April 15- August 15). Figure 1.3 shows the known Indiana bat use within and adjacent to the action area during the fall (August 15- October 15). These areas will most likely continue to be used by Indiana bats after emergence from the hibernaculum, during the reproductive season, and during fall swarming. Fall swarming activity is expected to occur within 10 miles (and up to 20 miles) from the hibernaculum during the late summer and fall months (Figure 1.3). There are no known hibernacula on Fort Drum, therefore no winter use is expected to occur on the installation.

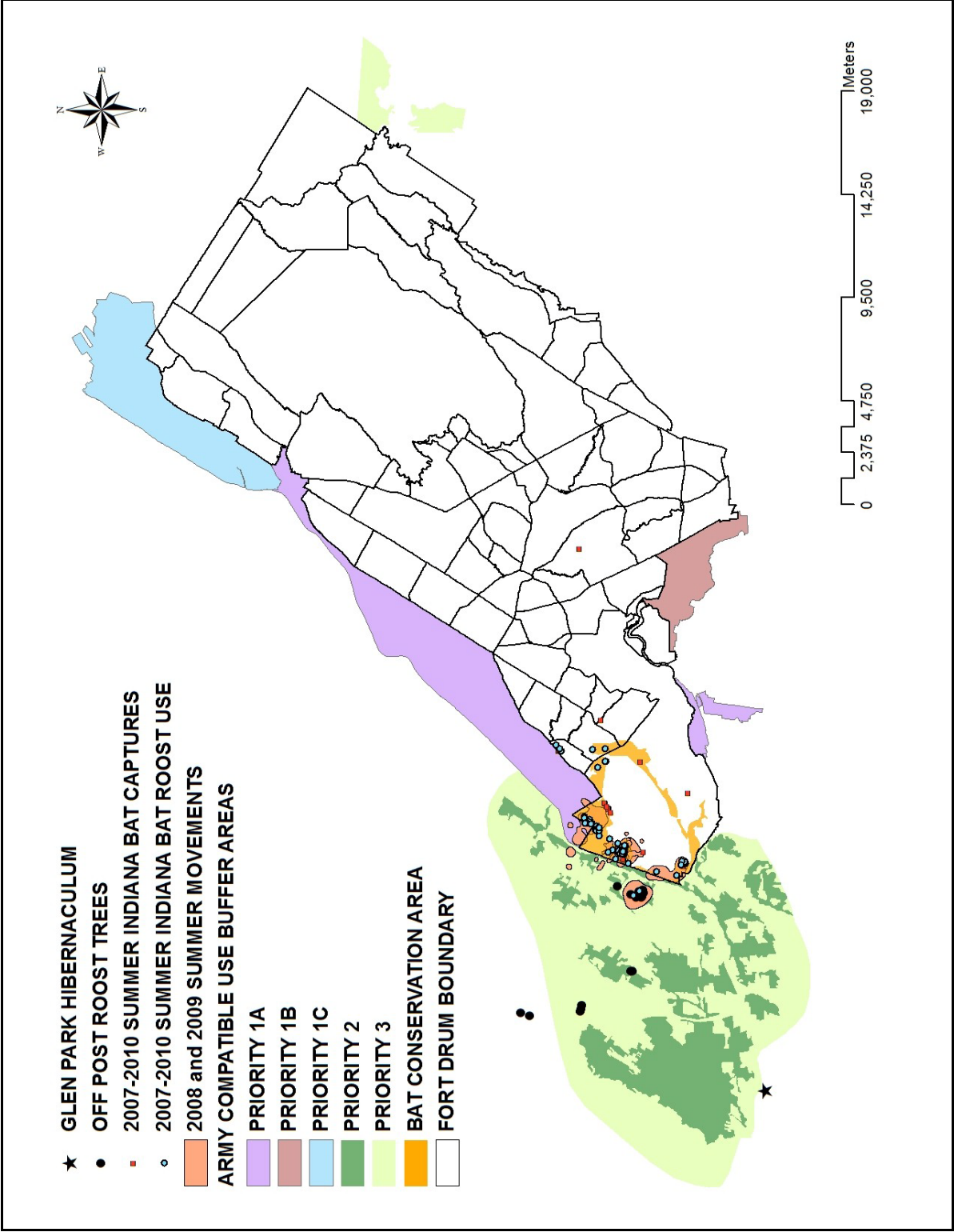


Figure 1.2 Known Indiana bat summer use within and adjacent to the Action Area at Fort Drum Military Installation.

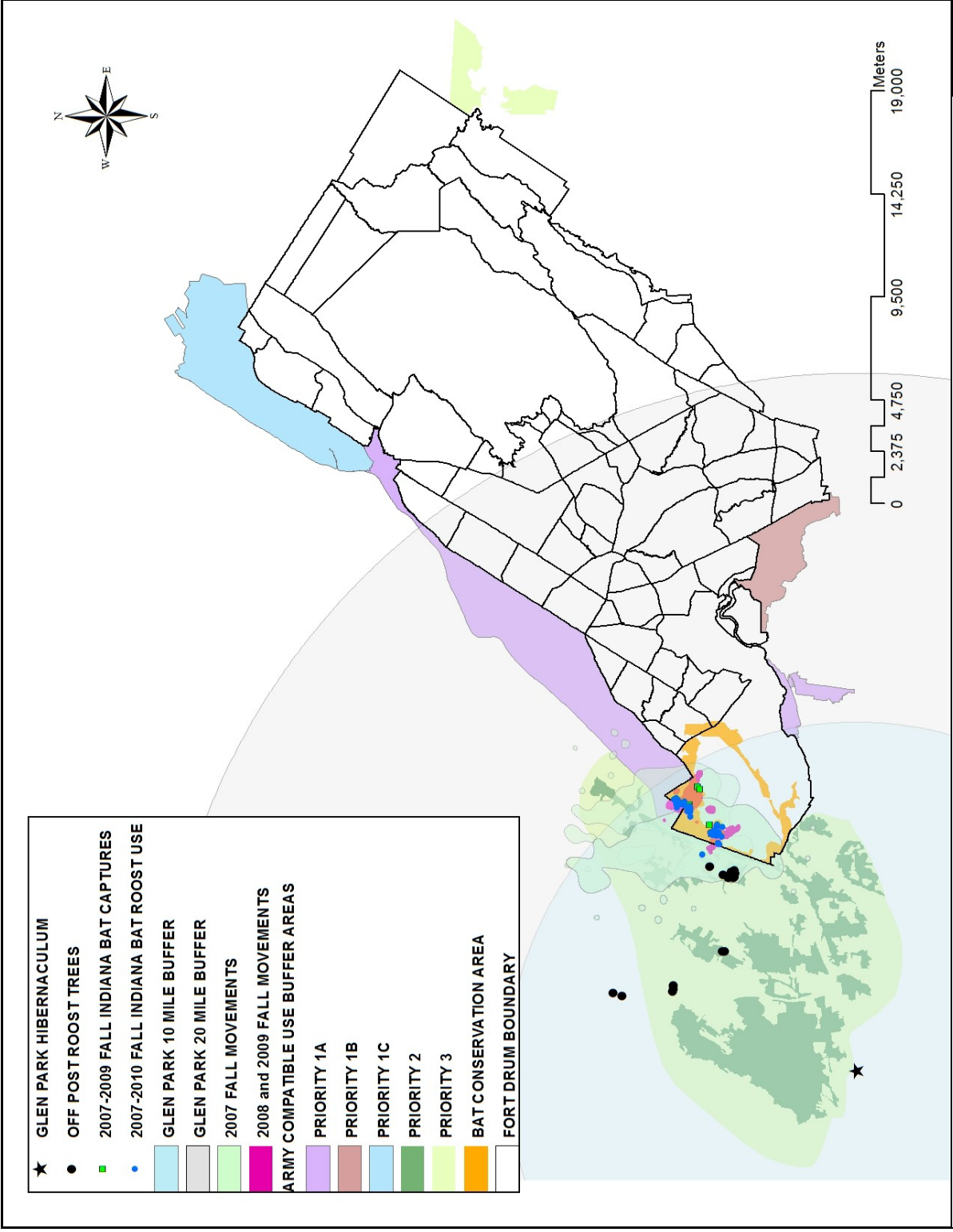


Figure 1.3. Known Indiana bat fall use within and adjacent to the Action Area at Fort Drum Military Installation.

1.5 Indiana Bat

1.5.1 General Description

The following is a summary of pertinent Indiana bat information. For additional information on life history, ecology, and threats, see the Indiana Bat Draft Revised Recovery Plan (USFWS 2007).

The Indiana bat is a medium-sized species belonging to the genus *Myotis* (Barbour and Davis 1969; USFWS 2007). On average, it weighs approximately 0.18-0.25 oz (5-7 g) and has a total body length between 1.6-1.9 in (41-49 mm). The Indiana bat is very similar to the northern myotis (*Myotis septentrionalis*) and the little brown bat (*Myotis lucifugus*). The Indiana bat is distinguished from northern myotis by the tragus length and shape, which is shorter and rounder. The Indiana bat differs from the little brown bat by the presence of a keeled calcar; by possessing fewer, shorter toe hairs; and its pelage has a dull appearance and does not contrast as starkly with the ears and wing membranes.

The Indiana bat is one of six hibernating species of bats that is known to be affected by white-nose syndrome (WNS). White-nose syndrome is a disease that has decimated bat populations in eastern North America and poses one of the most serious threats to the continued existence and recovery of the Indiana bat. See the remainder of this section, as well as, *Section 1.5.3 Population Status and Threats* for more information on the impacts of WNS on Indiana bats.

1.5.2 Background Ecology

1.5.2.1 Distribution

The Indiana bat is a temperate, insectivorous, migratory bat that ranges from Oklahoma, Iowa, and Wisconsin, east to Vermont and south to northwestern Florida (USFWS 2007; Figure 1.4).

1.5.2.2 Hibernation

Indiana bats spend the winter months hibernating in caves or mines (Tuttle and Kennedy 2002). In northern New York, Indiana bats typically hibernate from October to mid-April (Kurta et al. 1997; USFWS 2007). Within these winter hibernacula, Indiana bats form dense clusters ranging from 300 to 484 bats/sq ft (USFWS 2007). Indiana bats are most susceptible to injury or death at this stage because of their clustering behavior and their need to minimize energy loss. Disturbances may cause Indiana bats to wake prematurely, which can increase energy use and decrease their chances of survival. Repeated arousals can deplete their fat reserves thus leading to Indiana bats' death via starvation. Additionally, events, such as vandalism, disease, flooding or extremely cold conditions, can have devastating effects on hibernating Indiana bats and can substantially reduce the overall population after a single occurrence.

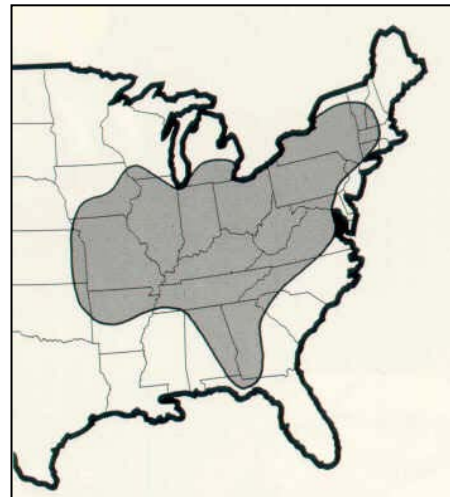


Figure 1.4 Distribution of the Indiana bat. (USFWS)

There are no known hibernacula on Fort Drum. The nearest known hibernaculum is located at Glen Park approximately 6.5 mi (10.5 km) west of Fort Drum. It is assumed that all Indiana bats on Fort Drum utilize the Glen Park hibernaculum. Some bats that have been tagged on Fort Drum have been radio-tracked (ESI 2008b) or observed (Alan Hicks, New York State Department of Environmental Conservation (NYSDEC); Robyn Niver, USFWS; Raymond Rainbolt, Fort Drum, personal communications) at Glen Park. Glen Park has experienced an approximate 80% decline since the onset of WNS, with numbers dropping from approximately 2000 animals pre-WNS to approximately 433 post-WNS (NYSDEC, unpublished data).

1.5.2.3 Spring Emergence

Spring is a critical time of year for Indiana bats due to low fat reserves and potentially limited food availability. Bats must replenish themselves after hibernation, and migrate to summer roosting areas. At this time females initiate fertilization and become pregnant.

Typically spring emergence in New York occurs in mid-April when outside temperatures are suitable for insects—Indiana bats arouse from hibernation at the Glen Park hibernaculum approximately April 13-17 (Al Hicks, NYSDEC, personal communication). Some bats may remain in close proximity of the hibernacula for a few days before migrating to summer habitats. This activity is known as spring staging. Others head directly to summer habitat. Roost trees used by adult females during this mid-spring period are similar to those used during the summer in terms of species, size, and structure (Britzke et al. 2006).

On Fort Drum, the earliest mistnetting that has been conducted is May 11 and the earliest capture of an Indiana bat has been May 13; however, it is assumed that Indiana bats are present on Fort Drum in mid-April given the proximity to the Glen Park hibernaculum and because bats have been found on the installation through the summer and autumn seasons. Pregnant females, males, and non-reproductive females have all been found roosting on Fort Drum after spring emergence.

1.5.2.4 Summer Roosting and Reproductive Behavior

In late spring or early summer—shortly after spring emergence—female Indiana bats form maternity colonies that usually consist of reproductive and/or non-reproductive females and pups that roost together; males generally roost in the same area individually or in small groups, but separate from females. Bat pups are typically born in June-July and will stay with the mother until they are volant (i.e., capable of flight) in July-August. Both juvenile and adult Indiana bats of both sexes have been documented on Fort Drum (ESI 2006, ESI 2008a, ESI 2011, USFS 2011).



Figure 1.5 Roost tree on Fort Drum with a large crack where bats were roosting. (Photo Adam Mann, ESI).

Summer sites that have a variety of suitable roosts are essential to the reproductive success of local populations.

Once Indiana bats find these areas, they typically exhibit strong site fidelity, returning to the same traditional summer maternity colony location (and specific trees) annually to bear their young (USFWS 1999; Kurta et al. 2002).

It is not known how long or how far female Indiana bats will search to find new roosting habitat if their traditional roost habitat is lost or degraded during the winter. If they are required to search for new roosting habitat in the spring, it is assumed that additional stress is placed on pregnant females at a time when fat reserves are low or depleted and they are already stressed from the energy demands of migration and pregnancy.

Fort Drum has abundant potential roosting habitat for bats with forested land and snags common throughout the installation. In 2008, 2009, 2010, and 2011 (ESI 2010, ESI 2011, USFS 2011, Fort Drum, unpublished data), Indiana bats on Fort Drum demonstrated site fidelity by returning to several of the same areas—and in some cases the same roost trees—that had been previously identified.

Portions of Fort Drum's Cantonment Area appear to be important areas for Indiana bats since Indiana bats from both on- and off-post studies have been observed to repeatedly use the areas for roosting and foraging (ESI 2006, USFWS 2008, ESI 2008a, ESI 2011, USFS 2011). Within and immediately adjacent to the Cantonment Area on lands in the Town of LeRay, Indiana bats can be found in distinct clusters of activity (Figures 1.7 and 1.8) with documented roost switching and forage overlap by individual Indiana bats between these activity clusters (ESI 2008a, ESI 2008b, USFS 2011). These clusters of activity and associated roosts make up the known maternity colony on Fort Drum.

Numbers of female Indiana bats vary within individual roosts. Roosts that contain 30+ bats on multiple days are typically defined as a "primary" roost (Callahan et al. 1997), however, primary maternity roost numbers appear to be lower in New York. On Fort Drum in 2007, five roosts were considered primary roosts when there were greater than 12 bats using the roosts on multiple nights. Only two of the five roosts had ≥ 20 bats (ESI 2008a). The largest number of Indiana bats ever emerging from a roost on Fort Drum in a single night was 64 in 2008 (USFS 2011). Based on this information, it had previously been assumed that between 75-100 Indiana bats were present within this known maternity colony, however, due to impacts from WNS, this colony size has most likely decreased. Bat emergence has declined post-WNS with 13 bats leaving a single roost in 2009, 12 bats in 2010, and 25 bats leaving a roost in 2011 (ESI 2011, USFS 2011, Fort Drum, unpublished data). It is assumed that all bats observed emerging from a roost are Indiana bats (Belwood 1996; USFWS 2007). Due to the impact of WNS, any roost with a reproductive female bat could now be considered a primary maternity roost.

Although primary roosts are central to Indiana bat reproduction and social organization during the summer months, Indiana bats are known to utilize multiple roost trees during the non-hibernation period (USFWS 2007). Usually, alternate roost trees are located in close proximity to primary roosts—distances between roosts can be a few meters to a few kilometers. Primary roosts are often located in openings or at the edge of forest stands, while alternate roosts can be in either openings or the interior of the forest stand. Primary roosts are generally taller than surrounding trees and are more exposed to solar radiation (Britzke et al. 2006). Alternate roosts may be used when temperatures are above normal or during precipitation. Weather has been found to influence bat behavior and habitat use (Humphrey et al. 1977).



Figure 1.6 A roost tree with sloughing bark and exposure to the sun. (Photo Adam Mann, ESI)

It has been suggested that Indiana bats use alternate roosts due to the ephemeral nature of snags and the need to locate future suitable roosts (Kurta et al 1997; USFWS 2007). Because of roost tree characteristics, Indiana bats tend to select forested areas that have high snag densities (Callahan et al. 1997). Fort Drum has abundant potential roosting habitat for bats with forested land and snags common throughout the installation.

Most roosts are located in dead or dying trees or within crevices of live trees that are located within riparian, bottomland, or upland forests (USFWS 2007). Summer roost selection is primarily based on tree structure, amount of solar exposure, and ease of accessibility. Although roost trees vary in species and size, primary roost trees are frequently large diameter trees that have exfoliating bark and that receive adequate amounts of sunlight. This type of tree structure is important for reproductive bats, because it provides a stable, warm environment necessary for rearing young. Cool temperatures can delay development of fetal and juvenile young thus selection of maternity roost sites may be critical to reproductive success.

As of September 2011, 64 summer maternity roosts (those used by adult and juvenile females and juvenile males spring-August 15) have been located on Fort Drum (ESI 2006, ESI 2008a, Copperhead 2009, ESI 2011, USFS 2011). Confirmed roosts on Fort Drum have been primarily located in standing dead or dying trees or within dead tree limbs. The average diameter (measured in Diameter Breast Height-DBH) for summer maternity roost trees on Fort Drum is approximately 14.1 in DBH (35.8 cm) with a range of 3.9-31.5 in DBH (9.9-80.0 cm). Although other projects (e.g., Interstate 81 Connector) have identified individual Indiana bats roosting both within and outside the boundaries of the Bat Conservation Area (BCA), all but six roosts found from Fort Drum-initiated projects have been located inside the BCA.

To date, American elm (*Ulmus Americana*; n = 34) is the most used summer roost tree on Fort Drum. Additionally, 10 other species have been used as summer roosts on Fort Drum: bitternut hickory (*Carya cordiformis*; n = 3), black cherry (*Prunus serotina*; n = 3), butternut (*Juglans cinerea*; n = 1), red maple (*Acer rubrum*; n = 3), red pine (*Pinus resinosa*; n = 1), Scotch pine (*Pinus sylvestris*; n = 1), silver maple (*Acer saccharinum*; n = 1), sugar maple (*Acer saccharum*; n = 8), white pine (*Pinus strobus*; n = 4) and quaking aspen (*Populus tremuloides*; n = 5). The diversity of tree species used as roosts reinforces the fact that it is the structure of the tree, not the species, that is important (Figures 1.5, and 1.6). Canopy cover varied around each roost tree, but most roosts were dominate or co-dominant in the canopy (USFS 2011).

While Indiana bats primarily roost in trees, some maternity colonies have been found in buildings (USFWS 2007) and individual bats have been found in bat houses. To date, no Indiana bats have been recorded in a building or bat house on Fort Drum.

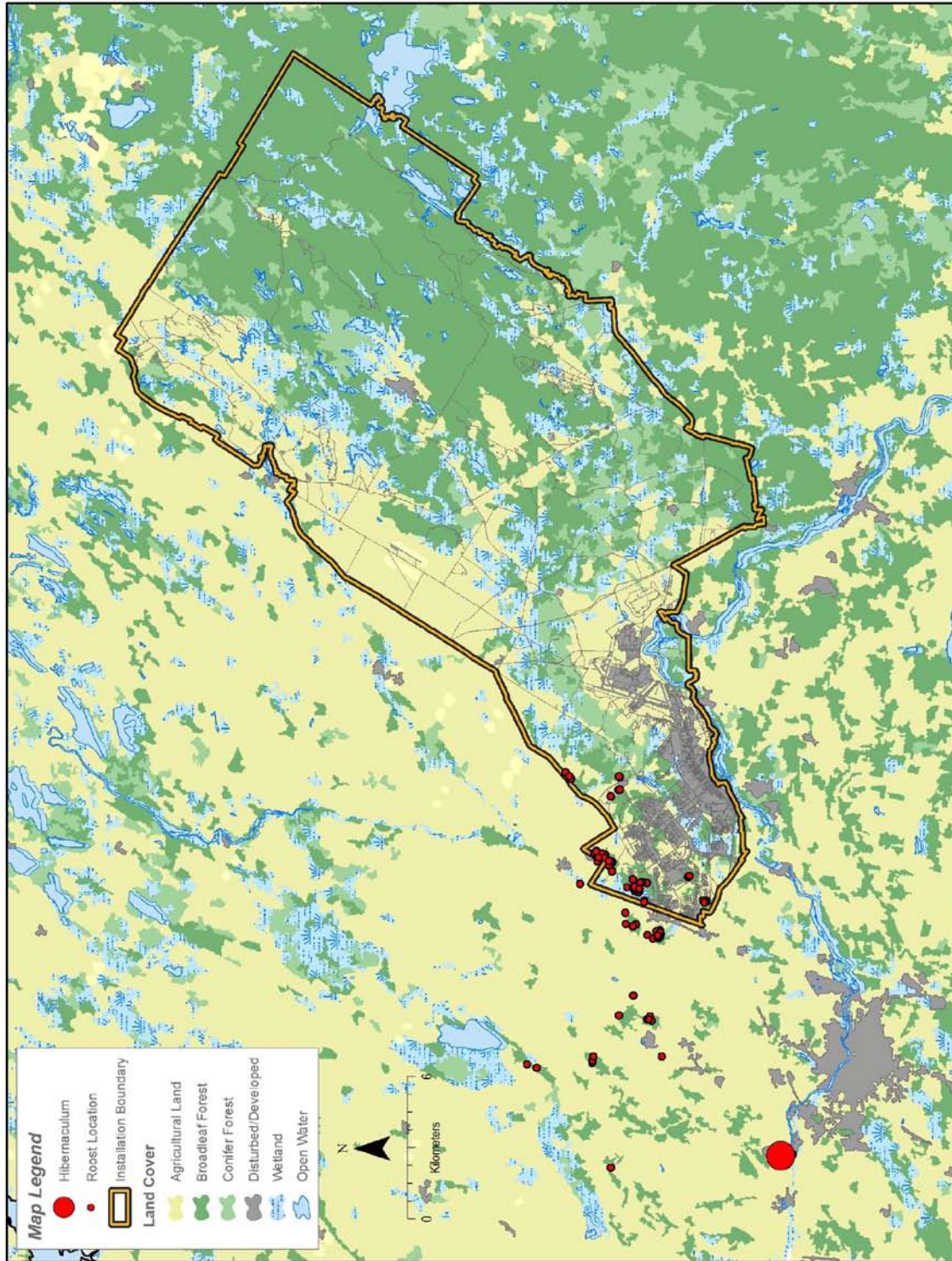


Figure 1.7. Known Indiana bat roost locations within and adjacent to Fort Drum Military Installation.

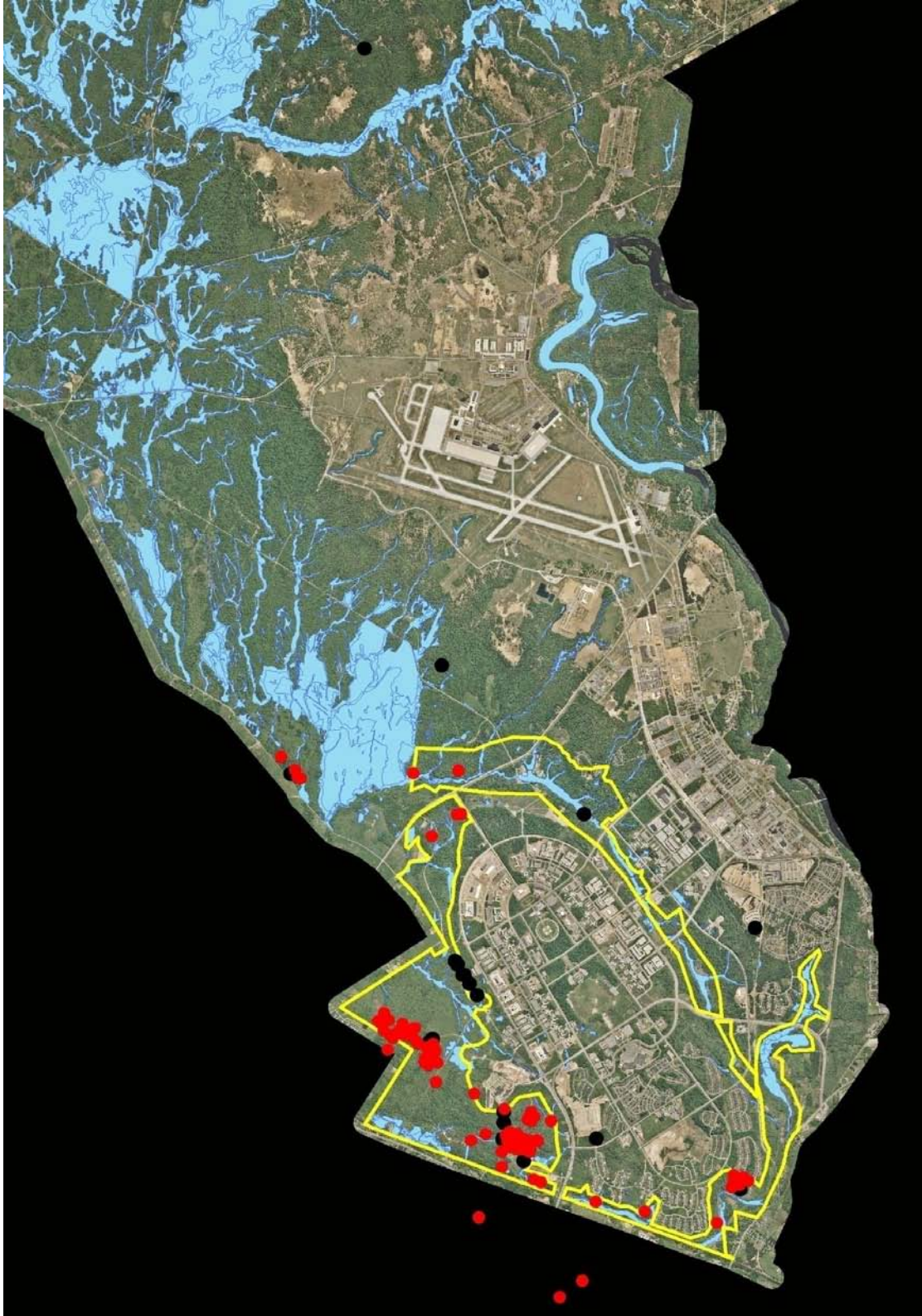


Figure 1.8. Known Indiana bat capture locations (black circles) and roost locations (red circles) from 2007 – 2010 survey and monitoring efforts on Fort Drum Military Installation.

1.5.2.5 Foraging/Travelling Movements

Indiana bats are selective opportunistic insectivores that feed on a number of insect species, predominantly Lepidopterans (e.g., moths), Dipterans (e.g., flies and mosquitoes), Coleopterans (e.g., beetles), and Hymenopterans (e.g., wasps, sawflies) (Murray and Kurta 2002, USFWS 2007). Recent research has suggested that insect consumption varies by season, location, and reproductive condition of the Indiana bat (Tuttle et al. 2006). In an urban-rural interface, Lepidopterans were consumed the most in June while Coleopterans were the predominant prey in early August (Tuttle et al. 2006).

The USFWS routinely suggests that agencies use a 2.5 mi (4 km) buffer around roost trees when analyzing impacts to foraging Indiana bats, unless there is site specific information to suggest otherwise. Research has shown that female Indiana bats forage 0.3 - 5.2 mi (0.5 - 8.4 km) from roost sites (Murray and Kurta 2004, Sparks et al. 2005, USFWS 2007). On Fort Drum, echolocation surveys using Anabat II detectors have identified probable Indiana bat call sequences throughout much of the installation (Figure 1.17). Radio-telemetry studies have confirmed foraging and movement activities in the Cantonment Area, Training Areas 3 and 4, and off-post up to 4 mi (6.4 km) from the traditional roosting clusters (ESI 2006, ESI 2008a, ESI 2008b, Copperhead 2009, ESI 2011, and USFS 2011; Figures 1.9 and 1.10). The longest confirmed movement was documented in 2010, when a juvenile female Indiana bat was captured in Training Area 8 and tracked back approximately 8 miles (13 km) to where it roosted in the known use cluster within the Cantonment Area (Figure 1.8).

Indiana bats forage 6 - 90 ft (2 - 30 m) above the ground near the treetops along riparian forests and floodplains, as well as in upland forests and in low fields and pastures (Humphrey et al. 1977, Brack 1983). Summer foraging areas may contain diverse land cover types, including agricultural lands, residential areas, and open woodlands (Carter et al. 2002, Farmer et al. 2002, Miller et al. 2002). Indiana bats also forage along habitat edges that incorporate early successional forest, mature forests, and fields (Menzel et al. 2001). Approximately, 92% of Fort Drum is covered by a variety of natural habitats which may be utilized by Indiana bats.

The home range size (fixed kernel) of three Indiana bats radio-tracked in the fall of 2007 varied from 1,267 - 5,295 ac (513 - 2,143 ha) with a mean range of 4,720 ac (1,910 ha) (ESI 2008b; Figures 1.9 and 1.10). Although these bats foraged both on and off of Fort Drum property, approximately two-thirds of the foraging movements were within the Cantonment Area and BCA. Results from extensive radio-tracking efforts of 14 bats in the summer and fall of 2008-2009 suggests similar foraging areas, however, the home range size was smaller and ranged from 36.5 - 532.5 ac (14.8 - 215.5 ha). Results from both studies suggest that adequate foraging resources exist for bats either within or adjacent to Fort Drum's Cantonment Area. Pasture/hay, deciduous forest, and palustrine forested wetlands were the most commonly used habitat types by the tagged Indiana bats (ESI 2008b, USFS 2011).

Very little research has focused on the use of travel corridors by Indiana bats. Most information pertaining to bat movements and travel corridors is incidental to other portions of a study and/or general observations. However, Murray and Kurta (2004) showed that Indiana bats increased commuting distance by 55% to follow tree-lined paths rather than flying over large agricultural fields, some of which were at least 0.6 mi (1 km) wide. The maximum size of an opening Indiana bats may cross is unknown.

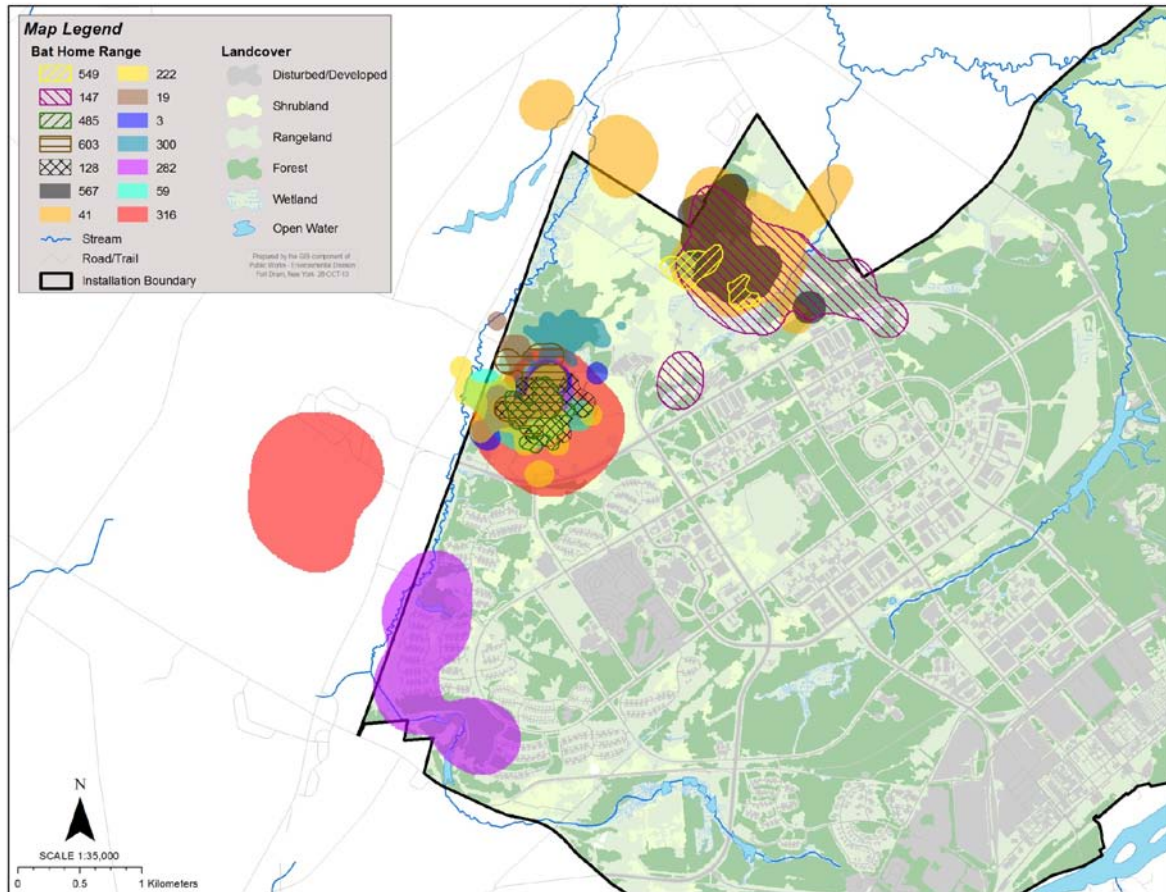


Figure 1.9. Foraging areas of Indiana bats on Fort Drum Military Installation in 2008 and 2009.

There are numerous observations of Indiana bats crossing interstate highways and open fields. Recent work found that on average, Indiana bats crossed a road 11.5 times per night with small unpaved and gravel roads being readily crossed (Dale Sparks, Indiana State University, personal communication). Bats did cross an interstate highway, but much less frequently at <0.5 times per night. In New York, Indiana bats tracked from hibernacula to spring and summer roosts have crossed Interstate 81, the Hudson River, Interstate 87, and other highways. These crossings primarily occurred during the initial migration from hibernacula to spring and summer habitats, rather than during nightly foraging bouts (NYSDEC, unpublished data).

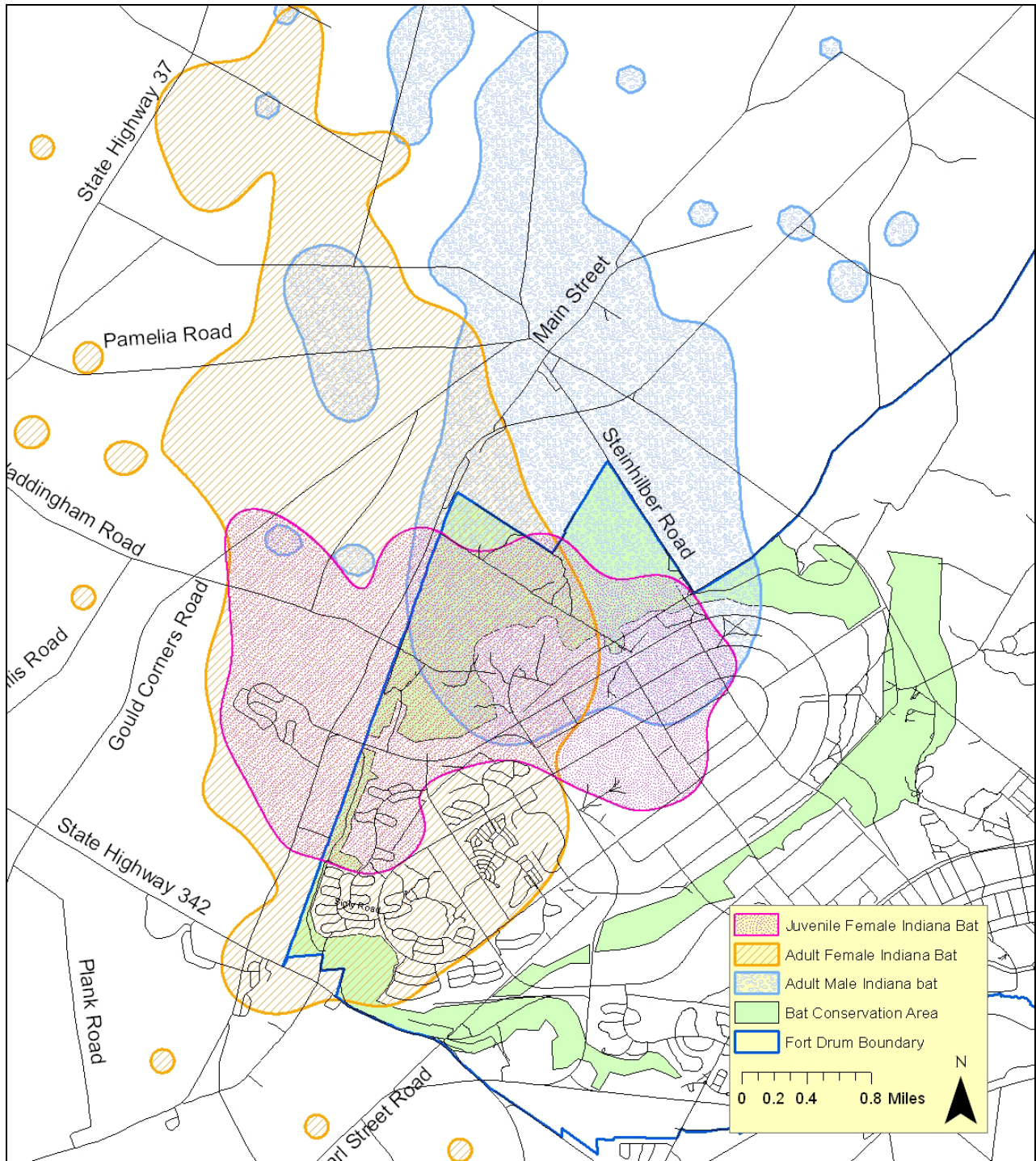


Figure 1.10. Fall home range for three foraging Indiana bats captured on Fort Drum in 2007 (ESI 2008b).

1.5.2.6 Fall Swarming

Forested habitat surrounding winter hibernacula provide important foraging and roosting sites during the autumn swarming period (USFWS 2007). Swarming typically occurs between August and October (Cope and Humphrey 1977). During the swarming period, Indiana bats replenish fat reserves that may have been depleted during migration in order to sustain them through winter hibernation. In the fall, Indiana bats frequently enter and exit winter hibernacula during the night with few remaining to roost during the day. It is assumed this behavior is used to facilitate mating, and to familiarize young with an area (Cope and Humphrey 1977).

Because of Fort Drum's proximity to a hibernaculum, the potential exists for Indiana bats to use part of the installation for swarming. Indiana bats have been recorded using areas between 0.2 – 20.0 mi (0.32 – 32.0 km) from winter hibernacula during fall swarming (USFWS 2007). Studies conducted on Fort Drum (2007-2010) have documented the presence of 13 (6 juvenile females, 3 adult males, 2 adult females, and 2 juvenile males) roosting and foraging Indiana bats utilizing the Cantonment Area later than August 15 (ESI 2008b, USFS 2011). One juvenile female was present on Fort Drum until October 10 and was subsequently tracked to the Glen Park hibernaculum, where it presumably spent the winter (ESI 2008b). Two other Indiana bats (1 juvenile female, 1 adult male) were present on Fort Drum until at least October 2, one adult male was present until at least October 8, and one adult female was present until at least October 12. Unfortunately, it is unknown whether these four bats left Fort Drum for the hibernaculum on their last recorded date or whether the transmitters fell off or their batteries died. In total, 62 fall roosts were located after August 15 within the Cantonment Area during surveys in 2007-2010, and 16 of these roosts were located between October 1 and October 12 (ESI 2008b, ESI 2011, USFS 2011).

It is assumed fall swarming activities are mostly completed on Fort Drum by October 15 of any given year primarily based on the drop in temperatures experienced in this area of northern New York. Over an 11 year period from 2000-2010, the average minimum temperature on Fort Drum from October 1 – October 15 was 44 °F (6.7 °C), with 18 out of a possible 165 days (or on average 1.6 out of every 15 days) during that period dropping to or below freezing at night. Conversely, during the same period in 2000-2010, from October 16 – October 31, the average minimum temperature was 38 °F (3.3 °C), with 54 of a possible 176 days (or on average 4.9 out of every 16 days) during the period dropping to or below freezing. Additionally, from November 1 – November 15, the average minimum temperature on Fort Drum was 33.8 °F (1 °C), with 80 of a possible 165 days (or on average 7.3 out of every 15 days) during the period dropping to or below freezing (Fort Drum, unpublished data). Insect activity is greatly reduced at these lower temperatures, and bats would have great difficulty maintaining fat resources previously acquired if they routinely stayed active and on the landscape after October 15.

1.5.3 Population Status & Threats

Rangewide and New York

The Indiana bat was listed in 1967 as being in danger of extinction under the Endangered Species Preservation Act of 1966 (32 FR 4001, March 11, 1967). In that same year, it was also listed as a state endangered species by the NYSDEC. Critical habitat for the Indiana bat was designated on September 24, 1976 consisting of 11 mines and two caves in six states (41 FR 41914, September 24, 1976). No Critical Habitat has been designated in New York.

Variation in regional populations were common from 1965-2007, with apparently decreasing numbers in the southern portion of the range, and increasing numbers in the northern portion of their range (i.e., New York). Overall the population (estimated at 513,398 individuals) saw a general decline of approximately 50% during that time (USFWS 2007). After the onset of WNS, the numbers have sustained further declines, with the latest rangewide population estimate (from winter 2008-2009) at 417,185 Indiana bats. This represents a 10.8% decline from the 2006-2007 population (USFWS 2011a).

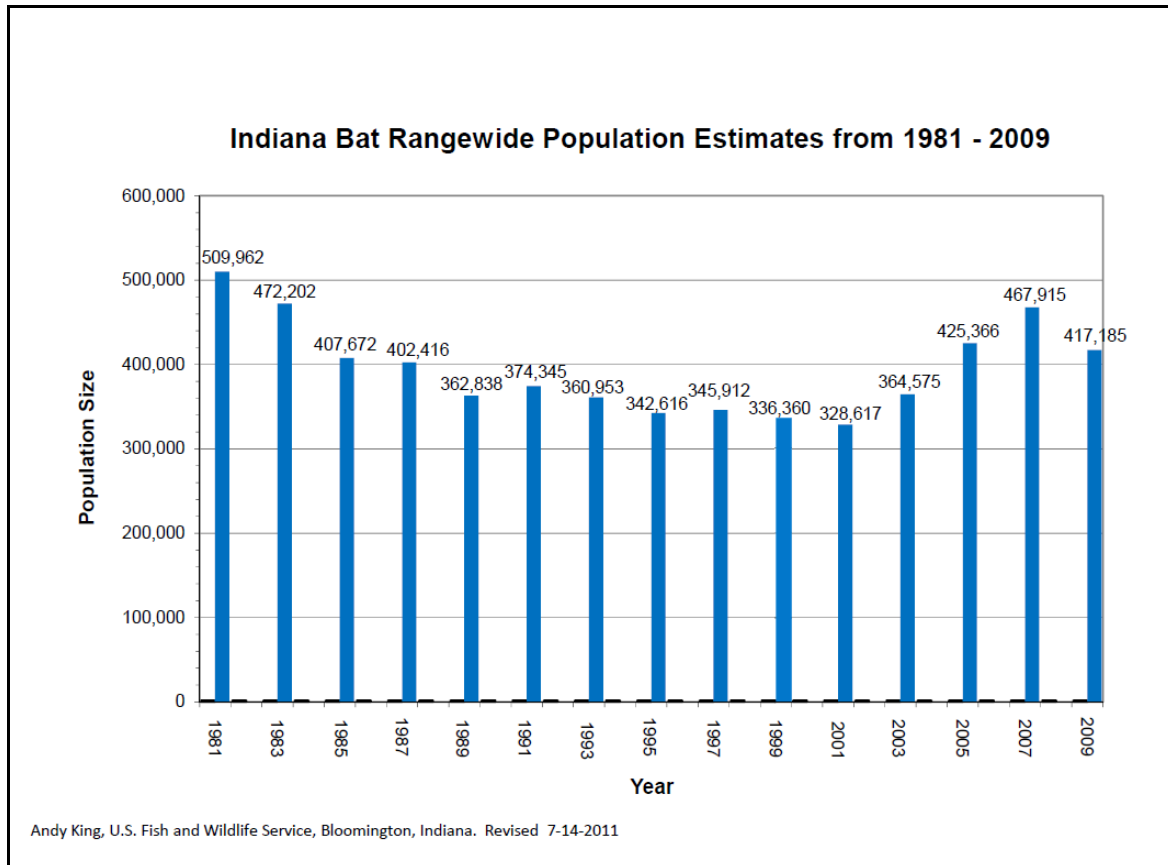


Figure 1.11. Indiana Bat Rangewide Population Estimates 1981-2009.

According to hibernacula surveys conducted by the NYSDEC, there were approximately 52,000 Indiana bats that overwintered in New York using 12 hibernacula prior to WNS (Figure 1.12; NYSDEC, unpublished data). After the onset of WNS, approximately 17,000 individuals were found in 16 hibernaculum sites (NYSDEC, unpublished data). In Jefferson County, New York, there is a single known Indiana bat hibernaculum in Glen Park that is classified as a Priority II hibernacula (hibernaculum that have current or historic populations between 1,000-9,999 and “contributes to recovery and long-term conservation” of Indiana bats). The hibernaculum is located approximately 6.5 mi (10.5 km) from Fort Drum, and while it historically provided wintering habitat for approximately 2,000 Indiana bats (Figure 1.13), only approximately 433 bats now reside in the cave. (Robyn Niver, USFWS, personal communication, NYSDEC, unpublished data).

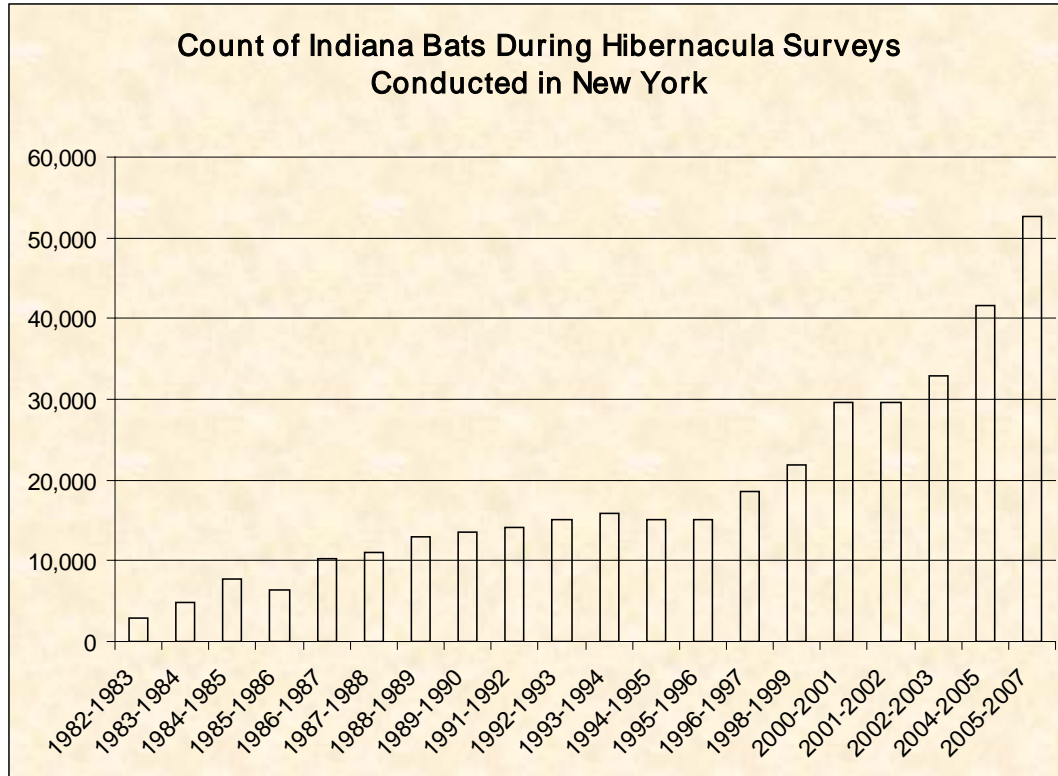


Figure 1.12. Population estimates from winter surveys of Indiana bats in New York.

Threats

While there are a number of documented and suspected reasons for the decline of Indiana bat populations (see USFWS 2007), currently the number one reason is WNS. First detected in Howe’s Cave in Schoharie County, New York in the winter 2006, WNS has spread throughout the northeastern United States and portions of Canada, and as far south as Tennessee. Additionally, evidence of the presumptive causative agent of the disease, the novel psychrophilic fungus *Geomyces destructans* (Blehert et al. 2009, Gargas et al. 2009, USFWS 2011b), has been detected on bats as far south and west as Missouri and Oklahoma. To date, WNS has severely impacted some of the Northeast’s most common bat species, killing greater than a million hibernating bats. This disease poses one of the most serious threats to the continued existence and recovery of the Indiana bat. Prior to WNS, the Recovery Priority of the Indiana bat was 8 meaning the species had a moderate degree of threat and high recovery potential; due to WNS, the Recovery Priority is now a 5, meaning the species has a high degree of threat and a low potential for recovery.

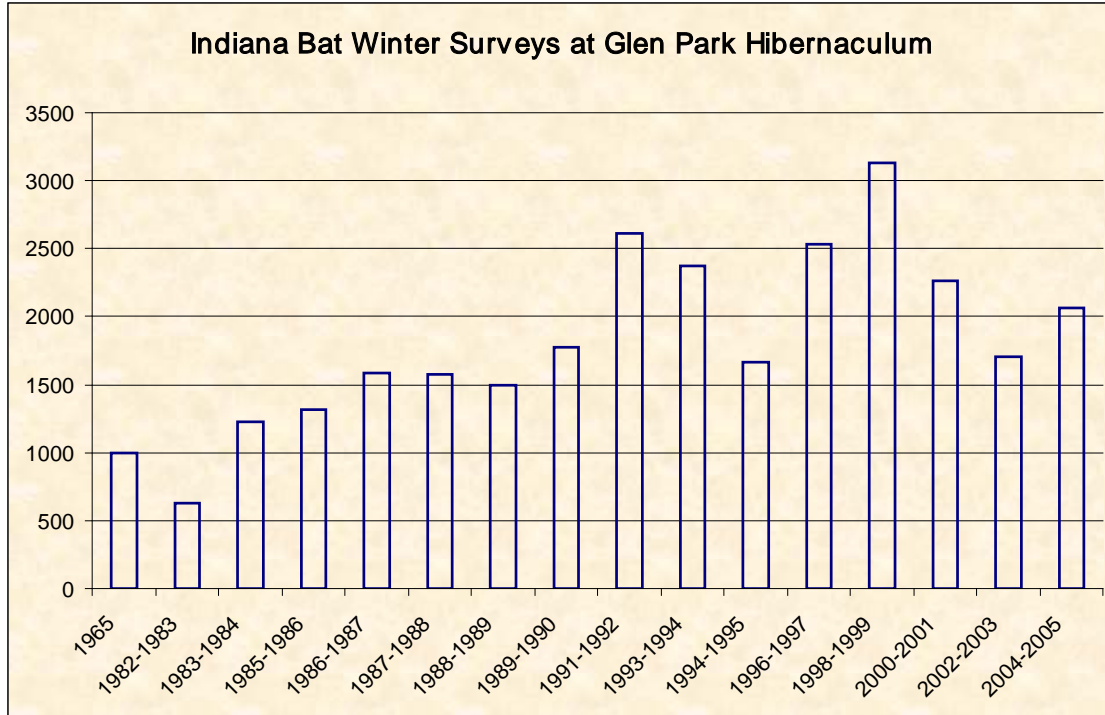


Figure 1.13. Population estimates of Indiana bats from the Glen Park Hibernaculum.

In 2009, after the outbreak of WNS, the nation-wide population was estimated at 417,185 individuals (a decrease of 10.8% from the 2006-2007 population), while the New York population plummeted 35.8% to 33,885 individuals (USFWS 2011a and NYSDEC, unpublished data, respectively). The numbers of Indiana bats at Glen Park have always fluctuated due to difficulty of detecting bats inside the labyrinth of caves (Table 1.1), but the overall numbers have definitely declined in the primary hibernation site within the cave (Figure 1.15). The population declines associated with WNS have also made it extremely difficult to locate members of the known colony on Fort Drum through traditional mistnet efforts, where previously colony members were relatively easy to capture. Additionally, the number of bats exiting roosts on Fort Drum that contain reproductive female Indiana bats have also dropped from initial counts in 2007 and 2008. This may indicate that the colony has broken into smaller maternity units, or that the numbers of bats are so low on the summer landscape that bats can no longer find sufficient numbers to form primary maternity roosts with robust numbers.

There are also a number of other documented and suspected reasons for the historic decline of Indiana bat populations which include disturbance during hibernation, habitat loss, pesticide contamination, persecution, and disease. Indiana bats are most susceptible to injury or death during hibernation. This can be from humans entering hibernacula and disturbing bats thus causing them to expend crucial fat reserves, which can lead to starvation if forced to arouse from sleep too often. Vandalism of hibernacula and the direct killing of hibernating Indiana bats have also contributed to population declines. Natural catastrophes, such as flooding or extreme temperatures, have resulted in the death of hibernating bats. Due to its importance to the survival of the species, the protection of Indiana bat hibernacula had been in the forefront of Indiana bat recovery plans (USFWS 2007).

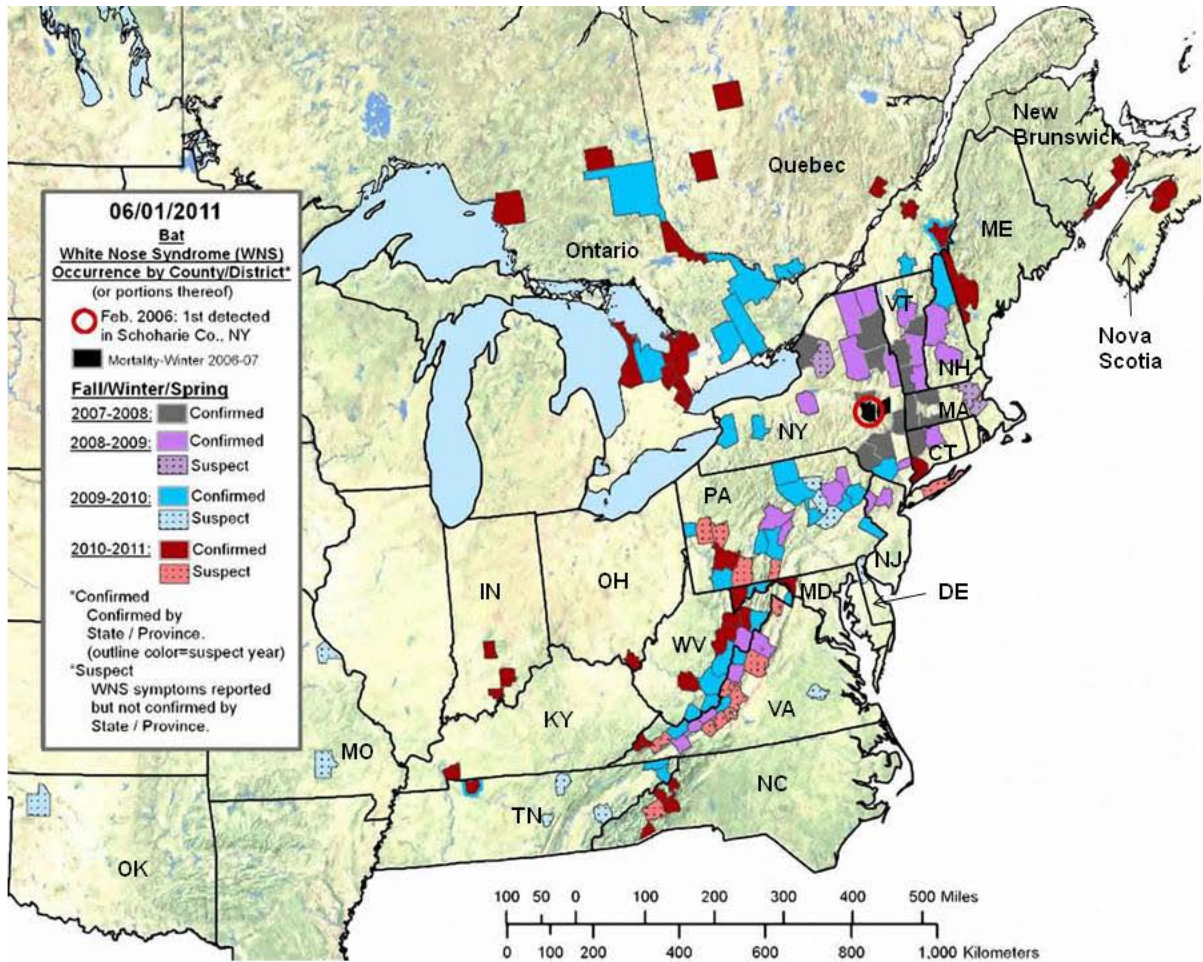


Figure 1.14. Summary of white-nose syndrome occurrence to date in the United States and Canada (Cal Butchkoski, Pennsylvania Game Commission).

The loss of summer habitat is another important factor affecting Indiana bats. Changing land use practices including urban and agricultural development, as well as fire suppression have reduced available roosting and foraging habitat (USFWS 2007). Timber harvests have the potential to remove important roosting/foraging sites for Indiana bats, but proper forest management can retain and even improve roosting and foraging habitat for Indiana bats by providing or maintaining forest structural features, such as snags, openings in canopy cover, and edge habitats.

Table 1.1. Population estimates of Indiana bats at the Glen Park hibernaculum. (Carl Herzog, NYSDEC)

Year	# Bats
1997	2,535
1999	3,129
2001	2,264
2003	1,704
2005	2,065
2007	1,928
2008	1,247
2009	1,719
2010	509
2011	433

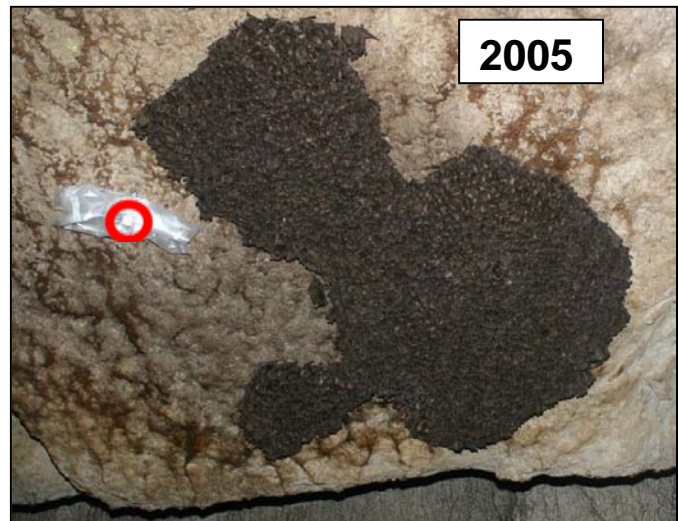


Figure 1.15 Indiana bats hibernating in Glen Park hibernaculum in 2005 before WNS and in 2010 after WNS. The red circle denotes the same temperature probe in both photos for comparison.

Bioaccumulation of environmental contaminants has also been identified as a suspected cause for the decline of Indiana bats (USFWS 2007). Organochlorine insecticides which became widely used after World War II are neurotoxic, synthetic chemicals of which many are resistant to metabolism in mammals (O'Shea and Clark 2002). Organochlorine insecticides may have resulted in chronic mortality of Indiana bats (O'Shea and Clark 2002). For example, guano collected from an Indiana bat roost in Indiana, in the 1970s, had concentrations of dieldrin in their guano comparable to the levels found in colonies of gray bats that suffered mortality from dieldrin poisoning (O'Shea and Clark 2002). Schmidt et al. (2002) measured levels of Polycyclic Aromatic Hydrocarbons (PAH) and organochlorine pesticides in surrogate bat species to ascertain potential affects to the Indiana bat. At low concentrations, these chemicals cause cancer and cellular mutations in mammals, and may affect reproductive success by reducing viability of gametes or offspring.

Another relatively recent threat to bats in the last decade has been wind power facilities (Kunz et al. 2007). Numerous wind power facilities have been recently constructed in northern New York, with more planned (Figure 1.16). A Bats and Wind Energy Cooperative (www.batsandwind.org) has been launched to conduct research on mortality causes and to develop solutions to prevent or minimize fatalities at wind farms. Monitoring at large wind facilities has documented two Indiana bat mortalities to date (WEST 2011), but the possibility exists that additional mortalities have gone undiscovered.

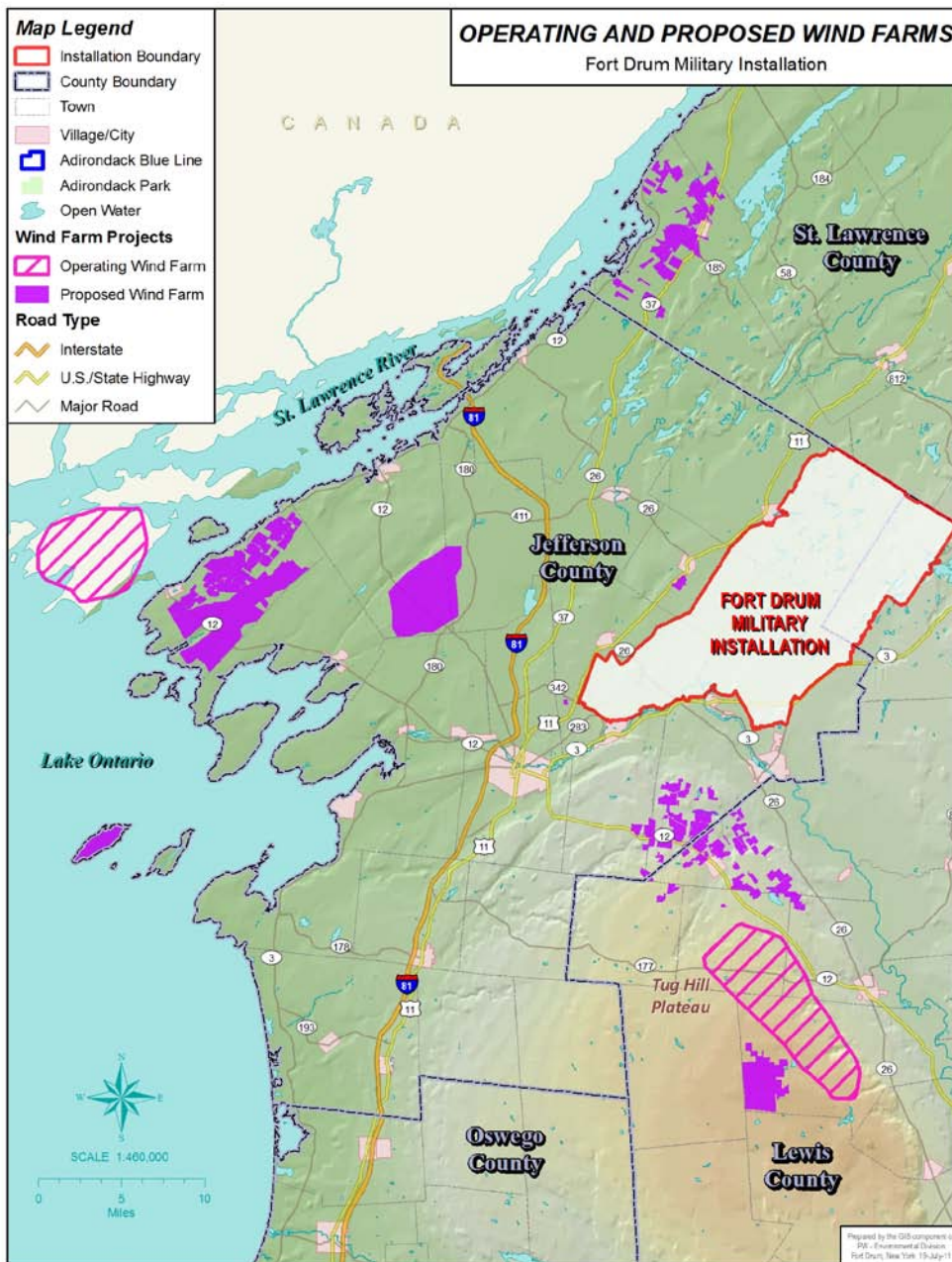


Figure 1.16. Operating and proposed wind farms within Fort Drum's operational airspace.

1.5.4 Population Status on Fort Drum

Acoustical surveys using Anabat echolocation detectors have been conducted annually since 2003 and provided support for the possible presence of Indiana bats throughout the installation (Figure 1.17). However, Indiana bats were not confirmed on Fort Drum until 2006 when an off-post study found four bats roosting and foraging in and around Fort Drum's Cantonment Area (ESI 2006). Since that time (2007-2011), summer mist net surveys have been completed on Fort Drum in an attempt to verify Anabat results, to record bat species presence, to assess the summer status of Indiana bats, and to locate Indiana bat maternity colonies on the installation. Given Fort Drum's size and amount of forests accessible for surveys, it was estimated that 384 net sites would have needed to be surveyed in order to sufficiently confirm the presence or probable absence of Indiana bats throughout the installation (Appendix A).

There was one known maternity colony in the Cantonment Area when the first BA (Appendix A) was written and BO (USFWS 2009) was subsequently issued in 2009. Because of the amount of habitat available, the proximity to the known hibernaculum and acoustical evidence suggested Indiana bat distribution throughout much of the installation, it was also assumed that a second undiscovered maternity colony existed in, or adjacent to, the southeastern part of the Training Area.

From 2007-2011, mist net surveys were conducted at 323 sites on Fort Drum following USFWS guidelines. Of the 323 sites, 246 sites were surveyed once, while the remaining 77 sites were surveyed two or more times. In the summer of 2007, 1,369 bats were captured of which 18 were Indiana bats (11 adult females, 2 adult males, 3 juvenile females, 2 juvenile males: ESI 2008a). Seventeen Indiana bats were captured in the Cantonment Area and one in Training Area 4. Ten of the 11 female Indiana bats were considered reproductive (i.e. pregnant, lactating, or post-lactating) and ten Indiana bats (7 adult females, 1 adult male, and 2 juvenile females) were radio-tagged and tracked to roosts. In 2008, mist net surveys were concentrated in the Training Area and captured 380 bats, including two Indiana bats (1 adult male and 1 adult female) in Training Area 3 (Copperhead 2009). Both were radio-tagged and tracked to roosts in the Cantonment Area and TA3 and TA4. In 2009, 394 bats were captured in the Training Area; however, no Indiana bats were captured. Additionally, drastic drops in other myotine bats were first noted. In 2010, 648 bats were captured, of which two were Indiana bats (1 adult male, and 1 juvenile female). The adult male was captured in the Cantonment Area near the known maternity colony, however, the juvenile female was captured in TA8, marking the first time an Indiana bat had been captured outside the Cantonment Area or the adjacent TA3 or TA4. However, this bat was subsequently tracked back to roosts in the known maternity colony, approximately 8 mi (13 km) away (ESI 2011). Therefore, all bats captured in the Training Area during surveys following USFWS protocol have been tracked back to roosts within the known maternity area in the Cantonment Area.

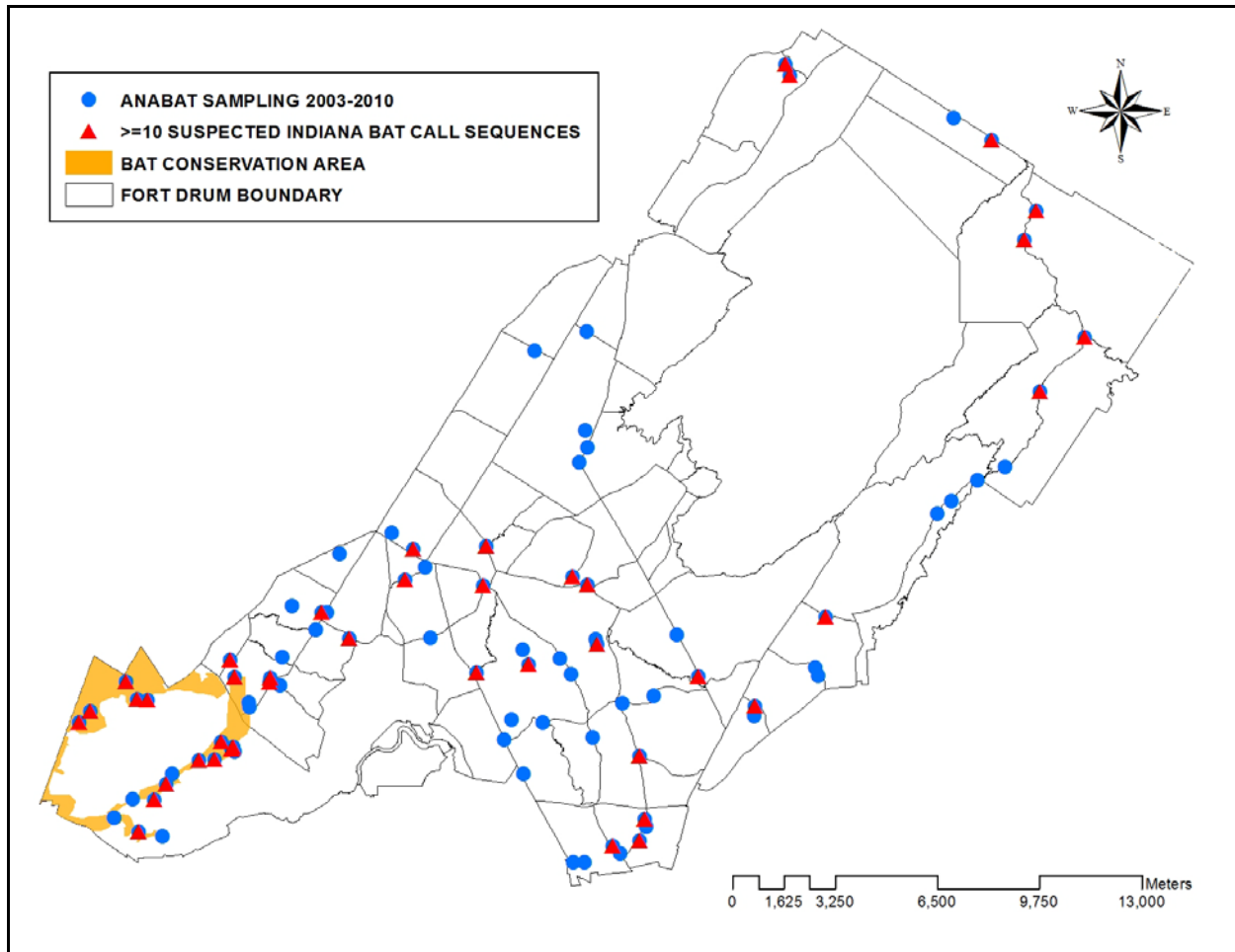


Figure 1.17. Anabat acoustical sampling locations on Fort Drum Military Installation, 2003-2010.

In addition to the above summer mist net surveys, a fall mist net survey was conducted in 2007 to opportunistically monitor the Cantonment Area (Figure 1.19). The study resulted in the capture of 35 bats of which three were Indiana bats (1 adult male, 1 adult female, and 1 juvenile female; ESI 2008b). Each bat was tracked to their diurnal roost, and foraging movements were monitored. These bats too stayed either within the known maternity use area, or immediately adjacent in the lands of the Town of Leray north of the Cantonment Area.

In 2008 and 2009, a more extensive project was initiated with the U.S. Forest Service and West Virginia University (WVU) to capture and intensively radio-track Indiana bats in the Cantonment Area to determine foraging areas and roost locations during spring, summer, and fall. Mist netting was opportunistically selected. Between May 13 to the beginning of October in 2008, 12 Indiana bats (5 adult females, 3 adult males, 2 juvenile males, and 2 juvenile females) were captured, and 12 were radio-tagged and tracked. One adult female was originally captured in the summer of 2007. Two bats (1 adult male and 1 juvenile female) remained on Fort Drum until October 2. In 2009, 4 Indiana bats (3 adult females, and 1 juvenile male) were captured and subsequently tracked. All bats used the known maternity use area in the Cantonment Area and foraged within the Cantonment Area, BCA and lands adjacent to Fort Drum in the Town of Leray.

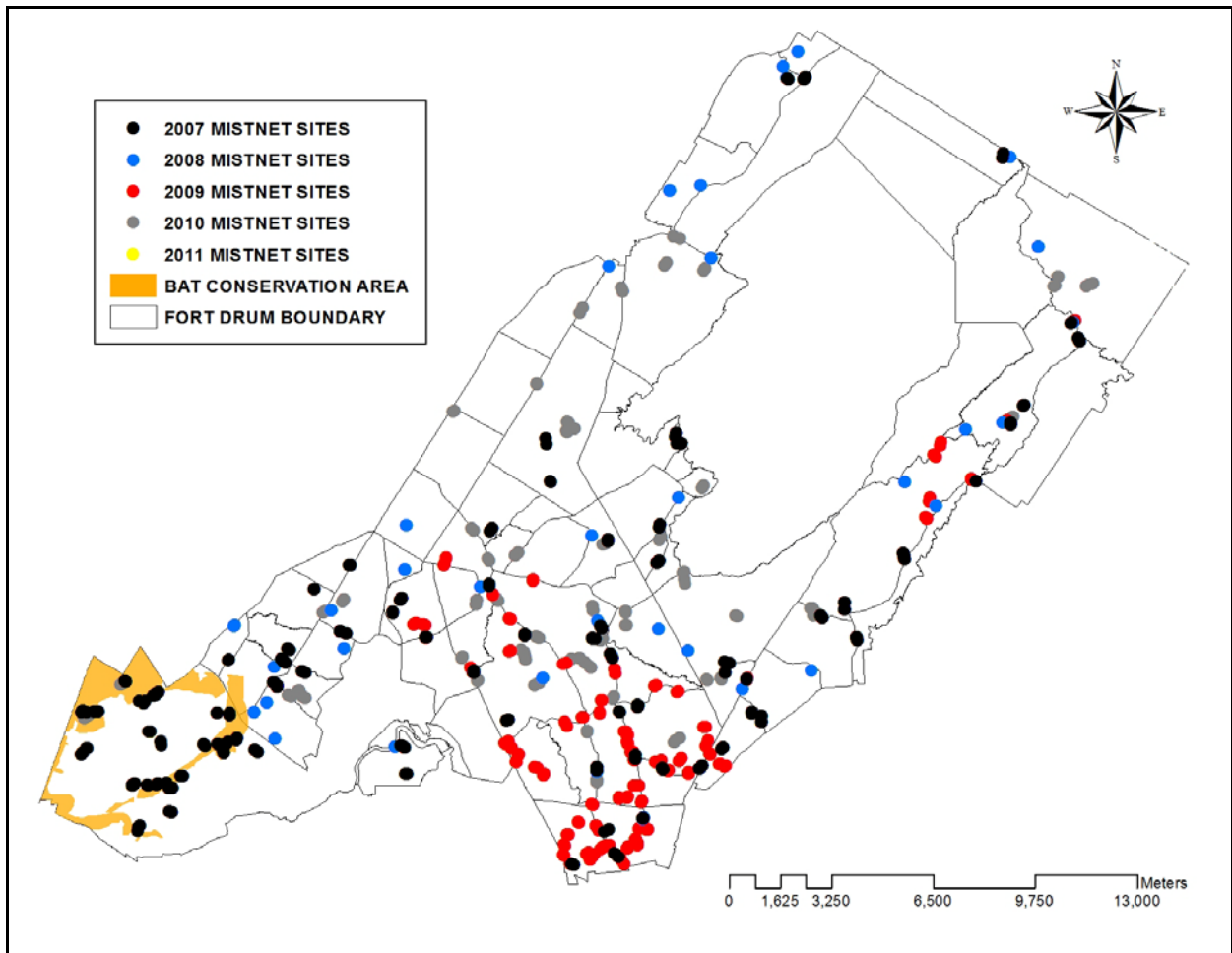


Figure 1.18. Mist net sampling locations on Fort Drum Military Installation performed to USFWS sampling protocols.

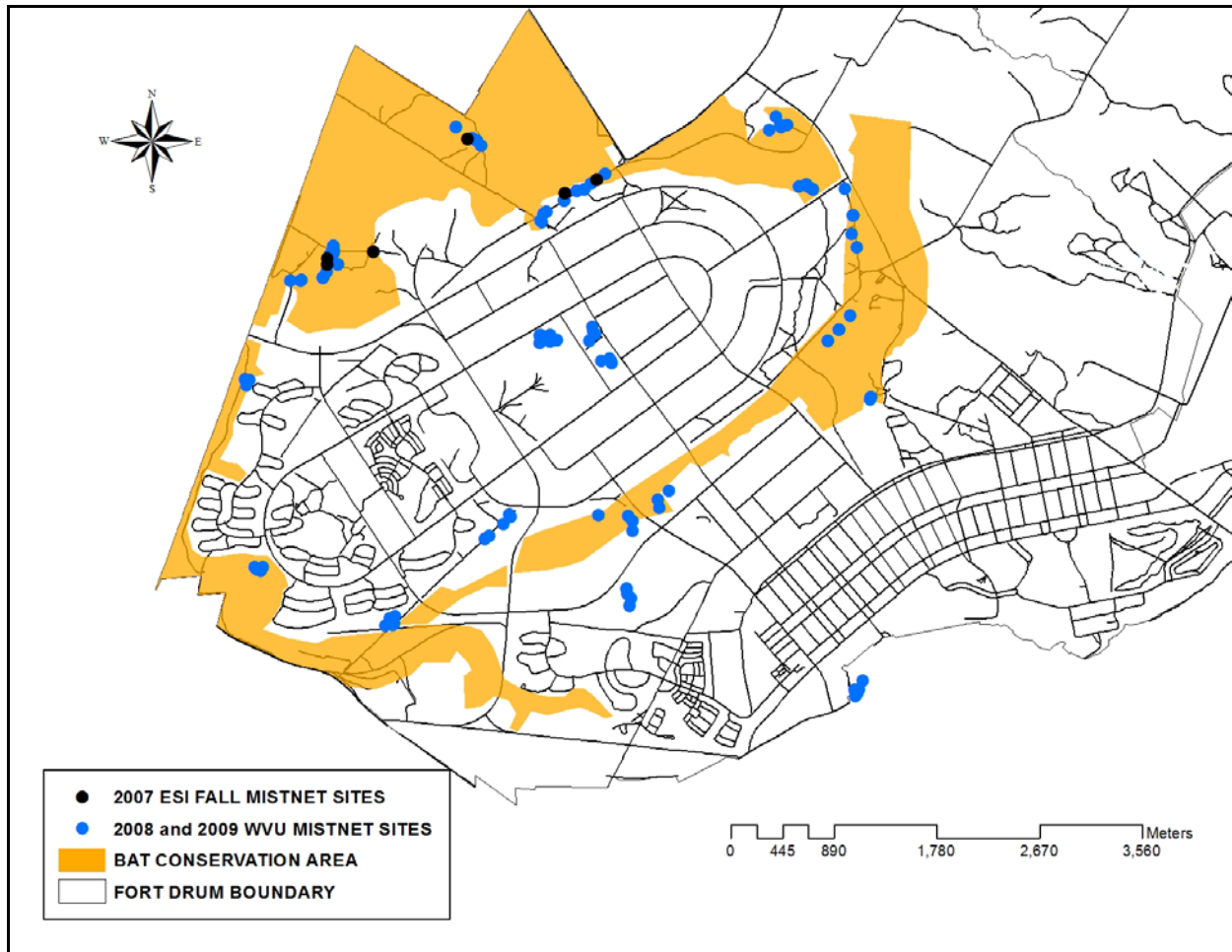


Figure 1.19. Opportunistic mist net sampling locations on Fort Drum Military Installation, 2007-2009.

Although Fort Drum did not survey the projected 384 sites following USFWS guidelines, we feel with all our efforts that an adequate survey effort was completed from 2007-2011 to determine probable use of Indiana bats (Figures 1.17, 1.18, and 1.19). After 5 years of mistnetting, only 4 Indiana bats have been discovered in the Training Area (Figure 1.20). Each of those bats were subsequently determined to be part of the known colony via radio tracking. Because of this new information, Fort Drum has revised its original determination that there may be an undiscovered colony in the Training Area. We now feel that previous evidence (e.g., acoustic recordings) of Indiana bat use in the Training Area was most likely from the known colony, and it is likely that the members of this colony were foraging/traveling farther away from the known use area than literature had previously established. Although the possibility still exists that there is a second, undiscovered maternity colony present in the Training Area, all information now suggests that suspected Indiana bat use within the Training Area is most likely periodic foraging or exploratory movements from the known colony in the Cantonment Area.

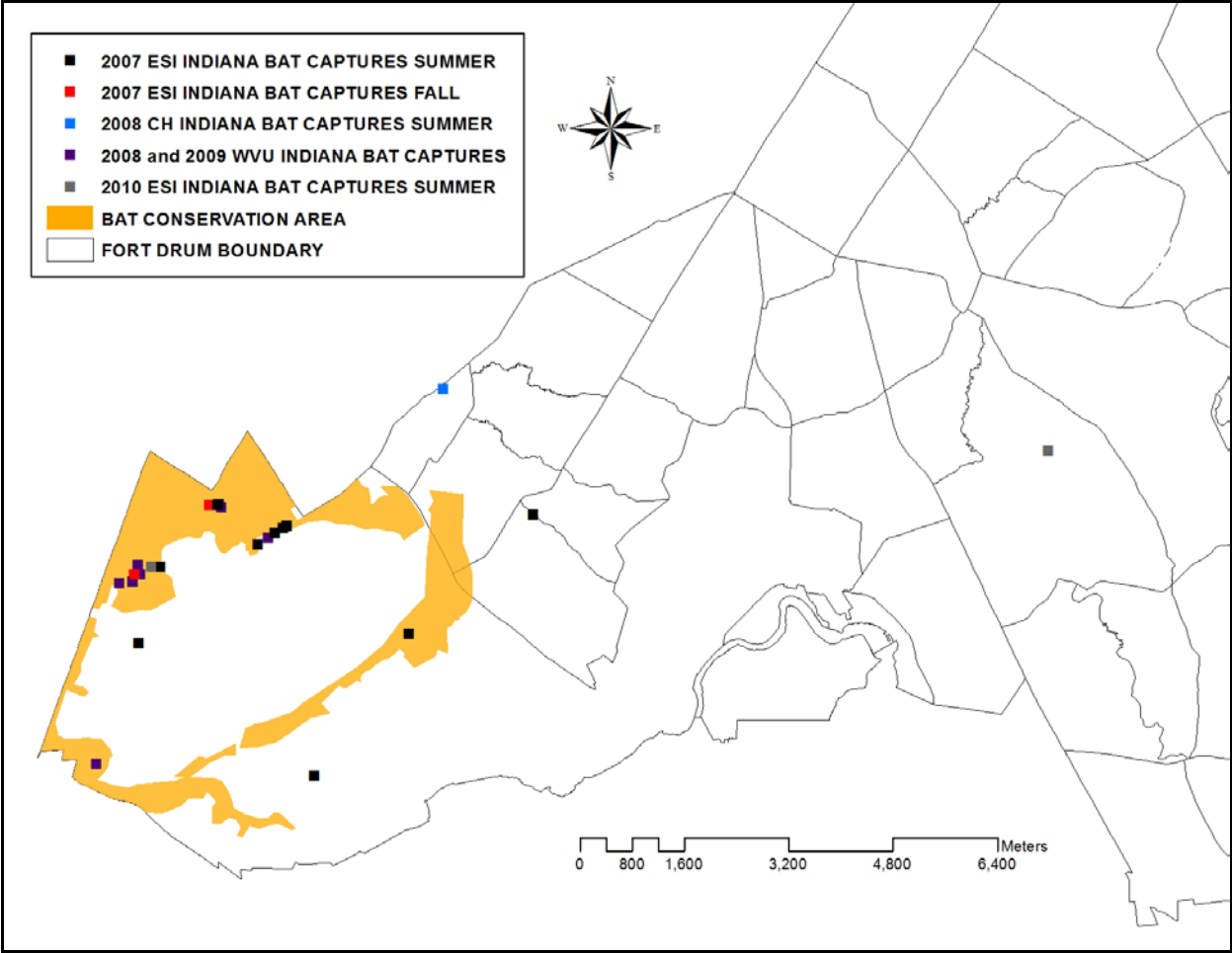


Figure 1.20. Indiana bat captures on Fort Drum Military Installation, 2007-2010.

2.0 Proposed Activities

This section assesses activities on Fort Drum that have the potential to affect the Indiana bat. These activities include: construction; wind development; military training; forest management; vegetation management; prescribed burning; use of pesticides; wildlife management/vertebrate pest control; outdoor recreation; and the ACUB program.

Because the current evidence no longer supports the presence and associated potential impacts to an undiscovered maternity colony in the Training Area, overall impacts from these activities should be reduced.

2.1 Construction

Between January 2012 -December 2014, approximately 30 projects are proposed for construction on Fort Drum. Approximately 20 projects will be concentrated in the Cantonment Area and the area surrounding Wheeler-Sack Army Airfield (WSAAF), and the remaining 10 are in the Training Area. All projects are subject to funding, mission priorities, and other factors, and although 30 are proposed, it is unknown how many will actually be constructed.

Given the total proposed impact, Fort Drum considers that the Conservation Measures originally presented in the 2009-2011 BA for Cantonment/WSSAF construction are still appropriate and propose only a few modifications related to active season clearing in *Section 2.1.1.3* and the addition of small-scale wind development as an additional construction activity. Please see below for these modifications.

2.1.1 Construction Activities

2.1.1.1 Cantonment Area/WSAAF Construction

During January 2009- December 2011, Fort Drum anticipated construction activities to occur on up to 2,483 ac (1,004 ha) of land in and around the Cantonment Area and WSAAF (Table 2.1 and Appendix A). During these three years, approximately 340 ac (138 ha; 14%) were actually cleared for construction (Figure 2.1), which included the loss of approximately 205 ac (83 ha) of natural vegetation, while the remaining approximately 135 ac (55 ha) were on already disturbed and/or developed land. During 2012-2014 we anticipate construction of approximately 20 new projects covering approximately 200 ac (81 ha) (or up to 410 ac (166 ha) after buffering for contingencies; Figure 2.2 and Table 2.2). Refer to Table 2.1 for acreages of impacted vegetative cover types from 2009-2011, and Table 2.2 for the proposed impacts for 2012-2014.

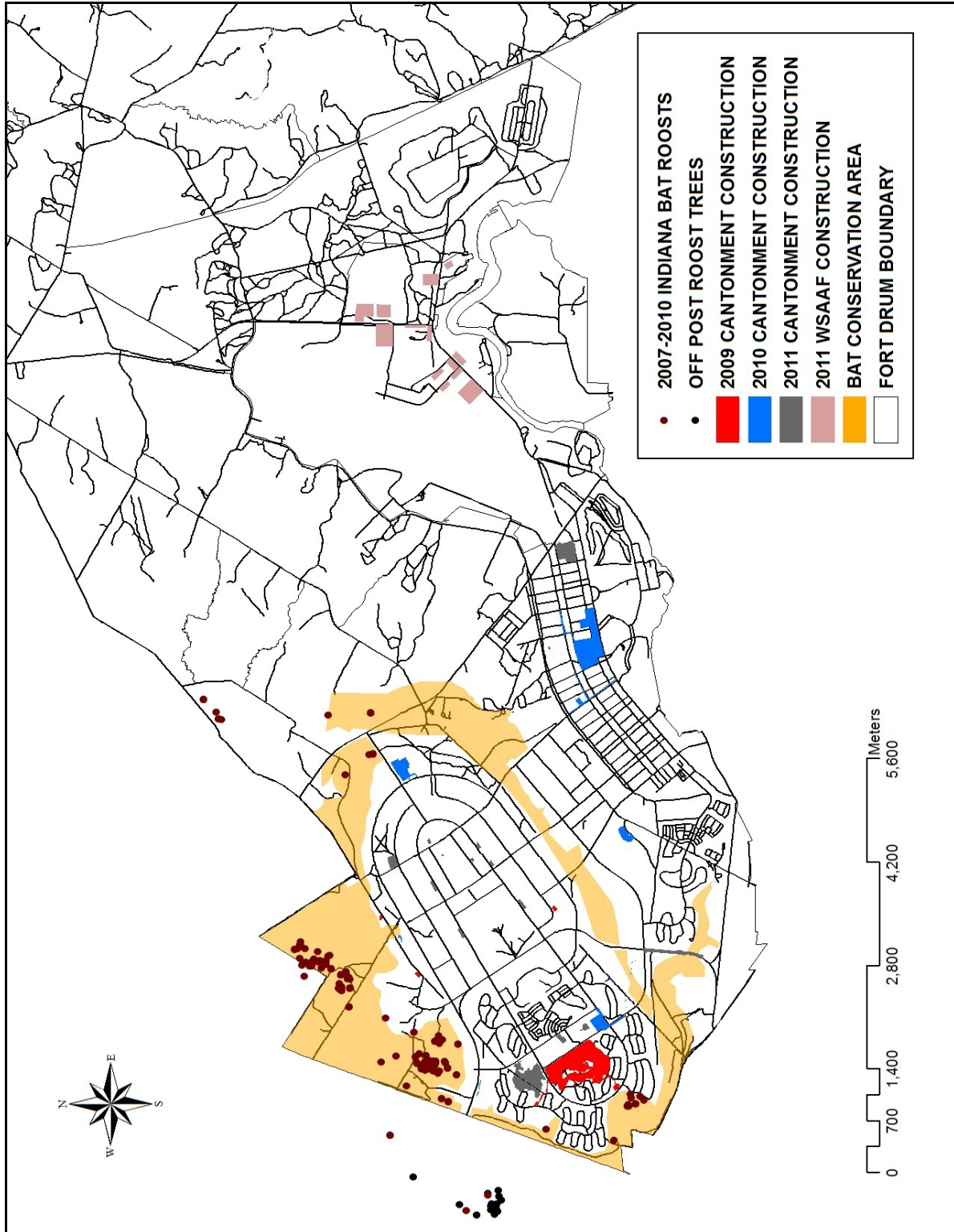


Figure 2.1. Completed clearing for construction projects between January 2009 – December 2011 within the Cantonment Area and WSAAF on Fort Drum Military Installation.

Table 2.1. Amount of vegetation by type (buffered by 50 ac/vegetation type) proposed for removal during 2009-2011 construction activities in the Cantonment Area and WSAAF, and actual landcover impacts from construction activities on Fort Drum Military Installation.

Landcover Type	Proposed Acres	Actual Acres
Conifer Forest	283	11.75
Deciduous Forest	619	55.19
Disturbed	300	97.51
Grasslands	518	59.06
Landscaped Yard	358	29.78
Mixed Forest	509	0.5
Sand Dunes/Flats	116	11.35
Shrublands	169	66.28
Water/Wetlands	8	5

Table 2.2. Amount of landcover by type (buffered by 25 ac/vegetation type, excluding wetlands) proposed for removal during 2012-2014 construction activities in the Cantonment Area and WSAAF on Fort Drum Military Installation.

Landcover Type	Proposed Acres
Conifer Forest	45
Deciduous Forest	110
Disturbed	50
Grasslands	30
Landscaped Yard	35
Mixed Forest	75
Sand Dunes/Flats	25
Shrublands	30
Water/Wetlands	10

Table 2.3. Amount of landcover by type (buffered by 50 ac/vegetation type) proposed for removal during 2009-2011 construction activities in the Training Area, and actual landcover impacts from construction activities on Fort Drum Military Installation.

Landcover Type	Proposed Acres	Actual Acres
Conifer Forest	172	0
Deciduous Forest	1449	26.04
Disturbed Area	75	15.32
Grasslands	791	94.91
Landscaped Yards	107	1.8
Mixed Forest	595	91.13
Shrublands	432	23.85
Water/Wetlands	259	3.00

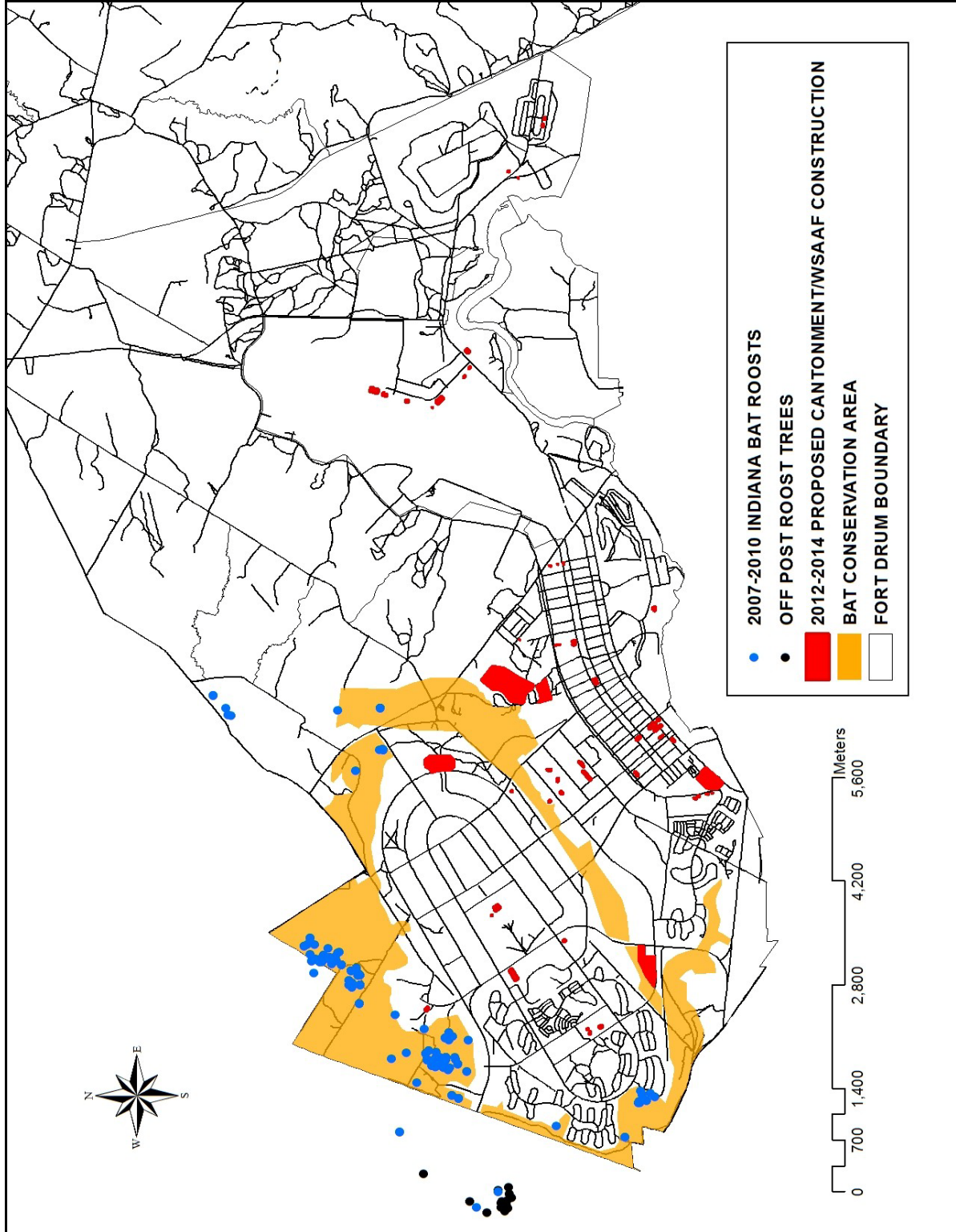


Figure 2.2. Proposed clearing for construction projects between January 2012 – December 2014 in the Cantonment Area and WSAAF on Fort Drum Military Installation.

2.1.1.2 Training Area Construction

Fort Drum anticipated clearing up to 3,478 ac (1,407 ha) of land in the Training Area between January 2009 – December 2011 (Table 2.3 and Appendix A). However, only approximately 260 ac (105 ha; 7%) were actually developed (Table 2.3 and Figure 2.3), removing approximately 240 ac (97 ha) of natural vegetation and 20 ac (8 ha) of previously disturbed and or developed area. We anticipate construction of 10 new projects on 290 ac (117 ha) (515 ac (208 ha) after buffering for contingencies; Table 2.4) during January 2012-December 2014. Refer to Table 2.3 for acreages of impacted vegetative cover types from 2009-2011, and Table 2.4 for the proposed impacts for 2012-2014.

Table 2.4. Amount of landcover by type (buffered by 25 ac/vegetation type) proposed for removal during 2012-2014 construction activities in the Training Area on Fort Drum Military Installation.

Landcover Type	Proposed Acres
Conifer Forest	100
Deciduous Forest	75
Disturbed	25
Grasslands	30
Landscaped Yard	25
Mixed Forest	150
Sand Dunes/Flats	25
Shrublands	50
Water/Wetlands	35

2.1.1.3 Active Season Clearing

As discussed in the previous BA (Appendix A), in order to facilitate small, unanticipated training-related projects, Fort Drum may need to clear trees in the Training Area during the time of year bats may be present on the property.

While Fort Drum will wait until after maternity colony activity has decreased, we may need to clear trees prior to when bats have entered Glen Park for hibernation. In the 2009-2011 BA, it was determined that an appropriate period for active season clearing would be between August 15-September 30, to avoid as many impacts as possible to non-volant juveniles (and possibly adults). However, with the information that Fort Drum has collected from fall foraging and movement work, we now suggest this period be revised to August 15-October 14 to more accurately reflect the time period when Indiana bats are known to be on the property.

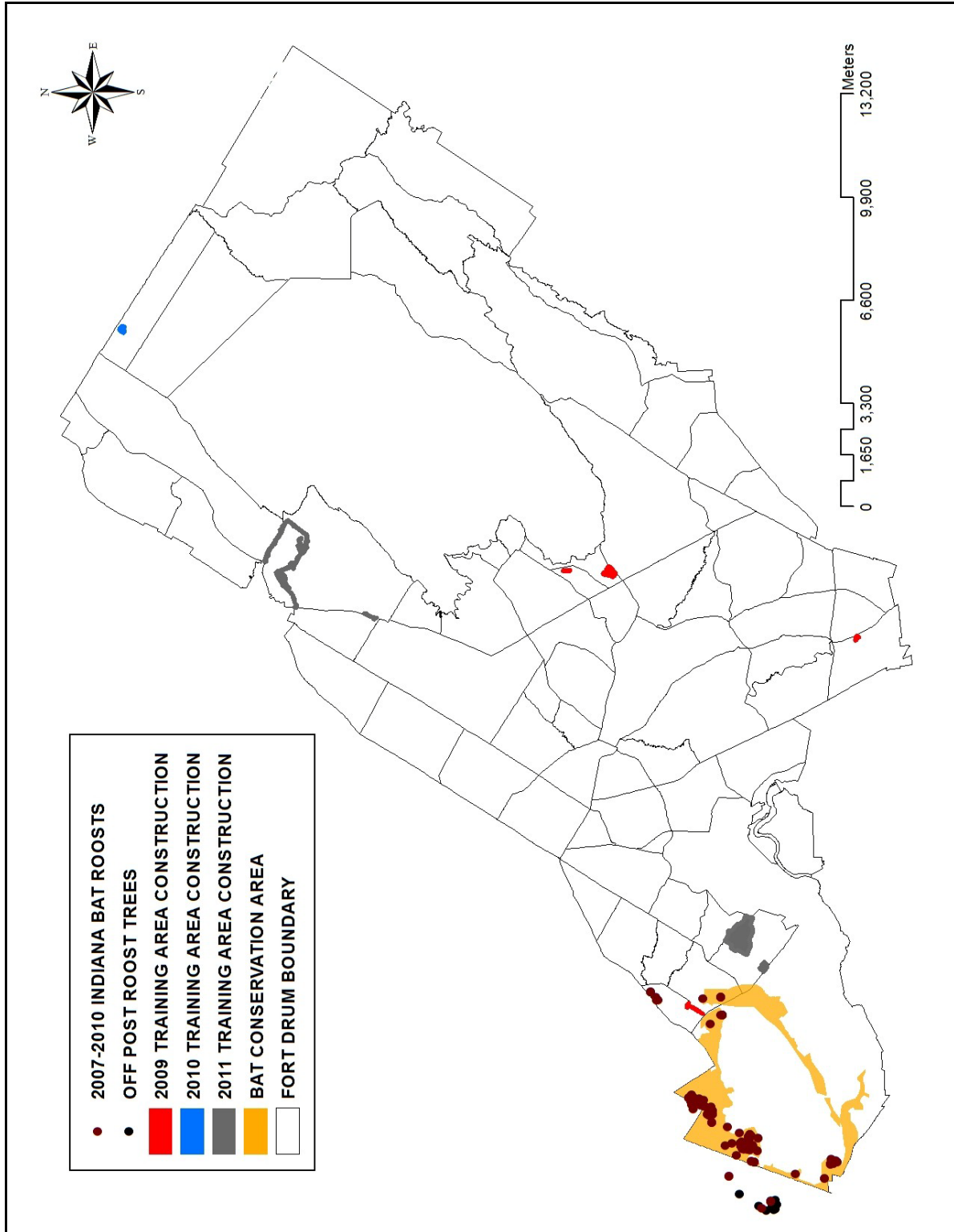


Figure 2.3. Completed clearing for construction projects between January 2009 – December 2011 within the Training Area on Fort Drum Military Installation.

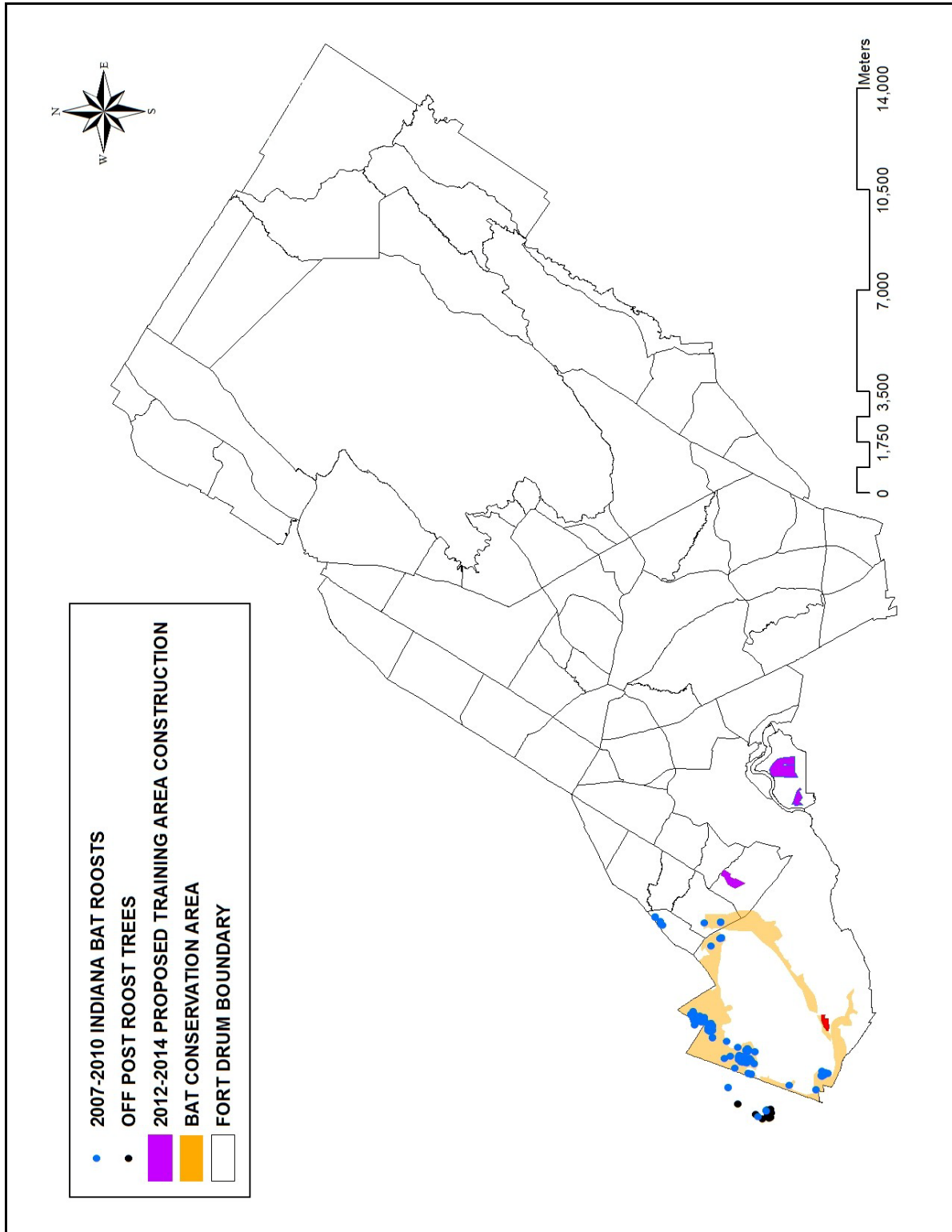


Figure 2.4. Proposed clearing for construction projects between January 2012 – December 2014 in the Training Area on Fort Drum Military Installation.

As part of the 2009-2011 BA, Fort Drum originally anticipated needing to conduct the in-season clearing east of the CSX railroad line running north and south through the southwestern part of the Training Area. This area was originally outside the known range of the known maternity colony, so no known direct impacts to this maternity colony were anticipated; however, in 2010, a juvenile female Indiana bat was captured in Training Area 8, east of the CSX tracks. Therefore, we suggest that a new boundary for clearing trees between August 15 – October 14 would only occur north and east of US Military Highway (Figure 2.5). This area is adjacent to most of the range facilities, is most likely where small projects covered under this scenario would be sited, and is outside the area of known maternity colony use.

In 2009-2011, up to 25 ac (10 ha) per year were anticipated to be cut during the active season; however, no actions were required. For the purposes of analysis, we assume that up to 5 projects will occur each year during 2012-2014, and that each project may need to harvest up to 5 ac (2.02 ha) of forested habitat (i.e., 25 forested ac (10 ha)/year). Although projects are subject to change, typical projects tend to be adjacent to existing trails or roads and are roughly 2 ac (0.8 ha) in size. In addition, projects are normally constructed on flat terrain.

Before construction begins, each project will be evaluated for potential Indiana bat use. If the project site has no suitable roosting habitat (i.e., all trees are less than 4 in DBH, there are no dead/dying large diameter trees), the site may be cleared. If suitable roosting habitat exists, the area will be monitored via mist netting and Anabat echolocation detection following the protocol below:

- 1) A minimum of two mist nets will be deployed per acre of suitable forested habitat in locations most likely to capture Indiana bats in or near the project site. Nets will be deployed for at least two nights.
- 2) Concurrently, a minimum of two Anabat detectors per acre will be deployed for at least two nights. Recording will occur 30 min. before sunrise until dawn. Placement of detectors will occur within or immediately adjacent to the project site and in such a manner that it is most likely to record Indiana bat echolocation call sequences.
- 3) Nets and detectors will not be deployed if the following weather conditions exist: precipitation; temperatures below 50 °F (10°C); and/or strong winds.
- 4) Echolocation passes will be identified using a filter for Indiana bats, and the number of identified passes will be recorded.
- 5) If no Indiana bats are captured via mistnetting, and no suspected Indiana bat call sequences are collected, the project can move forward immediately. If suspected Indiana bat call sequences are collected, two more nights of netting will be performed in an attempt to confirm Indiana bat use on the project site. If no Indiana bats are captured after this effort, the project can move forward immediately.
- 6) If an Indiana bat is captured on the site, a transmitter will be attached, and the bat will be tracked to roosts for the life of the transmitter. If the bat is not found to be using the project site or sites nearby, the project can move forward immediately. If the bat is subsequently found to be using the project site, the USFWS will be contacted to determine the next appropriate course of action.

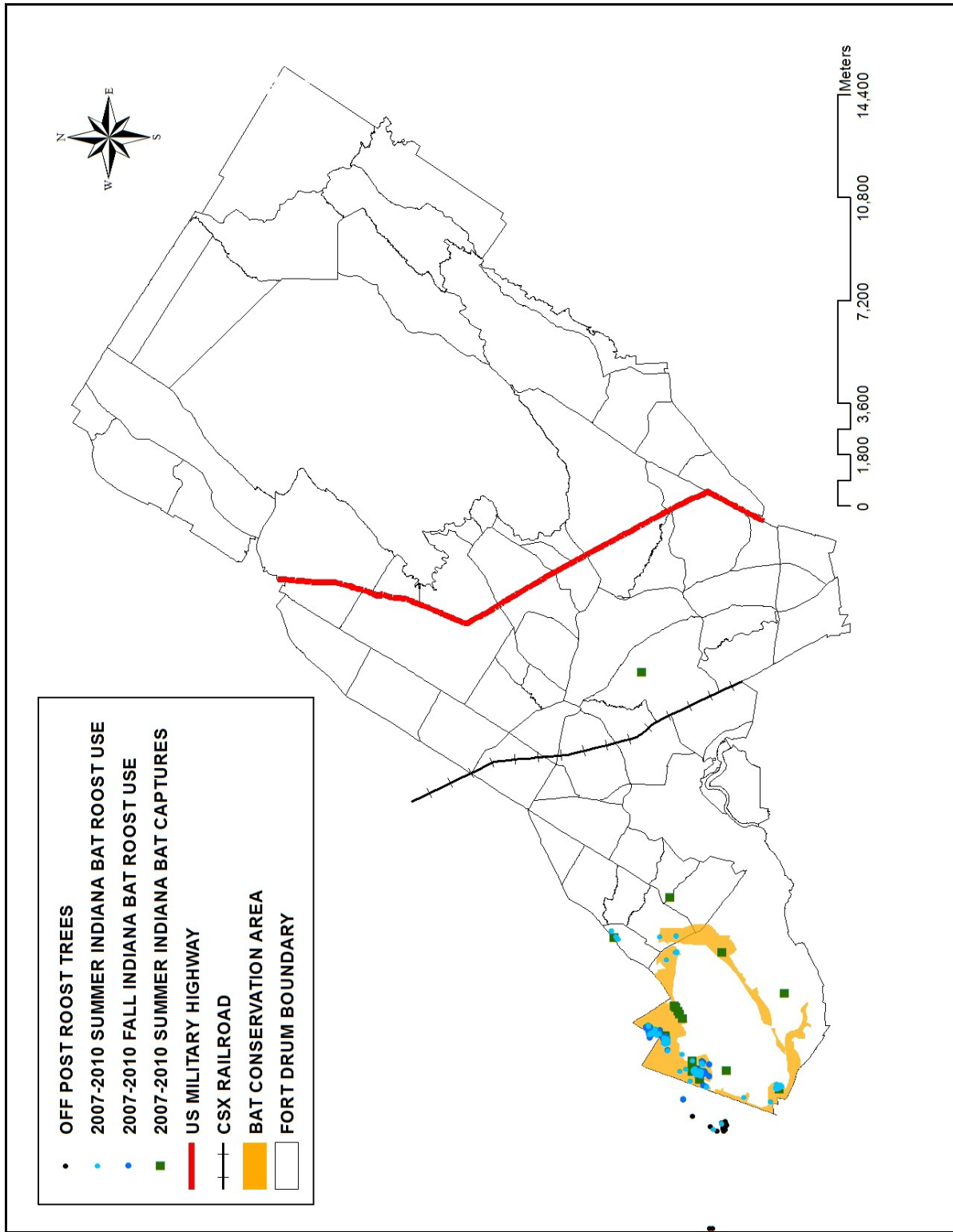


Figure 2.5. Locations of previous (CSX Railroad) and proposed (US Military Highway) boundaries for active season clearing for construction projects on Fort Drum Military Installation.

No land clearing for construction projects will occur between 16 April and 15 August anywhere on Fort Drum, and no construction projects will occur south/west of US Military Highway between August 16 - October 14. If an action is required south/west of US Military Highway, then additional consultation is needed with the USFWS. If Indiana bats are captured north/east of US Military Highway, then additional consultation is needed with the USFWS. Further consultation is also needed if a project exceeds 5 ac (2.02 ha) per site or if the cumulative acreage exceeds 25 forested ac (10 ha) per year.

2.1.1.4 Small Wind Development

For the purposes of this BA, small wind development is considered any wind development that utilizes turbines that have a total overall height at or below 150 feet (45.72 m; including rotor blades). Large wind development will be anything over that height.

Wind power is potentially a viable alternative energy option in northern New York. Given that large wind turbines have been shown to have significant impacts to birds and bats, as well as to radar equipment at airfields, Fort Drum has not seriously considered wind power generation on the installation to date. Small wind systems may be suitable for use, but there is currently limited information on effects to birds, bats, and airfield radar arrays. In order to determine if small wind turbines could provide a valuable alternative energy option for Fort Drum and other Army installations with limited environmental or mission impacts, Fort Drum has developed a small wind study with the US Army's Engineer Research and Development Center – Cold Regions Research and Engineering Laboratory (EDRC-CRREL).

Fort Drum is currently proposing to support the construction of two small wind turbines, one vertical axis and one horizontal axis, to study the operation of the wind turbines and determine feasibility of employing these types of systems at Fort Drum. If these types of turbines are found to be suitable for use with no or limited negative environmental consequences, they may be established at more locations on Fort Drum during the next 3 years. However, depending on the proposed location, additional consultation may be required with the USFWS.

The two turbines will be placed in Training Area 4A (Horizontal-44148.58/4878037.03, Vertical-441465.4/4877992.1; Figure 2.6). Approximately 2.5 ac (1 ha) of sparse grassland will be cleared to support this activity. The horizontal axis turbine will have a tower height of 100ft (30.5 m) and a rotor diameter of 22 ft (6.7 m) -overall height 112 ft (34 m). The vertical axis turbine will have a tower height of 40 ft (12.1 m), with an overall height of 55 ft (16.8 m-overall height includes FAA clearance lights). Both turbines will be equipped with a programmable brake that can automatically stop rotation of the blades at specific times or during specific wind speeds. Both turbines will also be established on tilt type mono poles with no guy wires.

In order to test the efficacy of these types of turbines, they will be run 365 days a year, 7 days a week, or as suitable when appropriate wind is present. This would include the time of year Indiana bats may be present on the property and at the project site. Large wind projects have documented at least two Indiana bat mortality events associated with the operation of the turbines, although other myotome bats have been killed (WEST 2011). Therefore, the small wind turbine site will be monitored daily during 2012 for bat mortality events while the turbines are in operation from April 15 - October 15. The site will be cleared and graveled (or otherwise made suitable for unimpeded monitoring) under the turbines out to a radius of one-and-a-half times the height of the horizontal axis turbine (168 ft, 51.2 m), and one time the height of the vertical axis turbine (55ft, 16.8 m). The turbines will be placed far enough apart from one another and in such a manner as to be able to readily determine which turbine caused any potential mortality.

All mortality monitoring protocols will be modeled from previously established methodology, will be developed in cooperation with the USFWS, and will be ready for implementation prior to turbine operation in April. If any myotis bats are killed during the operation of the turbines, the turbine will be braked to restrict operation to only the times when bats would not be present on the site (either during the day or from October 15 - April 15).

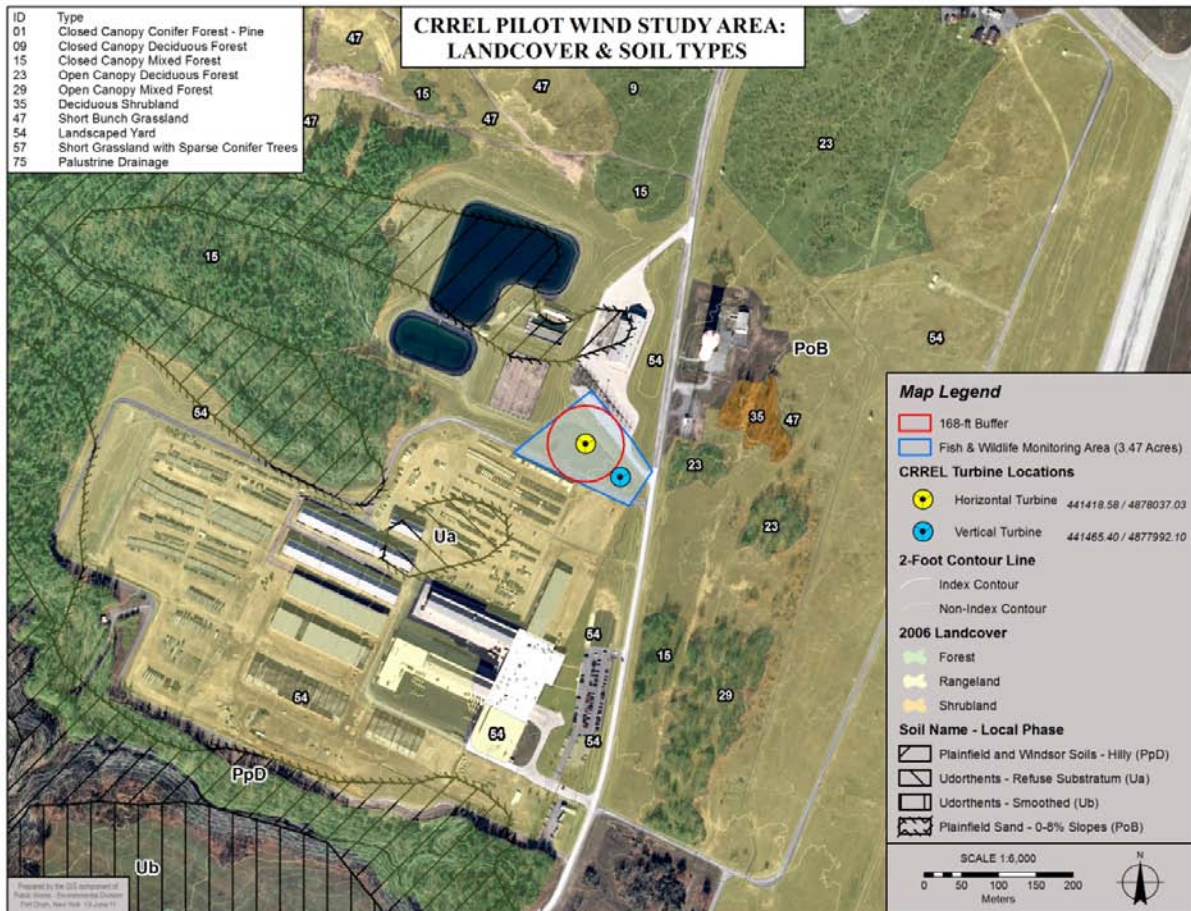


Figure 2.6. Proposed small wind study location in Training Area 4 on Fort Drum Military Installation.

Although the project site is within known Indiana bat range, there are currently no known Indiana bat roosts nearby. There will be no tree clearing on the site, and the nearest known roost is approximately 2.7 km away, therefore there should be no direct effects from the construction of the turbines. Additionally, tilt type mono pole construction with no guy wires will be utilized, thereby limiting mortality or wounding events to bats.

Although there are currently no anticipated effects to bats from the operation of the turbines, there is currently not enough information known about the operation of these small wind turbines to completely discount potential impacts. The project site is within known Indiana bat range and nearby to known foraging areas, yet there are no known movements of Indiana bats in and around the project area. However, it is possible Indiana bats could be flying through or around the area. A juvenile female Indiana bat was captured in Training Area 8 in 2010 and

subsequently tracked back to the known maternity area within the Cantonment Area and BCA. The proposed turbine locations are almost in a direct line between some of the known roosting areas and this capture site. Additionally, a nearby wash rack facility with a settling basin approximately 7 ac (2.8 ha) in size is functionally a large pond that may serve as a suitable foraging location. Until additional mortality monitoring information is collected during this study, it will be assumed that there may be adverse effects because the turbines will be running during the time of year that Indiana bats are present on the property and are operating at a height typical of Indiana bat foraging and summer movement. Therefore, Fort Drum has determined that the operation of the wind turbines may affect and are likely to adversely affect Indiana bats.

2.1.1.5 Demolition

Approximately 200 buildings on the installation built in the 1940s may be demolished between 2012 - 2014. The majority of buildings to be demolished will be in the Cantonment Area. Demolition will occur any time of the year as long as no bats are documented in the structure. The LeRay Mansion is the only building on Fort Drum known to have bats—a maternity colony of little brown bats. If bats of any species are discovered prior to, or during the course of demolition, then all work must cease and Fort Drum’s Fish and Wildlife Management Program must be immediately contacted. If bats are identified as Indiana bats, then additional steps will be taken to try and minimize impacts to the species. If the structure is safe to leave as is, then it will be left until after October 15, or until the bats have stopped using the structure. If the structure is unsafe and poses a risk to human health and safety, Fort Drum will attempt to exclude the bats immediately. If this is not possible, or bats are found to be using a structure during the maternity season when pups are not volant, the Fort Drum Fish and Wildlife Management Program will contact USFWS to discuss the most appropriate course of action.

2.1.1.6 Borrow Pits

There are several quarries/borrow pits on the installation (encompassing approximately 188 ac (76 ha)) that provide sand and gravel primarily for construction. Current borrow pit sites are disturbed sites with minimal vegetation. Up to 161 additional acres (65 ha) may be cleared to establish new borrow pits (Figure 2.4). Land clearing for, and operation of borrow pits is considered a “construction” activity for this BA. Refer to Table 2.5 for impacted vegetation types (no buffers were included in estimating vegetation cover types for borrow pits.) The general operation of borrow pits would not remove any additional vegetative cover, however, the potential exists that dust and noise generated from the operation may have some harmful impacts to Indiana bats. These impacts associated with dust and noise will be addressed below.

Table 2.5. Amount of vegetation types that is within the footprints of proposed borrow pits on Fort Drum Military Installation.

Vegetation Type	Acres
Conifer Forest	87
Deciduous Forest	38
Disturbed Area	2
Grassland	5
Mixed Forest	29
Shrubland	1
Total	161

2.1.1.7 Wetland Mitigation

As outlined in the 2009-2011 BA, when impacts to wetlands are unavoidable and determined to be more than minimal, a plan to construct other wetlands or waters, or utilize Fort Drum's wetland mitigation bank are incorporated into the wetlands permit application. During 2009-2011, one 7 ac (2.8 ha) mitigation project (Call Road) was constructed off post, with approximately 4 ac (1.6 ha) of wetland created. Currently, there are no foreseeable wetland mitigation projects to be constructed during 2012-2014, and Fort Drum's wetland mitigation bank will be utilized for all wetland impacts. The mitigation bank contains approximately 16 credits on 3 sites (North Corner, Antwerp, and Range 37 Borrow Pit; Figure 2.7). There is no anticipated maintenance or management required at these sites, other than minor vegetation management (e.g., invasive species control). It is expected that in the next 3 years not more than 3 credits will be debited for anticipated projects. Of these credits, it is expected the majority will be for emergent marsh, with smaller amounts of scrub-shrub and forested wetland. The mitigation bank was developed in accordance with US Army Corps of Engineers Mitigation Guidelines (33 CFR Parts 325 and 332; 40 CFR Part 230). For more details for wetland mitigation on Fort Drum, please see Appendix C.

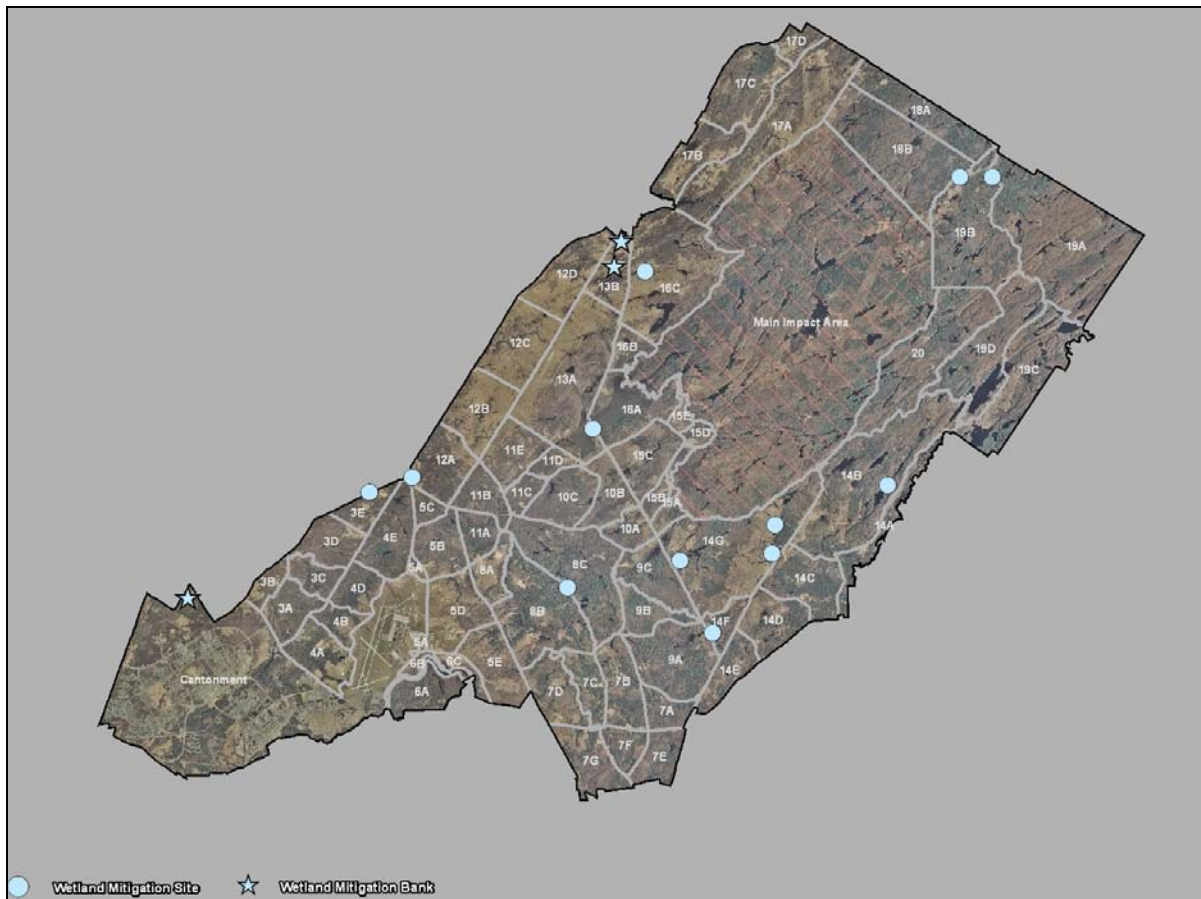


Figure 2.7. Constructed wetland mitigation sites and wetland bank sites on Fort Drum Military Installation.

2.1.2 Conservation Measures for Construction Activities

1. **Bat Conservation Area.** A 2,200+ ac (890 ha) Bat Conservation Area (BCA) is established to protect known Indiana bat roosting and foraging areas from permanent development within the Cantonment Area. The BCA attempts to provide connectivity of existing habitat in the Cantonment Area along the West Creek and Pleasant Creek corridors and the relatively undeveloped northern portion of the Cantonment Area where most of the known primary and maternity roosts are known. The BCA accounts for more than 20% of the total land area in the Cantonment Area. See *Section 3.1* for more information about the BCA.
2. **Roost Tree Protection.** All female roosts, including roosts identified in the future, will be protected from construction for the lifespan of the roost tree. Additionally, a buffer will be placed around all female roosts to protect the roost from disturbance and to maintain a semblance of a natural environment for Indiana bats. The size and shape of a buffer will be determined on a case by case basis by Fort Drum's Fish and Wildlife Management Program in consultation with the USFWS. Factors that will be considered will include surrounding landscape, habitat connectivity, distance to other roosts, distance to known foraging areas, and any other issue important to Indiana bats.
3. **Time of Year Restriction for Tree Falling.** A time of year restriction for clearing trees (> 4 in DBH) has been established to protect roosting Indiana bats during non-hibernation seasons. For the majority of construction activities, felling of trees must take place between October 15 - April 15 while most Indiana bats are at the hibernaculum. This will greatly reduce the risk of accidentally harming Indiana bats that may potentially be present in trees scheduled to be removed. Specifically, maternity colonies and their associated non-volant young will be protected from disturbance. Tree felling that will occur during the non-hibernation season (August 15 – October 14) and north and east of US Military Highway will be monitored for Indiana bats prior to clearing. If Indiana bats are found to be utilizing the site, Fort Drum will reinitiate consultation to determine the best course of action.
4. **Flagging or signs** will be used to demarcate forested areas to be cleared vs. not cleared prior to any construction activities for a given project. Flagging will be removed upon completion of the project.
5. **Via Environmental Protection Plans, Scope of Works, Contracts, etc.,** all personnel responsible for construction activities will be informed about the need to follow design plans, stay within flagging, minimize impacts to wildlife and other environmental concerns.
6. **Outdoor Lighting Minimization.** For all future projects, Fort Drum will evaluate the use of outdoor lighting and seek to minimize light pollution by angling lights downward or via other light minimization measures following Appendix O. Structures surrounding the BCA are in the final phases of being retrofitted to reduce lighting impacts in this known area of Indiana bat use. These areas should be completed by early 2012. High light levels may deter Indiana bats from areas as their nocturnal behavior may have evolved in response to predation risks (Speakman 1995, Sparks et al. 2005). By angling the light away from potential foraging and roosting areas, the area would be darker thus providing Indiana bats more protection from predators.

7. Demolition. If the building has pre-existing known bat colonies, then Fort Drum's Fish and Wildlife Management must be contacted before demolition is to occur. If during the course of demolition, bats of any species are discovered, then all work must cease and Fort Drum's Fish and Wildlife Management Program must be immediately contacted. If bats are identified as Indiana bats, then additional steps will be taken to try and minimize impacts to the species. If the structure is safe to leave as is, then it will be left until after October 15, or until bats have stopped using the structure. If the structure is unsafe and poses a risk to human health and safety, Fort Drum will attempt to exclude the bats immediately. If this is not possible, or bats are found to be using the structure during the maternity season when pups are not volant, the Fort Drum Fish and Wildlife Management Program will contact USFWS to discuss the most appropriate next course of action.
8. Water Quality. All construction activities with ground disturbance greater than one acre or that meets another requirement of the New York State Department of Environmental Conservation, are required to follow standards in New York State Pollutant Discharge Elimination System: Storm water General Permit for Storm water Discharges (Permit No. GP-0-08-001 Issued Pursuant to Article 17, Titles 7, 8 and Article 70 of the Environmental Conservation Law). All construction projects over an acre are required to prepare a sediment and erosion control plan or a storm water pollution prevention plan (SWPPP), which details all erosion and sediment control practices and, when necessary, post-construction storm water management practices. Practices mentioned within the SWPPP will be in accordance with the New York State Stormwater Management Design Manual ("Design Manual") dated August 2003, or the most current version or its successor. Erosion and sediment controls vary, depending on individual impacts from each project. Some temporary examples of erosion and sediment controls include silt fences, check dams, and sediment traps. Permanent controls may include retention ponds, detention ponds, and grass lined swales. With water quality control measures in place, it is expected that declines in water quality will be minimal and thus will continue to provide adequate habitat for Indiana bat prey and drinking water for Indiana bats. In fact, water quality may actually improve during the construction of future projects due to new stormwater practices that mitigate for old water quality issues when no conservation measures were required or implemented.
9. Record-keeping and Reporting. For annual reporting purposes, all entities responsible for construction activities on Fort Drum will submit electronic shapefiles of clearing limits to Fort Drum's Fish and Wildlife Management Program. This information will be used to describe vegetative cover types and habitat loss on Fort Drum and reported annually to the USFWS.
10. Only small wind turbines similar in nature to the ones described in *Section 2.1.1.4* will be used on Fort Drum during 2012-2014. All turbines will have a programmable break. If any myotis bat is killed due to operation of the two wind turbines on Fort Drum, the appropriate turbine will be immediately shut off during the time of year Indiana bats are assumed to be present on the property (April 15 - October 14). If both turbines are found to be causing negative impacts, both will be shut off during the time of year or day Indiana bats are present on, or utilizing the property, respectively.

2.1.3 Effects to Indiana bats

Fort Drum anticipates that potential impacts that construction activities may have on Indiana bats on the installation will be reduced from what was originally documented in the 2009-2011 BA.

2.1.3.1 Direct Effects

Hibernation

No hibernacula are known to exist on Fort Drum, and the nearest known hibernaculum to Fort Drum is 6.5 mi (10.5 km) away. Therefore, construction activities are anticipated to have no direct effects to hibernating Indiana bats.

Roosting

Spring/Summer Tree Clearing

No tree clearing will occur before 15 August to avoid impacts to non-volant pups. In addition, because most tree clearing will occur from October 15 – April 15 when most Indiana bats are absent from the installation, the potential to remove a summer maternity roost with large numbers of Indiana bats present is unlikely. Additionally, although other projects (e.g., Interstate 81 Connector) have identified some individual Indiana bats roosting both within and outside the boundaries of the Bat Conservation Area, all but 7 of 120 (summer and fall) roosts found from Fort Drum-initiated studies have been located inside the Bat Conservation Area. Because all known primary and most secondary roosts fall within the BCA, the potential for construction projects to directly affect maternity colonies with non-volant young is unlikely and effects are discountable.

Fall Tree Clearing

Studies conducted on Fort Drum (2007-2010) have documented the presence of 13 (6 juvenile females, 3 adult males, 2 adult females, and 2 juvenile males) roosting and foraging Indiana bats utilizing the Cantonment Area later than August 15 (ESI 2008b, USFS 2011). One juvenile female was present on Fort Drum until October 10 and was subsequently tracked to the Glen Park hibernaculum, where it presumably spent the winter (ESI 2008b). Two other Indiana bats (1 juvenile female, 1 adult male) were present on Fort Drum until at least October 2, one adult male was present until at least October 8, and one adult female was present until at least October 12. Unfortunately, it is unknown whether these four bats left Fort Drum for the hibernaculum on their last recorded date or whether the transmitters fell off or their batteries died. In total, 62 fall roosts were located after August 15 within the Cantonment Area during surveys in 2007-2010, and 16 of these roosts were located between October 1 and October 12 (ESI 2008b, ESI 2011, USFS 2011). Five years of radio tracking female and male juvenile and adult Indiana bats has documented approximately 95% (113/120) of all roosts, including all fall roosts in the BCA or off-post. Given the conservation measures established for the BCA, known fall roost locations/areas would not be cleared for construction. Therefore, Indiana bats that use the BCA for fall roosting will not be adversely affected by construction activities.

Still, the possibility exists that land clearing activities may occur in undiscovered Indiana bat fall roosting areas during October. Undiscovered roost locations that may be present outside the BCA and within construction zones could potentially be adversely affected by construction activities if roosts are removed before all Indiana bats have returned to the hibernaculum.

The likelihood of this happening is small. It is assumed fall swarming activities are mostly completed on Fort Drum by October 15 of any given year primarily based on the drop in temperatures experienced in this area of northern New York. Over an 11 year period from 2000-2010, the average minimum temperature on Fort Drum from October 1 – October 15 was 44 °F (6.7 °C), with 18 out of a possible 165 days (or on average 1.6 out of every 15 days) during that period dropping to or below freezing at night. Conversely, during the same period in 2000-2010, from October 16 – October 31, the average minimum temperature was 38 °F (3.3 °C), with 54 of a possible 176 days (or on average 4.9 out of every 16 days) during the period dropping to or below freezing. Additionally, from November 1 – November 15, the average minimum temperature on Fort Drum was 33.8 °F (1 °C), with 80 of a possible 165 days (or on average 7.3 out of every 15 days) during the period dropping to or below freezing (Fort Drum, unpublished data). It would be unlikely that bats would still be active in the landscape after October 14, given the lack of insect abundance that would be present and the energy that it would require to adequately deal with these low temperatures.

As part of the 2009-2011 BA, Fort Drum anticipated needing to remove trees in August and/or September east of the CSX railroad line running north and south through the southwestern part of the Training Area, however, no actions were required during that time. This area was originally outside the known range of the known maternity colony, so no known direct impacts to this maternity colony were anticipated. Impacts to a previously undiscovered maternity colony were anticipated however, and Fort Drum determined that tree felling in August and September east of the CSX railroad tracks may harm, disturb, injure, and/or kill Indiana bats in the undiscovered maternity colony, therefore likely adversely affecting Indiana bats. However, after 5 years of mistnetting only 4 Indiana bats have been discovered in the Training Area, and all those bats were all subsequently determined to be part of the known colony via radio tracking. Accordingly, Fort Drum has revised its original determination that there may be an undiscovered colony and associated impacts to it. We now feel that previous evidence (e.g., acoustic recordings) of Indiana bat use in the Training Area was most likely from the known colony, and it is likely that the members of this colony were foraging/traveling farther away from the known use area than literature had previously established. Therefore, our original determination that there was undiscovered maternity colony that may be adversely affected by tree felling in August and September was most likely erroneous. We purport that any potential impacts to Indiana bats from these activities would only be to the known colony.

In order to facilitate small, unanticipated training-related projects, Fort Drum may need to clear trees in the Training Area during the time of year bats may be present on the property (August 15 - October 14). It is expected that 5 projects with a maximum size of 5 ac (2.02 ha) may need to occur in this timeframe per year. No more than 25 forested ac (10 ha) per year would be cleared and projects would now only occur north and/or east of US Military Highway to minimize potential impacts to Indiana bats. All Indiana bats present on the installation after August 15 are volant and should be capable of flying from a roost tree during disturbances. Further, there are no known roost sites within approximately 12 km of U.S. Military Highway, and no Indiana bats have ever been captured north and/or east of this highway. To ensure that this information stays up to date, Fort Drum will also monitor for the presence of Indiana bats prior to any

clearing and will follow protocols established above. Therefore, clearing this small amount of acreage north and/or east of US Military Highway between August 15 - October 14 may affect, but is not likely to adversely affect Indiana bats.

Noise/Dust

Although tree removal will primarily occur when Indiana bats are not on the installation, other construction related effects (i.e. creation of dust and noise) that occur during the non-hibernation season have the potential to impact roosting Indiana bats. The creation of airborne dust by construction equipment is likely to occur in all earth moving projects, the magnitude is dependent on many factors, including humidity, wind velocities and direction, and location of soil disturbances. Dust will be created during the spring, summer, and autumn when Indiana bats are roosting in adjacent forested habitats and possibly foraging throughout the project areas. Any potential effects from dust would be very local within and immediately adjacent to the project areas, and is not anticipated to result in any discernable effect to Indiana bats.

Noise from equipment and personnel may disturb roosting Indiana bats, which may also cause them to abandon a roost. Callahan (1993) noted that bats abandoned a primary roost when a bulldozer cleared brush adjacent to the tree. However, Indiana bats have also been noted to tolerate noise. For example, a primary maternity colony identified along I-81 in Jefferson County did not appear to be affected by noise from travelling vehicles (USFWS 2008). Several projects, particularly around the Guthrie Ambulatory Health Care Clinic, are adjacent to multiple known Indiana bat roosts in the BCA. Construction around the clinic occurred during the non-hibernation season in 2008, but construction did not appear to affect known roosts or Indiana bat behavior. Indiana bats continued to utilize the forests adjacent to the construction for both roosting and foraging throughout the summer and fall seasons (ESI 2008a, USFS 2011). We anticipate Indiana bats to acclimate to noise associated with operation and maintenance activities.

Foraging

Spring/Summer Tree Clearing

All tree clearing will occur after August 15 to avoid impacts to non-volant pups. No impacts to foraging Indiana bats in the spring/summer period will occur from tree removal associated with construction.

Fall Tree Clearing

Most clearing will not occur between April 16 – October 14 when the majority of Indiana bats are present on Fort Drum. However, up to 25 forested ac (10 ha; with no more than 5 ac (2.02 ha) per project) in the Training Area may be removed between August 15 - October 14 as unforeseen shifts may occur within projects. Although this removal could immediately reduce potential available foraging habitat for Indiana bats in the known maternity colony, approximately 73,000 ac (29,542 ha) of forested habitat would still be present within the Main Impact Area the surrounding Training Areas, and the BCA so foraging habitat will be available to Indiana bats at all times during and after construction. Indiana bats are likely to shift their foraging behavior to natural habitats adjacent to construction projects in the Training Area, to avoid these areas. Approximately 95% of known foraging locations occur within the BCA or off post. No activities within the BCA are anticipated to result in decreased foraging habitat. Given

that in-season clearing activities will not occur where foraging has been concentrated to date, and the abundance of additional foraging habitat in adjacent areas, no direct effects to foraging Indiana bats are anticipated.

Beginning October 15, forested habitat may be permanently removed for construction. The last known date of Indiana bat use on Fort Drum is October 12 (ESI 2008b), so removing forested habitat after October 15 is unlikely to directly impact any foraging Indiana bats. Results from radio-tracking efforts of three Indiana bats radio-tracked in the fall of 2007 varied from 1,267 - 5,295 ac (513 – 2,143 ha) with a mean range of 4,720 ac (1,910 ha) (ESI 2008b). Although these bats foraged both on and off of Fort Drum property, approximately two-thirds of the foraging movements were within the Cantonment Area and BCA and most foraging was within 4 miles of the roosts. Results from extensive radio-tracking efforts of 14 bats in the summer and fall of 2008-2009 suggest similar foraging areas. Although the home ranges were smaller and ranged from 36.5 – 532.5 ac (14.8 – 215.5 ha), the majority of foraging locations were within the Cantonment Area and BCA, and bats typically foraged within 1.5 miles of their roosts. Results from both studies suggest that adequate foraging resources exist for bats either within or adjacent to Fort Drum's Cantonment Area (ESI 2008b, USFS 2011). Given that Indiana bats should not be present during tree clearing activities after October 14, there are no direct effects to foraging bats anticipated.

Dust

Dust from construction activities is known to coat adjacent vegetation, thus possibly reducing insect production locally along a narrow band; this may result in decreased foraging opportunities adjacent to the construction area. Data are not available for the effect of dust on bats. However, Indiana bats were noted to forage adjacent to construction projects on Fort Drum in 2008 and 2009 (Appendix I). Given the small area of potential dust impacts per project and the large amounts of foraging habitat available to Indiana bats, we do anticipate that any decreased localized insect abundance will result in any discernable impacts to Indiana bats.

2.1.3.2 Indirect Effects

Construction may indirectly impact Indiana bats via habitat fragmentation/degradation, loss of roosting and foraging habitat, loss or decline of prey availability, decline in water quality, increased risk of predation, and closer association to human activities.

Hibernation

No hibernacula are known to exist on Fort Drum, and the nearest known hibernaculum to Fort Drum is 6.5 mi (10.5 km) away. Therefore, construction activities will have no indirect effects to hibernating Indiana bats.

Roosting

Indiana bats may be indirectly affected by habitat loss due to construction, regardless of time of year restrictions for vegetation clearing. Up to 155 ac (63 ha) (230 ac (93 ha) buffered for contingencies) of woodlands, are expected to be cleared between October 15 and April 15 during the next three years within the Cantonment Area. Unknown roosts from the maternity colony could be unwittingly cleared for construction during this time. Indiana bats are known to display site fidelity to roost locations (Gumbert et al. 2002, Fort Drum, unpublished data), so the removal of woodlands or previous roost sites during winter hibernation may provide additional

stress after Indiana bats emerge in the spring since Indiana bats must find new roost locations. Research has suggested that big brown bats (*Eptesicus fuscus*) suffered more than a 50% decline in reproductive success when excluded from a maternity area (Brigham & Fenton 1986). Sparks et al. (2003) noted that an Indiana bat colony became more fragmented the year following the loss of a maternity roost, so they used more roosts and congregated less. It is suspected that Indiana bats on Fort Drum could also suffer a decline in reproductive success since more energy would be expended locating new suitable roosts. Because less woodland habitat is available in the Cantonment Area than the Training Area, extensive loss of roosting habitat in the Cantonment Area is more likely to result in harm to Indiana bats than in the Training Area. If extensive suitable habitat was lost in the Cantonment Area, Indiana bats may have to travel farther in the spring, thus expending more energy, in order to locate suitable roost sites to raise young. However, the majority of all known Indiana bat summer and fall roosts identified on Fort Drum are found within the BCA and are protected from construction. Indiana bats have used the same general areas on Fort Drum since 2007 (Appendixes D-I) and it is expected that they will continue to utilize the protected area as long as suitable roosts remain available. No documented female roosts will be removed at any time for new construction if the roosts are still useable. Although construction activities in the Cantonment Area and around WSAAF during the next three years could remove undiscovered roosts, the likelihood is low. There are 20 projects projected to remove approximately 155 ac (63 ha) (230 ac (93 ha) with buffering) of potential roosting habitat. Additionally, none of these projects are within 1 km of known roosts, and approximately 90% of all the known roosts documented since 2007 fall within the protection of the BCA. Construction projects are also not anticipated to reduce the available roosting habitat within the Cantonment Area to the point where impacts to the maternity colony are discernable. Therefore, the likelihood that Indiana bats would be negatively (indirectly) impacted by tree removal for construction projects in the Cantonment Area is unlikely.

Construction projects in the Training Area are typically restricted to certain areas to direct fire towards the Main Impact Area and for safety concerns. In the next three years, there are approximately 10 construction projects proposed on approximately 180 ac (73 ha) (255 ac (103 ha) with buffering) of woodlands within the Training Area. These are not anticipated to remove known roost trees in the Training Area and are not anticipated to occur within 5 km of known roosts. Construction projects are also not anticipated to reduce the available roosting habitat within the Training Area to the point where impacts to the maternity colony are discernable. Therefore, the likelihood that Indiana bats would be negatively (indirectly) impacted by tree removal for construction projects in the Training Area is unlikely.

Foraging

Indiana bats may be indirectly affected by habitat loss due to construction, particularly in the Cantonment Area. Further urbanization in the Cantonment Area will reduce the amount of available foraging habitat. As more habitat is permanently lost, the remaining natural habitat becomes more fragmented.

The extent to which forest fragmentation may impact Indiana bats is currently unknown. Indiana bats are predominantly found in highly fragmented landscapes and they are capable of exploiting fragmented habitat thru means of flight (USFWS 2007). However, the fragmentation of habitat potentially increases energy requirements of Indiana bats by concentrating a greater number of bats into remaining habitat which may increase competition and energy expenditure to catch the same number of insects. Moving further distances to reach fragmented habitats may also increase the amount of energy spent foraging and increases the risk of predation.

Indiana bats avoid flying over large open areas and will actually increase their flight time in order to travel along wooded corridors (Murray and Kurta 2004, Sparks et al. 2005). It has been shown that Indiana bats avoid foraging in highly developed areas potentially due to lower insect abundances (Sparks et al. 2005). In an urban-rural interface, Indiana bats foraged more often over agriculture or forested lands as opposed to highly developed areas (Sparks et al. 2005). Elevated energy demands associated with increased time spent foraging can create additional stress for Indiana bats, particularly after spring emergence when Indiana bats are already stressed from hibernation and when females become pregnant. Higher energy demands may also negatively impact Indiana bats in the fall as they relocate to the hibernaculum and as they accumulate fat reserves prior to hibernation. With the discovery of WNS, the amount of energy required by bats after hibernation for migration and reproduction as well as prior to hibernation, take on greater significance. Additional stress could weaken Indiana bats and make them more susceptible to the effects of WNS.

Construction activities are expected to remove up to 175 ac (71 ha) (300 ac (121 ha) with buffering) of potential foraging habitat in the Cantonment Area and WSAAF and 200 ac (81 ha) (325 ac (132 ha) with buffering) in the Training Area, respectively. Fragmentation of foraging habitat is most likely to occur in the Cantonment Area and around WSAAF where the majority of construction is predicted to occur, where the majority of buildings are currently located, and where most of the known maternity colony is found. However, to provide un-fragmented foraging areas and habitat corridors for Indiana bats in the Cantonment Area, Fort Drum set aside approximately 2,200 ac (890 ha) in the BCA. The BCA provides habitat connectivity throughout the Cantonment Area by following portions of West and Pleasant Creeks. Habitat connectivity by this conduit potentially minimizes the affect of habitat fragmentation by providing continuous natural areas for travel and foraging. Although one Indiana bat has been captured as far north and east as Training Area 8, studies on Fort Drum have shown that most Indiana bat foraging and movements on the property is occurring in Training Areas 3 and 4 and the northern portion of the Cantonment Area (ESI 2008b, ESI 2011, and USFS 2011) which includes the BCA. Results from radio-tracking efforts of 17 bats from 2007-2009 suggests that adequate foraging resources exists for bats either within or adjacent to Fort Drum's Cantonment Area (ESI 2008b, USFS 2011). Because the BCA provides foraging opportunities throughout the Cantonment Area and into Training Areas 3 and 4, habitat fragmentation may affect, but is unlikely to adversely affect the known maternity colony in the spring and summer or individuals in the fall.

Proposed projects in the Training Area are primarily expected to occur around the Main Impact Area and are more than 7.5 mi (11.25 km) from known Indiana bat roosting and foraging locations. Because of the vast amount of natural habitat available and the amount expected to remain in the Training Areas, it is unlikely habitat loss and/or fragmentation will affect Indiana bats in the Training Area. Ample amounts of vegetative cover will remain even after proposed projects. Therefore habitat fragmentation from construction in the Training Area may affect, but is unlikely to affect Indiana bats in the known maternity colony.

With increased development and more impervious surfaces, there will be higher levels of sediment and pollution run-off within the Cantonment Area (Klein 1979, Lenat & Crawford 1993). Urban environments have typically been shown to have less biotic diversity and abundance than agricultural or forested habitat types (Lenat & Crawford 1993). Thus an increase in urbanization may lead to declines in potential prey for Indiana bats. On Fort Drum, the BCA encompasses portions of Pleasant and West Creeks which are buffered by natural habitats. This vegetation aids in filtering water before it returns to streams (Karr & Schlosser 1977) and it provides natural habitat for insect production. Impacts to water quality will be

reduced as vegetative buffers minimize sediment and pollution run-off into streams. Temporary effects on water quality could occur during construction, which could reduce local insect populations. Insects associated with aquatic habitats make up part of the diet of Indiana bats; therefore, impacts to water quality may result in temporary, short-term indirect effects on foraging Indiana bats during spring, summer, and autumn. Given the other water quality beneficial actions that are implemented for construction, it is expected that declines in water quality will not be of significant concern, thus Indiana bats may be affected, but are not likely to be adversely affected by construction and water quality. In fact, water quality may actually improve during future development due to new stormwater practices in place that did not exist during earlier construction. Also, given the establishment of the BCA, Indiana bats are not likely to be adversely affected by a loss of prey.

Construction projects are anticipated to impact only a small amount (~10 ac-4 ha) of wetlands, mostly in the Training Area. Wetlands and riparian corridors provide important foraging habitat for Indiana bats, so loss of these habitats could result in short-term indirect effects on foraging behaviors, such as temporary reduction in insect prey. Indiana bats are considered selective, opportunistic foragers and should be able to locate additional aquatic and/or terrestrial insects nearby since numerous wetlands will remain throughout the Training Area and within the BCA. All efforts will be made to minimize impacts to wetlands and water bodies, however impacted waters will be mitigated appropriately through the wetland mitigation bank. Because there are ample water sources and wetlands throughout Fort Drum, we anticipate that any potential indirect effects to Indiana bats from a temporary reduction in water availability will be insignificant.

With increased development, more artificial lighting will be used for parking lots, security, etc. Indiana bats are nocturnal and more light may increase their risk of predation by birds of prey (Speakman 1995, Sparks et al. 2005). Projects on Fort Drum are being constructed throughout the Cantonment Area including next to the BCA, an area with known roost and foraging locations. These projects are anticipated to increase the amount of light pollution within the area of the known maternity colony. Foraging Indiana bats, including newly volant young, in this area may become more susceptible to predation. Fort Drum has been implementing light minimization measures since 2009 on newly constructed buildings and on buildings surrounding the BCA to help reduce these impacts. We will continue these efforts through 2014. With these measures, light pollution may affect, but is not likely to adversely affect Indiana bats.

Urbanization and fragmentation are positively associated with the spread of invasive species (Yates et al. 2004). With a higher number of roads and closer proximity to human habitation, there is a greater risk for invasive species to spread into forests. Invasive shrub species, such as buckthorn (*Rhamnus* spp.) and honeysuckle (*Lonicera* spp.), may alter forest structure and subsequently reduce the quality of habitat for bats. Recent research has shown that bat activity was lower in urban forests with a dense shrub understory than in more open forest fragments (Smith & Gehrt 2010). Dense forest structure may hinder bats' foraging and commuting capabilities, and it could potentially affect roost selection. Buckthorn and honeysuckle are currently found within the Cantonment Area and the BCA. Woodland interiors have isolated patches of these invasive shrubs, but the overall forest understory within the Cantonment Area is relatively open. At the present time, Indiana bats are not expected to be impacted by invasive plant species on Fort Drum, however no comprehensive invasive plant surveys have been conducted. If it is determined invasive shrub species may inhibit Indiana bat roosting or foraging opportunities, then the Fort Drum Fish and Wildlife Management Program will initiate appropriate measures to remove invasive species.

2.1.4 Conclusion

Construction activities in 2012-2014 may affect, but are not likely to adversely affect Indiana bats.

Although there will be a cumulative, permanent loss of some potential foraging and roosting habitat within the Cantonment Area, conservation measures are in place that will minimize potential direct and indirect impacts to Indiana bats. The BCA will continue to protect 2200 acres that encompasses the known maternity colony, all known primary maternity roosts and approximately 90% of all known roosts, and the majority of known foraging habitat on Fort Drum. Additionally, a tree cutting restriction between October 15 - April 15 will protect the majority of Indiana bats on the property outside of the BCA.

In the Training Area, up to 200 ac (81 ha) (or 410 ac (166 ha) after buffering for contingencies; Table 2.3) of natural vegetative cover will be removed which may temporarily impact Indiana bats (i.e., causing a slight shift in their foraging and roosting behavior). Construction activities in the Training Area are likely to have minimal indirect effects on the known maternity colony.

Due to the location of the known maternity colony, the location of the proposed construction projects in the Training Area, and the established conservation measures and monitoring protocols, Indiana bats in the known maternity colony are not likely to be adversely affected by tree felling during the non-hibernation season in the Training Area.

2.2 Military Training

Fort Drum has been used as a military training site since 1908, and military training continues to be the primary purpose of the installation. Training occurs on Fort Drum year-round at all times of the day and night. Training is somewhat dictated by weather and climate with maximum usage occurring from April through September. The majority of training is conducted in the Training Area. The Training Area comprises approximately 97,737 ac (39,533 ha)—over 90% of the entire installation—and can be roughly divided into three components: maneuver area, ranges, and the Main Impact Area. Additional training activities also occur in the Local Training Areas (LTAs) within the Cantonment Area.

2.2.1 Military Training Activities

Military training in the next three years is expected to be similar to training activities in the past 10+ years, and in particular the last three years as covered under the 2009-2011 BA. While training type and/or intensity may vary annually as differing numbers of soldiers utilize the facilities, we do not anticipate any activity that would cause any additional or unaddressed impacts not previously covered under the previous BA for sustainment operations, engineering operations, air operations, water operations, field training operations, live munitions training, and demolition. Therefore, Fort Drum affirms that the conservation measures and effects analyses identified within the 2009-2011 BA for those activities remain appropriate. Please see Appendix A for a more detailed description and background of these activities as well as maps of the Training Area, LTAs, and range facilities.

Since the 2009-2011 BA, we have revised the description of the proposed action for smoke/obscurants use to address inconsistencies in the operational Range Regulations and the actual definitions and usage of different types of smoke producing devices and operations on

Fort Drum. Additionally, we have revised the Conservation Measures to address the inconsistencies as well. Please see *Sections 2.2.2 and 2.2.3* for revised Conservation Measures and analyses regarding the use of smokes/obscurants for the next three years on Fort Drum.

Smoke/Obscurants

Smoke/obscurants are used to conceal military movements and help protect troops and equipment. They can be used throughout the Training Area as part of another military operation, or as part of an independent training scenario. Although they would be primarily used during the day, smoke/obscurants may be deployed at night.

For the purposes of this BA smoke/obscurants are classified into three categories: (1) smoke operations-operations that utilize fog oil and/or graphite flakes to produce large amounts and sustained smoke; (2) colored smoke, smoke grenades, and smoke pots (aka pyrotechnics) - items that typically utilize terephthalic acid (TPA) to produce smoke; and (3) smoke munitions-those items that typically utilize white phosphorous (WP) for signaling, screening and incendiary purposes.

Category 1

Although Category 1 smoke operations have not been utilized on Fort Drum in the past 5+ years, this type of training could occur on approximately 30,000 ac (12,140 ha) of the Training Area. Smoke training would be rotated regularly among multiple areas to minimize impacts to any one area of the installation. A typical training exercise that uses smoke/obscurants and smoke generators would normally last from 1 to 4 hours. Smoke generators may generate smoke from fixed locations or during mobile operations covering up to several hundred acres or more. Smoke dispersion is variable depending on means of dispersing smoke (i.e., fixed or static) and weather conditions (i.e., wind). Refer to Appendix A for representative examples of fog oil dispersion from static and mobile smoke training areas in Pasquill atmospheric stability category E (3D/International 1997). Fog oil (i.e., Standard Grade Fuel #2) would be generated the majority of the time, while graphite could also be generated about 25% of the training time (ENSR 2006). Potentially up to 200 days of training could be conducted using fog oil/graphite smoke each year. In those 200 days, approximately 270 generator-hours (number of hours each generator would operate annually x number of generators used on installation) would produce fog oil smoke per year. Approximately 22,120 gallons of fog oil per year could be used on Fort Drum to produce fog oil smoke; approximately 37,800 pounds of graphite per year could be used on Fort Drum, to generate graphite smoke.

The actual amounts of graphite and fog oil that would be used annually will likely never reach these established upper threshold quantities. The amount of graphite use, in particular, would likely be much less. Graphite is expensive, it has rarely been used on Fort Drum, and it is currently not approved for large scale use on the installation.

Category 2

TPA is used in Category 2 floating or ground smoke pots, and in smoke grenades. TPA is ignited and burned to produce smoke. The primary combustion products of TPA are carbon monoxide, carbon dioxide, sulfur dioxide, benzene, toluene, and formaldehyde. It is used alone, or in combination with fog oil to fill in incomplete fog oil screens. Refer to Appendix A for past usage of smoke/obscurants for concentrations of TPA at varying distances (Pasquill Category B).

Category 3

Category 3 WP is used for signaling, screening, and incendiary purposes, and is usually dispersed by explosive munitions. WP is used only on the Range facilities and in the Main Impact Area. WP flame produces a hot, dense white smoke composed of particles of phosphorus pentoxide, which are converted by moist air into phosphoric acid. WP ignites when it is exposed to air and may cause burns. Smoke typically lasts up to 15 min.

2.2.2 Conservation Measures for Military Training

1. a) No Category 1 smoke operation will be conducted within 1,000 m of the installation boundary, public roads, Cantonment Area, ammunition supply point or WSAAF in accordance with *Fort Drum Regulation 350-4 Range Regulation* and *Fort Drum Regulation 350-6 Assignment and Operational Use of Local Training Areas (LTAs)*. This restriction currently protects all known Indiana roosts and the majority of the known maternity use area (i.e., roosting and core foraging area) from close proximity smoke exposure (Figure 2.8).
 - b) In the Training Area, Category 1 smoke and obscurants must be used >100 m from any known Indiana bat maternity roost areas between April 16 – October 15. This will help to protect Indiana bat roosts into the future. The 100 m buffer serves to minimize the effects of smoke and obscurants by providing distance between the roost and the densest amount of the smoke/obscurants. Training missions will be aware of maternity areas via the NEPA process and will be directed to avoid these areas (Appendix P).
 - c) Category 1 smoke operations must also be rotated among training areas to minimize impacts to any one area.
 - d) The use of Category 2 smoke (aka pyrotechnics) may be used in the Training Areas at any time within 1,000 m of the installation boundary, but will not be used within 100 m of any known Indiana bat maternity roost areas between April 16 - October 15.
 - e) Category 2 smoke may not be used within 100 m of any forested areas within the LTAs between April 16 - October 14. The prior time of year restriction identified in *Fort Drum Regulation 350-6 Assignment and Operational Use of Local Training Areas (LTAs)* was April 16 - September 30, however because of the new information about the temporal use of Fort Drum by Indiana bats, this restriction has been modified. Approval from Range Control and NEPA review is required prior to any use of Category 2 smoke, and these reviews will help ensure that Category 2 smoke use is in accordance with this conservation measure.

f) Category 2 smoke may be periodically used at three mobile MOUTs within the LTAs – (one mobile MOUT is in an open area of the BCA and one is in an open area near the BCA) during April 15 - October 15. Only infrequent use of colored smoke is expected to be used in around the mobile MOUTs. The closest known roost tree to the Mobile MOUTs is approximately 550m away. With the exception of the Category 2 colored smoke used at the mobile MOUTS, no other smoke or obscurant may be used in the BCA. Currently, all known maternity roosts are found within the BCA or within a 1,000 m from the installation boundary.

2. In the Training Area and LTAs, the cutting of trees and tree removal is prohibited without approval by Fort Drum's Forest Management Program in accordance with current Environmental Guidelines. If approved, actions will be in accordance with all conservation measures in *Section 2.3 Forest Management*. In general, this is a relatively rare military training action. No female roosts, including roosts identified in the future, will be felled for training for the lifespan of the roost. No tree felling will occur in the BCA for training purposes.
3. In the LTAs, vehicular traffic is restricted to open grassy areas within easy access of the road in accordance with *Fort Drum Regulation 350-6 Assignment and Operational Use of Local Training Areas*. Vehicles are not permitted to cross streams, ditches, wetlands, or dense vegetation in order to reach grassy areas without prior NEPA review, thus minimizing impacts to natural habitats.
4. In the LTAs, POL operations are prohibited in accordance with *Fort Drum Regulation 350-6 Assignment and Operational Use of Local Training Areas*. This helps to minimize the risk of accidental water/ground contamination.
5. Fort Drum will abide by the Fort Drum Integrated Wildland Fire Management Plan (Fort Drum 2005) which includes fire danger ratings, unless under special circumstances that are approved by the commander. Military activities that may spark fires will not be conducted during moderate to high danger ratings in order to prevent unintentional wildfires. This will protect Indiana bats from smoke exposure and from roost destruction. Burn bans are most likely implemented during the summer months when reproductive Indiana bats are present on Fort Drum.

2.2.3 Effects to Indiana bats

Please see Appendix A for the effects analysis for all operations and activities except smoke/obscurants. Fort Drum has reaffirmed that those activities may affect but are not likely to adversely affect Indiana bats, as they should have no different impacts in the next three years as they had in the previous three covered under the 2009-2011 BA. The conservation measures and the effects analyses remain appropriate for those activities. Please see below for the effects analysis of smoke and obscurants on Indiana bats on Fort Drum. New information on the distribution of Indiana bats has been derived over the past 3 years from studies conducted on Fort Drum, which is reflected in this new analysis.

2.2.3.1 Direct Effects

Hibernation

No hibernacula are known to exist on Fort Drum, and the nearest known hibernaculum to Fort Drum is 6.5 mi (10.5 km) away. Therefore smoke and obscurant use will have no direct effects to hibernating Indiana bats.

Roosting

Smoke and obscurants have the potential to infiltrate Indiana bat roost trees (Guelta & Balbach 2006), which may expose Indiana bats (volant and non-volant) to potentially harmful chemicals via ingestion, inhalation, or through the skin. The smoke itself may force Indiana bats to abandon the roost, and smoke exposure can have harmful effects.

For the purposes of this BA smoke/obscurants will be classified into three categories: 1) smoke operations-operations that utilize fog oil and/or graphite flakes to produce large amount and sustained smoke; 2) colored smoke, smoke grenades, and smoke pots (aka pyrotechnics) - items that typically utilize terephthalic acid (TPA) to produce smoke; and 3) smoke munitions-those items that typically utilize white phosphorous for signaling, screening and incendiary purposes.

Category 1

There are limited data on the toxicity of fog oil to wildlife, however, it is probable that smoke operations utilizing fog oil have the potential to impact roosting Indiana bats.

Fog oil is expected to have low oral toxicity to Indiana bats, as it is not likely that bats would be ingesting large amounts of oil. Given current restrictions, the closest a smoke operation could occur to a known Indiana bat roost is approximately 550 m away in Training Area 3A. However, the likelihood that a smoke operation would occur there is extremely low. If unfavorable wind and weather conditions develop, smoke produced in that area (and up through Training Area 5B; Figure 2.8) would travel into the restricted smoke operation area (i.e., WSAAF, the Cantonment Area, or public highways). It is more likely that smoke operations would occur in areas far enough away from these restricted areas as to not cause conflicts. Thus the closest smoke operation to the known roost areas would more likely be greater than 7,000 m away. Additionally, up to 40% of fog oil evaporates in the air within an hour, and up to 90% of fog oil has evaporated within a week and it does not seem to readily adhere to soil, vegetation or wildlife (Driver et al. 1993 and ENSR 1999). Therefore it would not be expected that Indiana bats in the known roosting area would have large amounts of fog oil directly deposited on them to groom off and ingest. Given all these considerations, the likelihood that there will be adverse effects to Indiana bats in the known roosting area from fog oil ingestion is discountable.

If a smoke operation occurs near an unknown roost out in the training area, the possibility exists that bats could be exposed to fog oil. Oil could be directly deposited on them of which they could groom off and ingest. It is likely that Indiana bats would temporarily abandon the roost if they were being exposed to large amounts of fog oil. However, even if they remained, it is believed that up to 40% of fog oil evaporates in the air within the first hour and it does not seem to readily adhere to soil, vegetation or wildlife (Driver et al. 1993, ENSR 1999) making it unlikely that high concentrations would be deposited on the bats. Therefore it is unlikely that Indiana bats in unknown roosts would be adversely affected by ingestion of fog oil.

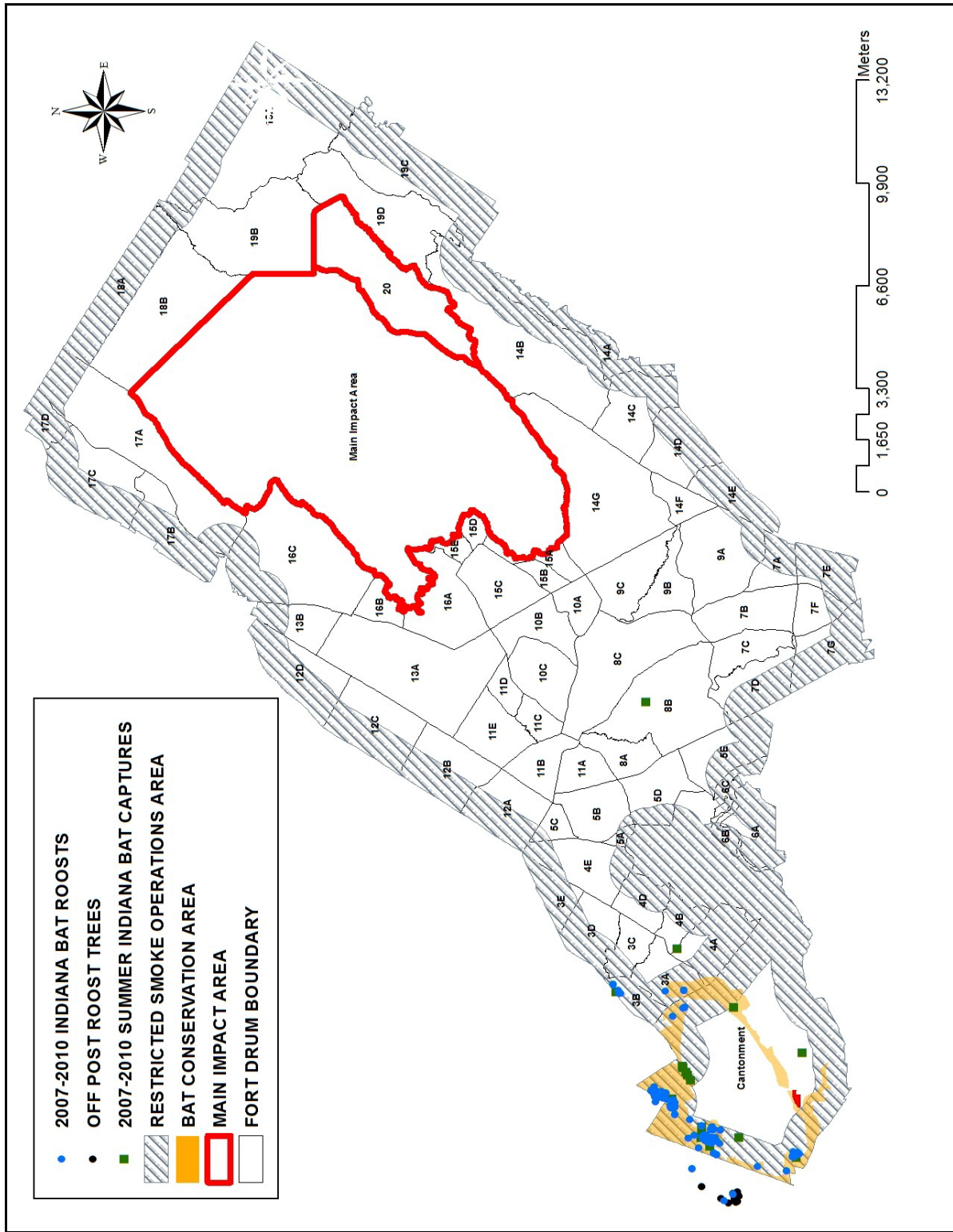


Figure 2.8. Buffer (1000 m) around Fort Drum Military Installation where smoke operations are prohibited per Fort Drum Regulation 350-4.

Fog oil has low potential for acute toxicity (dermal exposure) and may cause slight to moderate irritation after a single exposure to the skin (National Research Council 1997). Seemingly the highest likelihood for exposure and adverse effects are through inhalation. The concentration of fog oil aerosols and rates of deposition are dynamic and highly dependent on local conditions such as the length of the military training exercise, distance from the source (i.e., generator), wind currents, temperature, humidity, local terrain, and precipitation (Smith et al. 2005). Some studies (Driver et al. 1993) have attempted to model the complex atmospheric conditions that affect fog oil smoke dispersion and deposition and determine estimates of fog oil concentrations in the atmosphere that could result from a typical smoke operation (Table 2.6). Other studies (Liljegren et al. 1988 and Policastro et al. 1989) have attempted to develop more realistic estimates of fog oil by sampling concentrations of fog oil in the field at various distances from the source (Table 2.6).

Studies examining exposure concentrations from smoke produced from various oils typically found in smoke operations are quite variable. These studies (summarized in Getz et al. 1996) have examined acute and chronic exposure concentrations to other small mammals (e.g., mice, guinea pigs, hamsters, and rats). Although limited in some scope and applicability, these studies do provide some continuity in exposure risk. They determined that only minimal adverse effects (no deaths) were observed in small mammals at exposures up to 200 mg/m³. Additionally, Driver et al. (2002) exposed red-winged blackbirds (*Agelaius phoeniceus*) to concentrations up to 400 mg/m³ that resulted in no adverse effects to the birds. Although not directly analogous, it provides additional continuity in exposure risk to small wildlife species in general.

Bringing together the two types of studies (i.e., potential exposure concentrations at a given distance and the potential unsafe concentrations) there is still some inherent variability based on all the unknowns that accompany this type of analysis, however, even at the closest distance (25 m) during a typical fog oil operation, the concentration in the air is not expected to exceed 200 mg/m³ (Table 2.6). As the distance increases to 100 m the average concentrations decrease, suggesting that at this distance, fog oil is unlikely to reach high enough concentrations to result in the death of any roosting Indiana bats. Based on the current restrictions, the closest a smoke operation could occur to a known Indiana bat roost is approximately 550 m away in Training Area 3A. However, the likelihood that a smoke operation would occur there is extremely low. If unfavorable wind and weather conditions develop, smoke produced in that area (and up through Training Area 5B; Figure 2.8) would travel into the restricted smoke operation area (i.e., WSAAF, the Cantonment Area, or public highways). It is more likely that smoke operations would occur in areas far enough away from these restricted areas as to not cause conflicts. Thus the closest smoke operation to the known roost areas would more likely be greater than 7,000 m away. Additionally, up to 40% of fog oil residue evaporates within an hour, and up to 90% within one week (Driver et al. 1993). Therefore, the likelihood that fog oil would have any direct acute effect on bats in the known roosting area is unlikely. At these distances, the likelihood that fog oil would reach sufficient levels to result in sublethal effects for individuals in the known colony is also unlikely.

In order to protect additional bats in future roosts from high concentrations of fog oil, a conservation measure will limit smoke operations within 100 m of known maternity roost trees during the time of year Indiana bats are present on the installation (April 16 - October 14). By minimizing the concentration of smoke around maternity roosts at this time, it will reduce the risk of Indiana bats from abandoning roosts and/or non-volant pups. At this distance, Indiana bats (including pups) are unlikely to suffer acute effects, however repeated exposure could result in chronic effects to Indiana bats. Prolonged and repeated exposure of fog oil may cause adverse

pulmonary and systemic effects which could reduce fitness and fecundity of Indiana bats (3D/International 1997). The rotation of smoke/obscurants between areas will help minimize the Indiana bats' risk to chronic exposure. Because of the above considerations and the fact that majority of the known use area of the maternity colony is within the BCA and Cantonment Area, there would be limited exposure to the known colony from fog oil. Therefore, the use of fog oil may affect, but will not adversely affect Indiana bats in the known roosting area.

In the 2009-2011 BA, it was anticipated that fog oil use was likely to affect an undiscovered maternity colony. As stated above, Fort Drum no longer asserts that there is an undiscovered colony. As such, only individuals in unknown roosts of the known colony would potentially be impacted by fog oil use.

Although no adverse effects are anticipated to bats within the known roosts within the Cantonment Area and Training Areas 3 and 4, and future roosts will be protected as they are found, bats in unknown roosts may be adversely affected by fog oil. Repeated exposure within 100 m over the course of a smoke operation training mission would most likely cause adult Indiana bats to abandon the roost, however, if there are non-volant pups present that the adults fail to move, these pups could be killed directly by the fog oil exposure, or indirectly by the adults abandoning the roost. Given that over 5 years, there have been only a small number of roosts (6 known roosts of which 2 are maternity roosts) found in the Training Area, the likelihood that unknown maternity roosts are present throughout the Training Area is low, but not discountable. Therefore, fog oil operations may affect and will adversely affect a small number of Indiana bats in unknown roosts in the Training Area.

Graphite smoke inhalation studies have shown to cause only mild respiratory tract inflammations in rats even at high graphite concentrations (100 mg/m³)(National Research Council 1999a). Repeated inhalation exposure also produced minimal effects in rats and all noted symptoms were reversible after two weeks. Dermal exposure to rabbits showed no signs of toxicity, including no skin irritation (National Research Council 1999a). Graphite was not acutely toxic when given orally to rats at 5 g/kg of body weight. Given the low probability of use and the low toxicity to experimental animals, it is unlikely that the Indiana bat maternity colony will be negatively affected by exposure to graphite smoke, and its toxicity impacts are discountable.

Table 2.6 Estimates of fog oil concentrations resulting from typical smoke screening operations at given distances from the source.

Study	Distance from source (meters)	Average (mg/m ³)	Range (mg/m ³)	Maximum (mg/m ³)
Lilegren et al. 1988 ^A	100	7.7		
	200	3.6		
	400	2.6		
Policastro et al. 1989 ^A	25	116		
	100	8		
	200	3		
Driver et al. 1993 ^B (30 min release)	100	64.3	27-120	
	200	51.8	7-140	
	400	27.9	1.8-93	
	1000	6.9	1.6-24	
Driver et al. 1993 ^B (300 min release)	100	64		
	200	29		
	400	8.7		
	1000	1.6		
Getz et al. 1996 (120 min release)	100	64	25-102	
	200	56	8-105	
	500	46	1.3-90	
	1000	13	0.8-25	
US Army 1997 ^B	100	3.8		13.5
	250	3.5		12.7
	500	2.7		11.2
	1,000	1.2		4.3
Department of the Army 1997 (30 min release)	100		0-14	
	1000		0.1-1	
A- Results from studies conducted in the field B- Results from modeling				
Table is summarized from Getz et al.1996 and ENSR 1999.				

Category 2

Overall data on the toxicity of colored smoke and TPA is limited, however there is concern about effects regarding dermal and respiratory-tract sensitization (National Research Council 1999b). From the available information, it appears colored smoke has varying effects to small mammals dependent on color type and formulation (National Research Council 1999b). Some symptoms that were observed in mammals after exposure included reduced growth rate in juveniles, respiratory afflictions, and sensitization of skin. Because the potential toxicity of colored smokes is unknown, it was recommended by the Subcommittee on Military Smokes and Obscurants (National Research Council 1999b) that soldiers only use colored smoke for signaling and

marking and not obscuring. This measure was to minimize exposing soldiers to colored smoke before appropriate acute toxicity and inhalation studies could be conducted. By using colored smoke as a signaling/marketing tool, it will not be broadly dispersed, which also minimizes the risk of smoke exposure to Indiana bats.

Based on recent past use, Category 2 colored smoke has only been utilized around known Indiana bat areas on Fort Drum fewer than 10 times, and the closest use has been within 350 m. An Ecological Risk Assessment prepared by 3D/International found that Indiana bats within 30 m of deployed colored smoke grenades may inhale unsafe quantities of colored smoke, which could result in acute effects (3D/International 1997). Within the known maternity roosting area, it is unlikely that this would ever happen. In the BCA (where 90% of known roosts are located), smoke will not be used within 100 m of forested areas during the non-hibernation season, but could be used at the three MOUTs (Figure 2.9) between April 15 - October 15. However, the mobile MOUTs in the BCA are approximately 550m from known maternity roosts. As additional roosts may be found, this smoke type will be restricted within 100 m of known roosts in the Training Area from April 15-October 15 to protect roosting Indiana bats. Additionally, Category 2 smoke typically lasts only approximately 2 min in duration, making the likelihood of exposure extremely limited. Given these considerations, the likelihood that Category 2 smoke would have adverse affects to bats within the known roosting area is discountable.

Although no adverse affects are anticipated to bats within the known roosts within the Cantonment Area and Training Areas 3 and 4, and future roosts will be protected as they are found, bats in unknown roosts may be adversely affected by Category 2 smoke. The potential exists that colored smoke may be deployed near unknown roosts in the Training Area. If colored smoke or other smoke grenades are deployed within 30 m of the unknown roosts, bats may inhale unsafe quantities of smoke, which could result in acute effects (3D/International 1997). Given that over 5 years, there have been only a small number of roosts (6 known roosts of which 2 are maternity roosts) found in the Training Area, the likelihood that unknown maternity roosts are present throughout the Training Area is low, but not discountable. Therefore, Category 2 smoke may affect and will adversely affect a small number of Indiana bats in the Training Area.

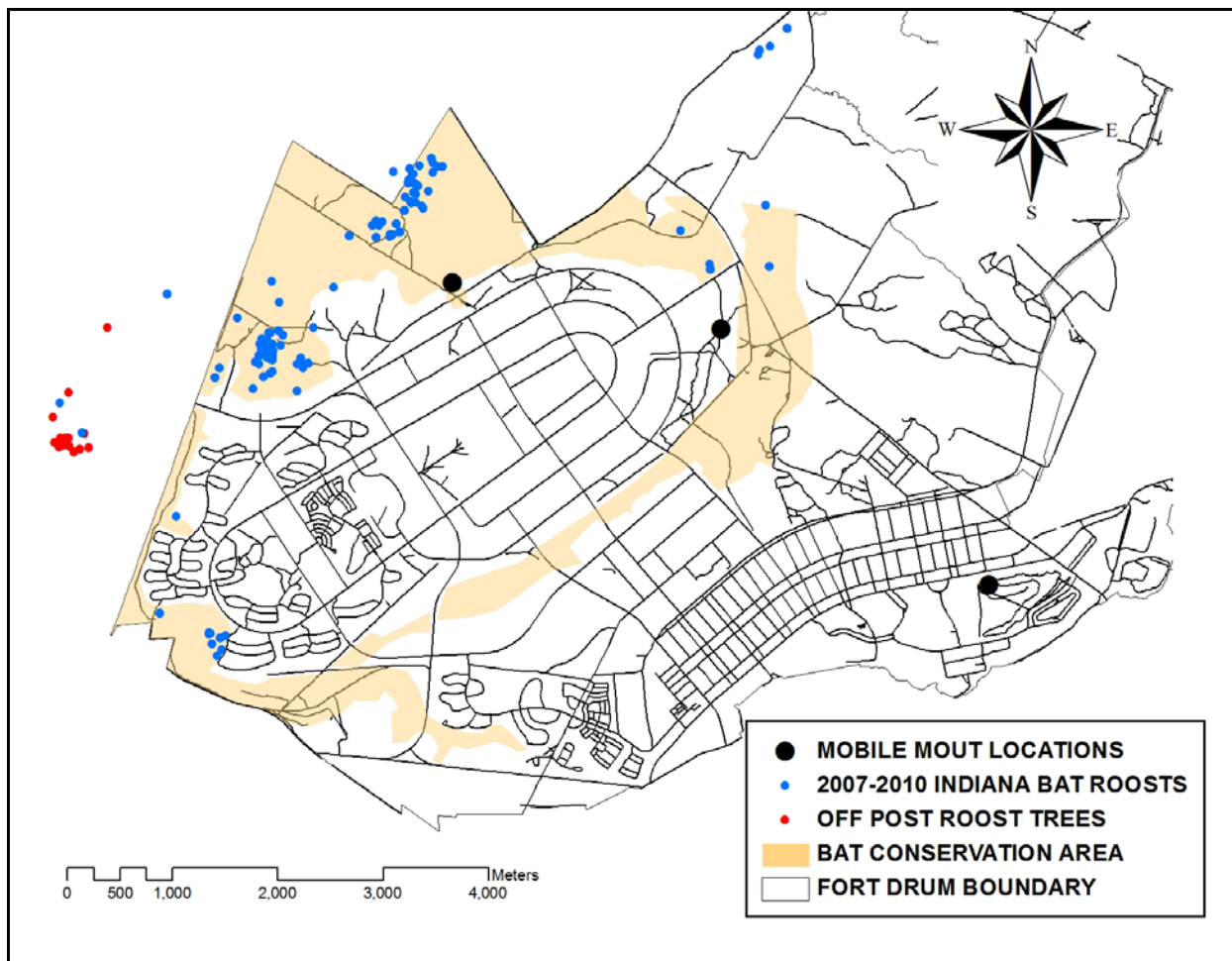


Figure 2.9. Mobile MOUT locations in the LTAs within the Fort Drum Cantonment Area.

Category 3

WP can result in severe burns if it comes into contact with the skin; and it is highly toxic if ingested (National Research Council 1999a). Inhalation studies of WP on mice, rats, and goats showed signs of respiratory tract irritation (National Research Council 1999a). Rats exposed to WP for 15 min/day, 5 days/week for 13 weeks at 1,740 mg/m³ (H₃PO₄) resulted in the death of 32% of the rats within 6 weeks. LC₅₀ for rats exposed to WP for 1 hour ranged from 1,300 to 4,800 mg/m³. Reproduction and development of rats showed that higher WP exposure (1,742 mg/m³ for 15 min/day, 5 days/week for 10 weeks) were associated with lower natal weights and had severe effects on survivability (National Research Council 1999a). Indiana bats exposed to WP smoke will likely show signs of respiratory irritation, and if pregnant Indiana bats are exposed to WP in high concentrations over a period of time, it could result in negative effects to offspring including lower fecundity and/or natal weights.

Currently, the use of WP is restricted to the ranges or the Main Impact Area and is used infrequently. Although wind could disperse WP out of those areas, there are currently no known roosts located within approximately 12 km (~7.5 mi) of the ranges or the Main Impact Area. In the previous BA, Fort Drum assumed that there was also the potential that there was an undiscovered maternity colony in the Training Area that may be adversely affected by WP

smoke via inhalation, ingestion, or dermal absorption during the non-hibernation seasons. Due to the best available information (see *Section 1.5 Indiana Bat-Fort Drum*) Fort Drum no longer asserts that there is a second maternity colony, and potential impacts would only be to the known colony residing in the Cantonment Area. It is known that the Cantonment Area colony members utilize the Training Areas, however, only 4 Indiana bats have been captured, and only 2 maternity roosts have been found in the Training Area. No Indiana bats have been captured within 3 mi (4.8 km) of the ranges or the Main Impact Area.

Because of the distance between the known roosting area of the colony and WP training sites, the infrequent and variable deployment of WP, and the limited likelihood that Indiana bats would be using the ranges or Main Impact Area, effects of WP on Indiana bats roosting within the known maternity colony are discountable. It is unlikely WP smoke will drift and adversely affect the known roosts.

Although no adverse effects are anticipated to bats within the known roosts within the Cantonment Area and Training Areas 3 and 4, and future roosts will be protected as they are found, bats in unknown roosts may be adversely affected by WP Category 3 smoke. The potential exists that WP smoke may be deployed near unknown roosts in the Training Area. If WP smoke is deployed within close proximity of unknown roosts, bats may inhale unsafe quantities of smoke. Given that over 5 years, there have been only a small number of roosts (6 known roosts of which 2 are maternity roosts) found in the Training Area, the likelihood that unknown maternity roosts are present throughout the Training Area near the ranges is low, but not discountable. Therefore, Category 3 smoke may affect and will adversely affect a small number of Indiana bats in the Training Area.

Foraging

Category 1

Most known foraging typically occurs within the Cantonment Area, the BCA, and off post. Given current restrictions, the closest a smoke operation would occur to these known foraging areas is approximately 2000 m away in Training Area 3A. However, the likelihood that a smoke operation would occur there is extremely low. If unfavorable wind and weather conditions develop, smoke produced in that area (and up through Training Area 5B; Figure 2.8) would travel into the restricted smoke operation area (i.e., WSAAF, the Cantonment Area, or public highways). It is more likely that smoke operations would occur in areas far enough away from these restricted areas as to not cause conflicts. Thus the closest smoke operation to the known foraging areas would more likely be greater than 8,000 m away. Additionally, up to 40% of fog oil evaporates in the air within an hour, and up to 90% of fog oil has evaporated within a week and it does not seem to readily adhere to soil, vegetation or wildlife (Driver et al. 1993 and ENSR 1999). Therefore it would not be expected that Indiana bats in the known foraging area would have large amounts of fog oil deposited on their skin and fur to be groomed off and ingested, nor is it expected that they would inhale unsafe quantities as they foraged. Additionally, it is not expected that smoke operations would be conducted during hours that Indiana bats will be active for foraging, however, if they were conducted when Indiana bats are foraging, bats have the ability to avoid the smoke and chemicals and can forage in adjacent areas, thus limiting exposure. Given all these considerations, the likelihood that there will be adverse effects to Indiana bats in the known foraging area from fog oil ingestion or inhalation is discountable.

If Indiana bats are foraging in the Training Area and encounter a smoke operation, or it is being conducted during the time when bats are actively foraging, there is a possibility that bats could be exposed to potentially harmful chemicals. However, bats have the ability to avoid the smoke and chemicals and can forage in adjacent areas, thus limiting exposure. There are large areas of suitable foraging habitat. As such, smoke and obscurants may affect but should not adversely affect Indiana bats as they forage in unknown areas in the Training Area.

Category 2

Most known foraging typically occurs within the Cantonment Area, the BCA, and off post. Although Category 2 colored smoke has only been utilized around this known Indiana bat foraging areas in the past, it has been infrequent (fewer than 10 times known). An Ecological Risk Assessment prepared by 3D/International found that Indiana bats within 30 m of deployed colored smoke grenades may inhale unsafe quantities of colored smoke, which could result in acute effects (3D/International 1997). In the BCA smoke will not be used within 100 m of forested areas during the non-hibernation season, but could be used at the three MOUTs (Figure 2.9) between April 15 - October 15. However, Category 2 smoke typically lasts only approximately 2 minutes in duration, making the likelihood of exposure extremely limited even if bats were flying near the MOUTs. Further, if Category 2 smoke is deployed near where Indiana bats are foraging, bats have the ability to avoid these areas and can forage in adjacent areas, thus limiting exposure. Given these considerations, the likelihood that Category 2 smoke would have adverse affects to the Indiana bats foraging in the known roosting area is discountable.

If Indiana bats are foraging in the Training Area and encounter a Category 2 smoke, there is a possibility that bats could be exposed to potentially harmful chemicals. However, smoke grenades and colored smoke typically last only a couple of minutes in duration, and bats have the ability to avoid these areas, thus limiting exposure. There are large areas of suitable foraging habitat. As such, Category 2 smoke may affect but should not adversely affect Indiana bats as they forage in unknown areas in the Training Area.

Category 3

Currently, the use of WP is restricted to the ranges or the Main Impact Area and is used infrequently. Although wind could disperse WP out of those areas, there are currently no known foraging locations within approximately 12 km (~7.5 mi) of the ranges or the Main Impact Area. It is known that the Cantonment Area colony members utilize the Training Area, however, only 4 Indiana bats have been captured in the Training Area. No Indiana bats have been captured within 3 mi (4.8 km) of the ranges or the Main Impact Area.

Because of the distance between the known roosting area of the colony and WP training sites, the infrequent and variable deployment of WP, and the limited likelihood that Indiana bats would be using the ranges or Main Impact Area, effects of WP on Indiana bats foraging within the known maternity colony are discountable. It is unlikely WP smoke will drift and adversely affect the foraging bats, and bats have the ability to avoid these areas and can forage in adjacent areas, thus limiting exposure.

If Indiana bats are foraging in the Training Area and encounter a Category 3 smoke deployment, there is a possibility that bats could be exposed to potentially harmful chemicals. However, bats have the ability to avoid these areas, thus limiting exposure. There are large areas of suitable foraging habitat throughout the Training Area. As such, Category 3 smoke may affect but should not adversely affect Indiana bats as they forage in unknown areas in the Training Area.

2.2.3.2. Indirect Effects

Hibernation

No hibernacula are known to exist on Fort Drum, and the nearest known hibernaculum to Fort Drum is 6.5 mi (10.5 km) away. Therefore military training activities currently have no indirect effects to hibernating Indiana bats.

Roosting

Category 1

Smoke operations are not expected to have indirect effects to individuals within the known roost area. Based on the current restrictions, the closest a smoke operation could occur to a known Indiana bat roost is approximately 550 m away in Training Area 3A. However, the likelihood that a smoke operation would occur there is extremely low. If unfavorable wind and weather conditions develop, smoke produced in that area (and up through Training Area 5B; Figure 2.8) would travel into the restricted smoke operation area (i.e., WSAAF, the Cantonment Area, or public highways). It is more likely that smoke operations would occur in areas far enough away from these restricted areas as to not cause conflicts. Thus the closest smoke operation to the known roost areas would more likely be greater than 7,000 m away. Additionally, up to 40% of fog oil residue evaporates within an hour, and up to 90% within one week (Driver et al. 1993). Therefore, the likelihood that fog oil would have any indirect chronic affect on bats in the known roosting area is unlikely. At these distances, the likelihood that fog oil would reach sufficient levels to result in sublethal effects for individuals in the known colony and affect reproduction, natal weights, etc. is unlikely.

In order to protect bats in additional future roosts in the Training Area from high concentrations of fog oil, a conservation measure will limit smoke operations within 100 m of known maternity roost trees during the time of year Indiana bats are present on the installation (April 16 - October 14). By minimizing the concentration of smoke around maternity roosts at this time, it will reduce the risk of Indiana bats from abandoning roosts and/or non-volant pups. However prolonged and repeated exposure of fog oil may cause adverse pulmonary and systemic affects which could reduce fitness and fecundity of Indiana bats (3D/International 1997). The rotation of smoke/obscurants between areas will help minimize the Indiana bats' risk to chronic exposure. Because of the above considerations and the fact that majority of the known use area of the maternity colony is within the BCA and Cantonment Area, there would be limited exposure to the known colony from fog oil. Therefore, the use of fog oil may affect, but will not adversely affect Indiana bats in the known roosting area.

Although no adverse affects are anticipated to bats within the known roosts within the Cantonment Area and Training Areas 3 and 4, and future roosts will be protected as they are found, bats in unknown roosts may be adversely affected by fog oil. Repeated exposure within 100 m over the course of a smoke operation training mission would most likely cause adult Indiana bats to abandon the roosts, and potentially abandoning (permanently or temporarily) non-volant pups. If the adult female were to permanently abandon the pup, her reproductive effort would be eliminated for that year. Additionally, even if pups are abandoned only temporarily, this reduced parental care could ultimately lead to increased predation risk for the pup. Either way, exposure to fog oil could ultimately result in reduced fitness for the adult female and added energy expenditure to avoid smoke. Given that over 5 years, there have been only a small number of roosts (6 known roosts of which 2 are maternity roosts) found in

the Training Area, the likelihood that unknown maternity roosts are present throughout the Training Area is low, but not discountable. Therefore, fog oil operations may affect and will adversely affect a small number of Indiana bats in unknown roosts in the Training Area.

Category 2

Based on recent past use, Category 2 colored smoke has only been utilized around known Indiana bat areas on Fort Drum fewer than 10 times, and the closest use has been within 350 m. An Ecological Risk Assessment prepared by 3D/International found that Indiana bats within 30 m of deployed colored smoke grenades may inhale unsafe quantities of colored smoke (3D/International 1997). Within the known maternity roosting area, it is unlikely that this would ever happen. In the BCA (where 90% of known roosts are located), smoke will not be used within 100 m of forested areas during the non-hibernation season, but could be used at the three MOUTs (Figure 2.9) between April 15 - October 15. However, the mobile MOUTs in the BCA are approximately 550 m from known maternity roosts. As additional roosts may be found, this smoke type will be restricted within 100 m of known roosts in the Training Area from April 15 - October 15 to protect roosting Indiana bats. Given these considerations, it is not anticipated that there will be any indirect effects, and the likelihood that Category 2 smoke would have adverse effects is discountable.

Although no adverse effects are anticipated to bats within the known roosts within the Cantonment Area and Training Areas 3 and 4, and future roosts will be protected as they are found, the potential exists that colored smoke or other smoke grenades may be deployed near unknown roosts in the Training Area, and bats may be adversely affected. Exposure within close proximity may cause adult Indiana bats to abandon the roosts, and potentially abandon (permanently or temporarily) non-volant pups. If the adult female were to permanently abandon the pup, her reproductive effort would be eliminated for that year. Additionally, even if pups are abandoned only temporarily, this reduced parental care could ultimately lead to increased predation risk for the pup or reduced nutritional intake. Either way, exposure to Category 2 smoke could ultimately result in reduced fitness for the adult female and added energy expenditure to avoid smoke. Given that over 5 years, there have been only a small number of roosts (6 known roosts of which 2 are maternity roosts) found in the Training Area, the likelihood that unknown maternity roosts are present throughout the Training Area is low, but not discountable. Therefore, Category 2 smoke may affect and will adversely affect a small number of Indiana bats in unknown roosts in the Training Area.

Category 3

Currently, the use of WP is restricted to the ranges or the Main Impact Area and is used infrequently. Although wind could disperse WP out of those areas, there are currently no known roosts located within approximately 12 km (~7.5 mi) of the ranges or the Main Impact Area. It is known that the Cantonment Area colony members utilize the Training Areas, however, only 4 Indiana bats have been captured, and only 2 maternity roosts have been found in the Training Area. No Indiana bats have been captured within 3 mi (4.8 km) of the ranges or the Main Impact Area. Because of the distance between the known roosting area of the colony and WP training sites, the infrequent and variable deployment of WP, and the limited likelihood that Indiana bats would be using the ranges or Main Impact Area, indirect effects of WP on Indiana bats roosting within the known maternity colony are discountable. It is unlikely WP smoke will drift and adversely affect the known roosts.

Although no adverse effects are anticipated to bats within the known roosts within the Cantonment Area and Training Areas 3 and 4, and future roosts will be protected as they are found, the potential exists that WP smoke may be deployed near unknown roosts in the Training Area, and bats may be adversely affected. Exposure within close proximity may cause adult Indiana bats to abandon the roosts, and potentially abandon (permanently or temporarily) non-volant pups. If the adult female were to permanently abandon the pup, her reproductive effort would be eliminated for that year. Additionally, even if pups are abandoned only temporarily, this reduced parental care could ultimately lead to increased predation risk for the pup or reduced nutritional intake. Either way, exposure to Category 3 smoke could ultimately result in reduced fitness for the adult female and added energy expenditure to avoid smoke. Given that over 5 years, there have been only a small number of roosts (6 known roosts of which 2 are maternity roosts) found in the Training Area, the likelihood that unknown maternity roosts are present throughout the Training Area is low, but not discountable. Therefore, Category 3 smoke may affect and will adversely affect a small number of Indiana bats in unknown roosts in the Training Area.

Foraging

No category of Smoke/obscurant use is anticipated to have indirect effects on foraging Indiana bats. 3/D International (1996) evaluated the environmental fate of fog oil at Fort McClellan, Alabama. No increase of fog oil hydrocarbons were noted in soil, surface water, sediment, tree bark, leaf, insect, or bat tissue samples taken from fog oil exposure sites. Fog oil is biodegradable and will remain in soil only a few days, depending on soil fauna present and time of year fog oil is released (3D/International 1997, ENSR 1999). Harmful quantities of fog oil are not expected to accumulate in the environment at Fort Drum because fog oil is readily biodegraded by aerobic microorganisms and undergoes chemical degradation in aqueous environments. Prey are unlikely to be affected by exposure to fog oil through aquatic pathways.

Prey species are unlikely to be affected by exposure to terephthalic acid (TPA) in smoke through aquatic pathways (3D/International 1997). The primary combustion products of TPA are carbon monoxide, carbon dioxide, sulfur dioxide, benzene, toluene, and formaldehyde. These compounds are released in a gaseous state. It is very unlikely they will accumulate in soil or water because they volatilize and are transformed by photochemical reactions. If small quantities enter groundwater or surface water systems, they will be biodegraded by microorganisms. The particulate matter of TPA may be removed from the atmosphere by dry or wet deposition. TPA is relatively insoluble in water, but certain combustion products may enter water systems. Quantities that enter water systems (i.e., groundwater or surface water) will be rapidly degraded through photochemical reactions or through biodegradation as TPA is an organic acid that many terrestrial and aquatic microorganisms can utilize in metabolic processes.

As a part of sustainment operations, POL Spill Prevention plans and procedures are in place and implemented to minimize the impact of POL spills when they occur. POL spills may contaminate water bodies, thus impacting aquatic species, including insect prey of Indiana bats. However, because of these procedures, insect prey should not be adversely affected by POL activities. Thus Indiana bats will not be adversely affected. POL impacts are discountable.

2.2.4 Conclusion

Considering their presence on Fort Drum and the length of time Fort Drum has been an active military installation, it is assumed that Indiana bats have adapted to military noise training, and activities. While the use of smoke and obscurants is not anticipated to adversely affect bats within the known roosting and foraging areas, bats using unknown areas in the Training Area for roosting and foraging are likely to experience direct adverse effects primarily through smoke inhalation and indirect effects through reduced fitness.

2.3 Forest Management

2.3.1 Forest Management Activities

Please see Appendix A for more detailed information about the Forest Management Program on Fort Drum

In the 2009-2011 BA, it was anticipated that up to 4,900 (1,982 ha) of forests would be harvested (Appendix A and Table 2.7). However, actual harvest during 2009-2011 was approximately 1,100 ac (445 ha; Table 2.7 and Figure 2.10). The Forest Management Program anticipates cutting up to 1,300 ac (526 ha) during the next 3 years, however for the purposes of this BA, that number will be buffered by an additional 1000 ac (405 ha) to deal with unforeseen military training support or other contingencies (Table 2.8 and Figure 2.11). This acreage will also include all potential standing firewood sales that remove trees greater than 4" DBH.

In addition to timber harvesting, up to 300 ac (121 ha) will be site-prepared between August 1 - April 15 to support tree regeneration and to control unwanted vegetation. Site preparation will remove vegetation less than 4 in DBH to expose the soil for planting of trees. Site preparation will occur the year following a timber harvest but within the same footprint. If site preparation is required at other sites, then further consultation will be needed.

Forest management on Fort Drum utilizes both even-aged (e.g., clearcutting or shelterwood) and uneven-aged (e.g., single tree or group selection) harvest methods to manage forests to support military training, timber production/health, and wildlife habitat creation/enhancement. Environmental conditions (e.g., wet or rocky soils), training requirements, and stand characteristics dictate harvest methods.

Table 2.7. Approximate acreage of forests that were proposed for harvest between January 2009 -December 2011, and acreages actually harvested on Fort Drum Military Installation.

Forest Type	Proposed Acres	Actual Acres
Conifer	715	125
Deciduous	1655	207.3
Mixed	1060	767.7
Unknown	1470	
Total	4900	1100

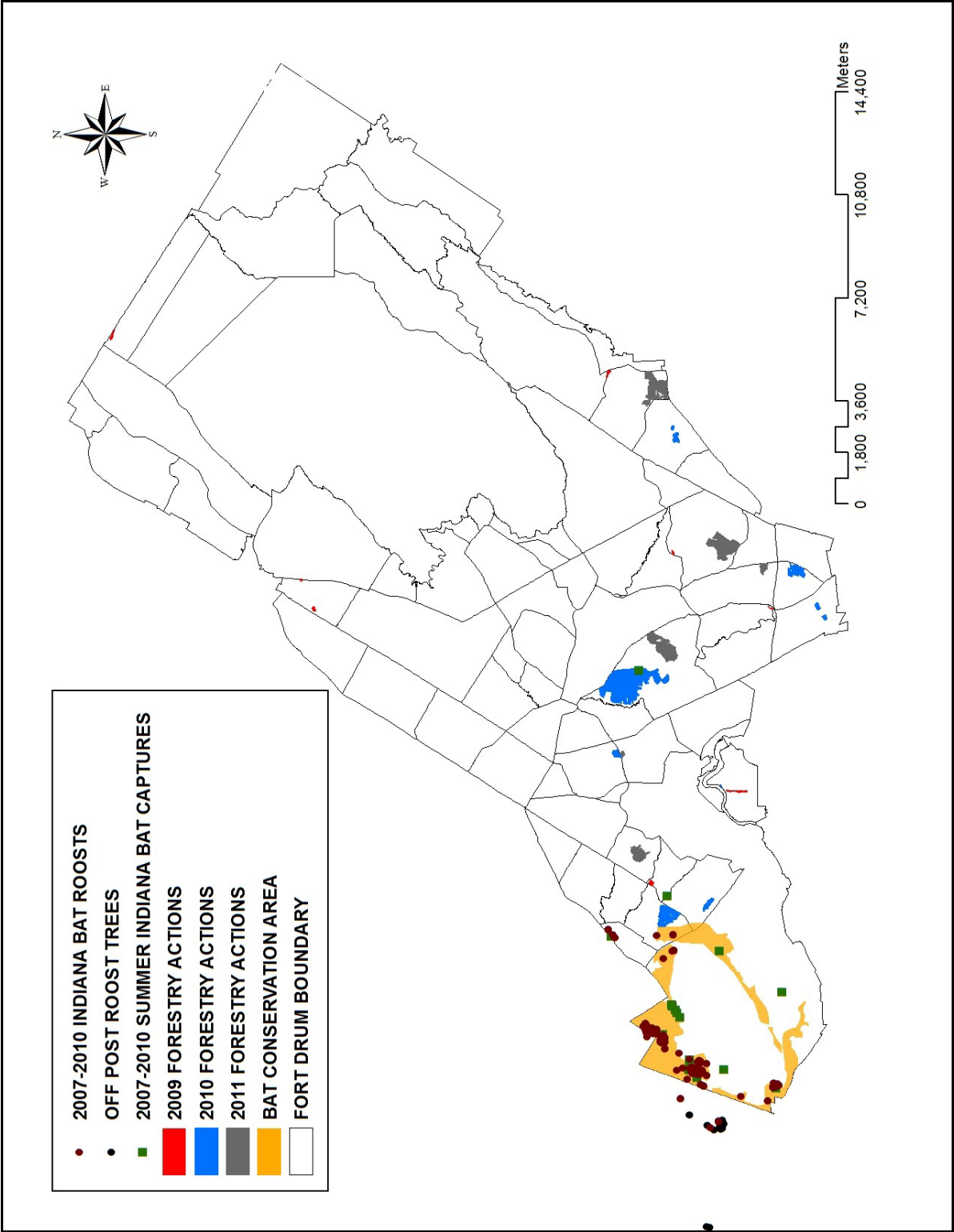


Figure 2.10. Completed Forest Management actions on Fort Drum Military Installation, 2009-2011.

Table 2.8. Approximate acreage of forests that are proposed to be harvested for all Forest Management actions between January 2012 -December 2014 on Fort Drum Military Installation.

Forest Type	Proposed Acres
Conifer	200
Deciduous	313
Mixed	782
Buffer	1000
Total	2295

Most timber harvesting is expected to occur within the Training Area, and no treatments are currently scheduled within the Cantonment Area. Other actions (e.g., tree clearing for construction or maintenance activities) may require the removal of trees in the Cantonment Area, however, these are not sustainable forestry actions and are addressed in *Section 2.1 Construction* and *Section 2.4 Vegetation Management*, respectively.

As discussed in the 2009-2011 BA (Appendix A), in order to minimize soil disturbance, erosion, and water quality, the Forest Management Program may need to harvest early successional and/or mixed forests in the Training Area during the time of year bats may be present on the property between August 15 - September 30. This time period was selected to avoid as many impacts as possible to non-volant juveniles (and some adults). However, with the information that Fort Drum has collected from fall foraging and movement work, we now suggest that this period should be revised to August 15 - October 14 to more accurately reflect the time period when Indiana bats are known to be present on the installation. In 2012 – 2014, up to 500 ac (202 ha) may be harvested during this time (150 ac may be clearcuts).

As part of the 2009-2011 BA, Fort Drum originally anticipated needing to conduct the in-season cutting east of the CSX railroad line running north and south through the southwestern part of the Training Area. This area was originally outside the known range of the known maternity colony, so no known direct impacts to this maternity colony were anticipated; however, in 2010, a juvenile female Indiana bat was captured in Training Area 8 east of the CSX tracks. Therefore, we suggest that a new boundary for cutting trees between August 15 – October 14 would only occur north and east of US Military Highway (Figure 2.12). This area is outside the area of known maternity colony use.

Potential harvest areas would be north and/or east of US Military Highway on the following soil types: clay, clay loam, loamy sand, sandy loam, silt loam, and silty clay. Forest stands would be predominantly aspen, birch, or mixed hardwood/conifer. The average patch size that may be harvested is estimated at 50 ac (20 ha) per site and the maximum patch size should not exceed 200 ac (81 ha) per site. If a clearcut is needed in these locations, it will not exceed 50 ac per site. Refer to Figure 2.13 for proposed locations of sites that may be harvested in-season; however any area north and east of the US Military Highway that meet the aforementioned criteria and soils may be harvested in-season not to exceed 500 ac (202 ha) in three years. These sites are harvested for the benefit of military training which is dictated by the ever-changing mission, so exact locations and harvest scenarios are not known at this time.

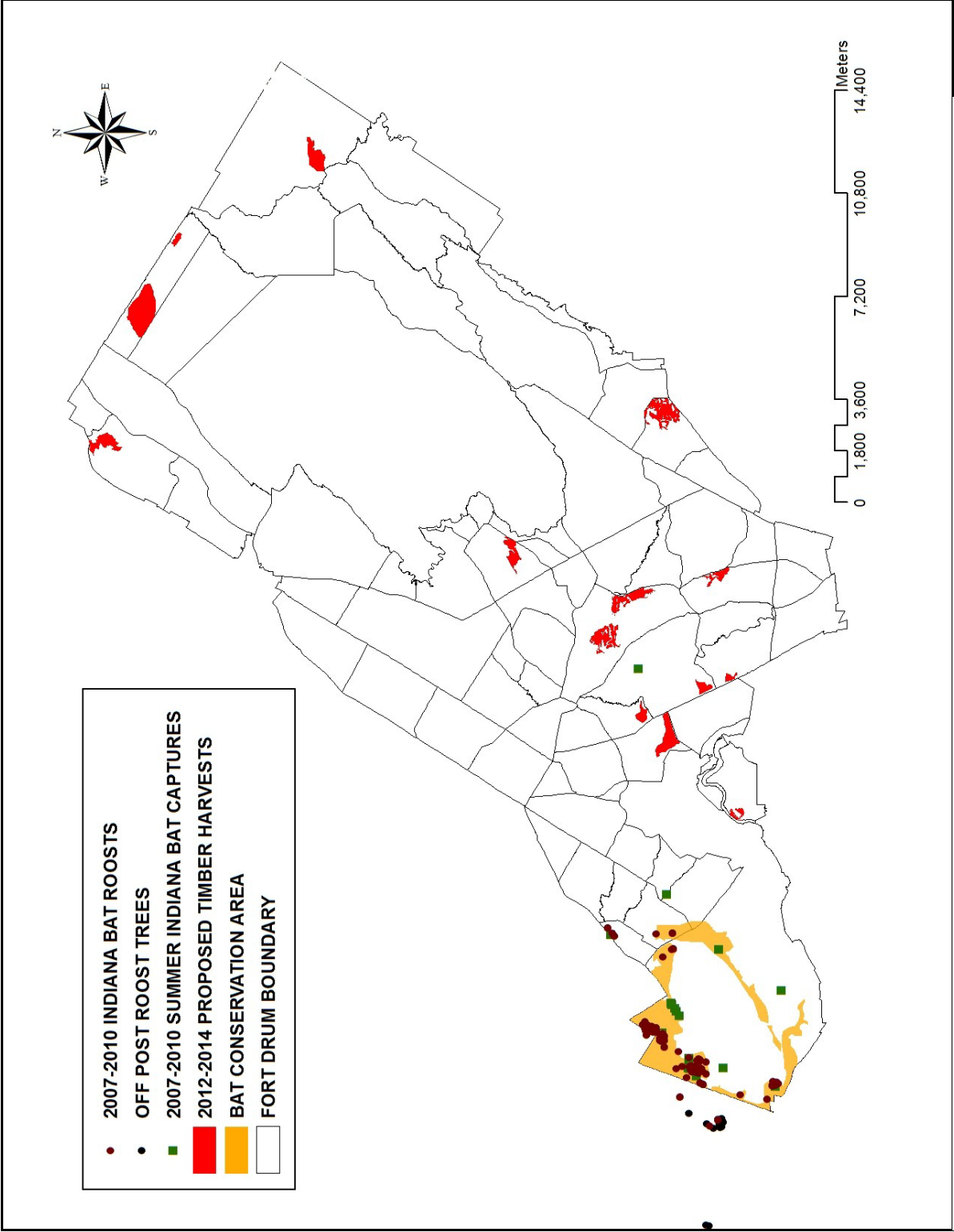


Figure 2.11. Proposed Forest Management actions on Fort Drum Military Installation, 2012-2014.

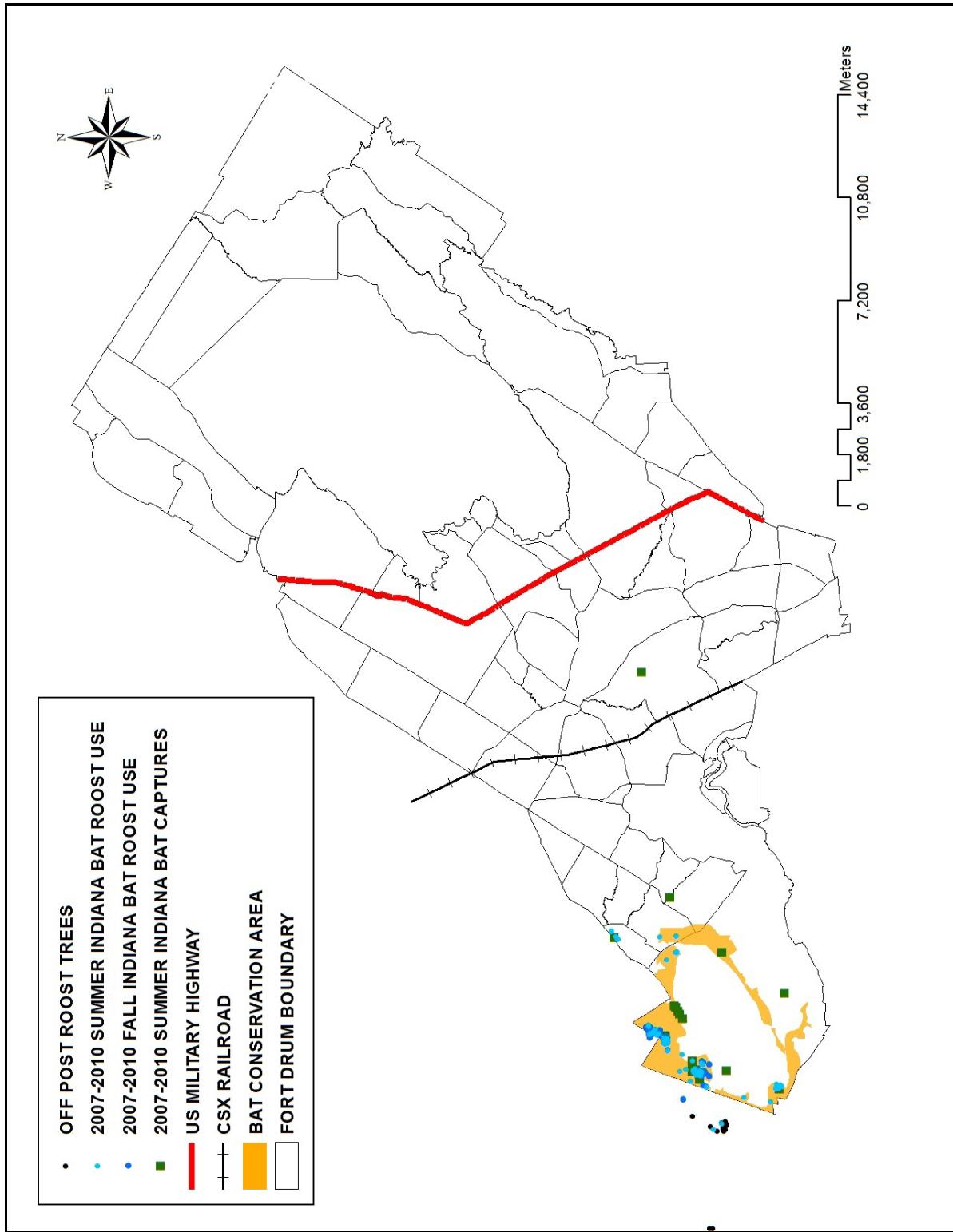


Figure 2.12. Locations of previous (CSX Railroad) and proposed (US Military Highway) boundaries for active season clearing for Forest Management actions on Fort Drum Military Installation.

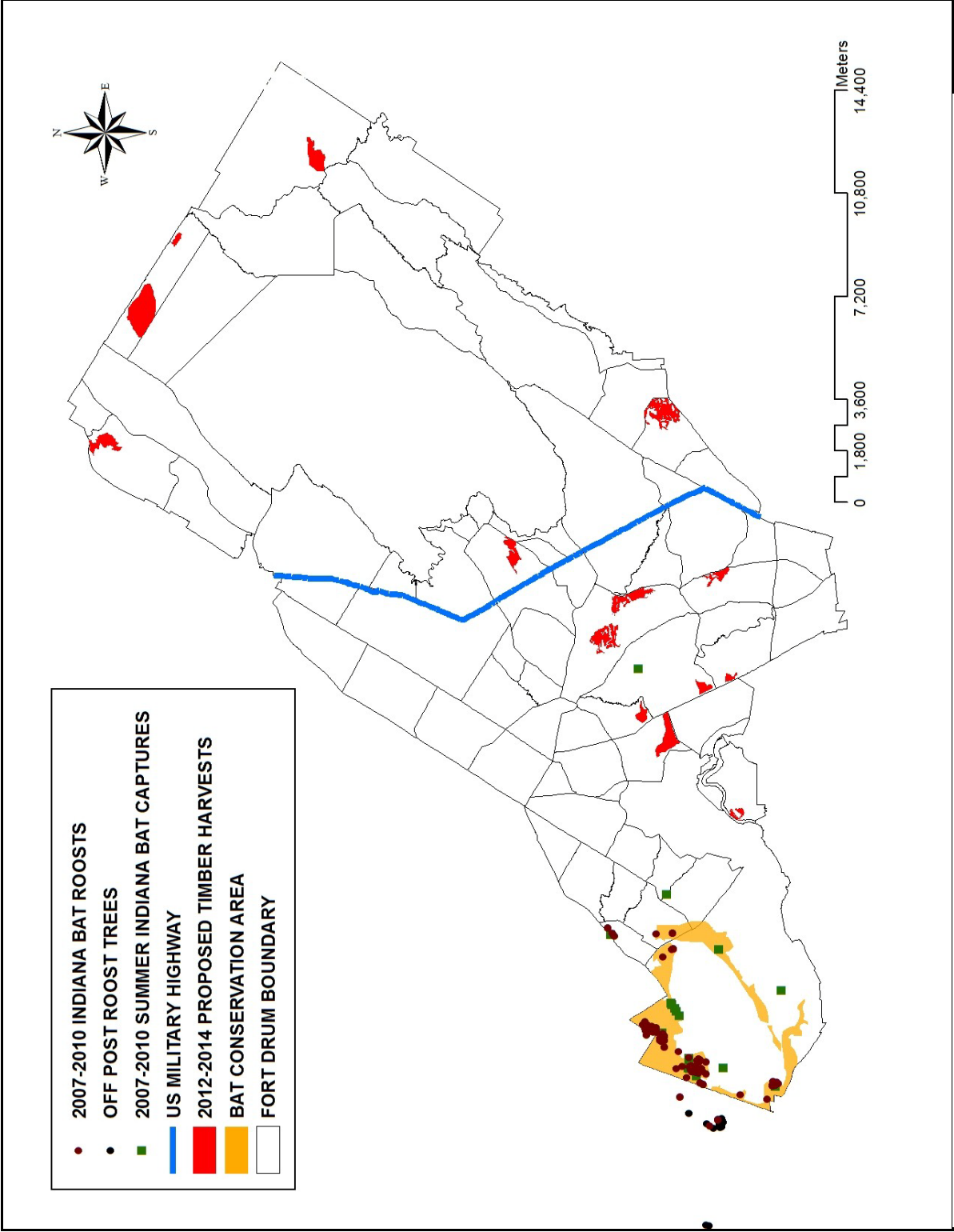


Figure 2.13. Proposed locations of harvests between August 15-October 14 north and/or east of US Military Highway on Fort Drum Military Installation, 2012-2014.

Before cutting begins, each sale are will be evaluated for potential Indiana bat use. If the site has no suitable roosting habitat (i.e., all trees are less than 4 in DBH, there are no dead/dying large diameter trees), the site may be cleared. This scenario would be unlikely, as most areas would have both trees > 4 inches DBH and large diameter dead/dying trees. If suitable roosting habitat exists, the area will be monitored via mist netting and Anabat echolocation detection following the protocol below:

- 1) If the site is less than or equal to 50 acres, a minimum of two mist nets will be deployed per every 10 acres of suitable forested habitat in locations most likely to capture Indiana bats in or near the project site. If the site is greater than 50 and up to 200 acres, a minimum of two nets will be deployed per every 25 acres of suitable forested habitat in location most likely to capture Indiana bats in or near the project site. Nets will be deployed for at least two nights.
- 2) Concurrently, if the site is less than or equal to 50 acres, a minimum of two Anabat detectors will be deployed per every acre 10 for at least two nights. If the site is greater than 50 and up to 200 acres, a minimum of two Anabat detectors will be deployed per every 25 acres. Recording will occur 30 min. before sunrise until dawn. Placement of detectors will occur within or immediately adjacent to the project site and in such a manner that it is most likely to record Indiana bat echolocation call sequences.
- 3) Nets and detectors will not be deployed if the following weather conditions exist: precipitation; temperatures below 50°F (10°C); and/or strong winds.
- 4) Echolocation passes will be identified using a filter for Indiana bats, and the number of identified passes will be recorded.
- 5) If no Indiana bats are capture via mistnetting, and no suspected Indiana bat call sequences are collected, the project can move forward immediately. If suspected Indiana bat call sequences are collected, two more nights of netting will be performed in an attempt to confirm Indiana bat use on the project site. If no Indiana bats are captured after this effort, the project can move forward immediately.
- 6) If an Indiana bat is captured on the site, a transmitter will be attached, and the bat will be tracked to roosts for the life of the transmitter. If the bat is not found to be using the project site or sites nearby, the project can move forward immediately. If the bat is subsequently found to be using the project site, the USFWS will be contacted to determine the next appropriate course of action.

No forest management projects involving the cutting of trees will occur between 16 April - 15 August anywhere on Fort Drum, and no projects will occur south/west of US Military Highway between 16 August - 14 October. If a project is needed south/west of US Military Highway between 16 August - 14 October, additional consultation will be required with the USFWS. If Indiana bats are captured north/east of US Military Highway, then additional consultation is needed with the USFWS. Further consultation is also needed if project exceeds 200 ac (81 ha) per site or if the cumulative acreage will exceeds 500 ac (202 ha) during the 3 year period.

Military Training Support

Military training support actions in the next three years are expected to be similar to those covered under the 2009-2011 BA. While amount, type, and/or duration may vary annually, we do not anticipate any activity that would cause any additional or unaddressed impacts not previously covered under the 2009-2011BA. Therefore, we affirm that the effects analysis and

conservation measures from the previous BA remain appropriate. Please see Appendix A for more information. Please see Appendix A for more information regarding forest management for military training support.

Timber Production/Forest Health

Actions carried out to support timber production/forest health in the next three years are expected to be similar to those covered under the 2009-2011 BA. While amount, type, and/or duration may vary annually, we do not anticipate any activity that would cause any additional or unaddressed impacts not previously covered under the 2009-2011 BA. Therefore, we affirm that the effects analysis and conservation measures from the previous BA remain appropriate. Please see Appendix A for more information. Please see Appendix A for more information regarding forest management for timber production/forest health.

Wildlife Habitat Management

Actions carried out to support wildlife habitat management in the next three years are expected to be similar to those covered under the 2009-2011 BA. While amount, type, and/or duration may vary annually, we do not anticipate any activity that would cause any additional or unaddressed impacts not previously covered under the 2009-2011 BA. Therefore, we affirm that the effects analysis and conservation measures from the previous BA remain appropriate. Please see Appendix A for more information. Please see Appendix A for more information regarding forest management for wildlife habitat management.

Water Quality Protection

Fort Drum's Forest Management Program and Wetlands Management Program developed several measures to minimize the risks of impacting water quality from soil disturbance, which also provide a benefit a variety of wildlife.

1. If possible, new log landings will be constructed at least 200 ft (61 m) from water bodies and wetlands.
2. Spill kits and oil absorbent mats will be present on log landings in case of fuel, lubricant or hydraulic fluid spills or leaks.
3. If necessary, soil will be stabilized by seeding and mulching at the end of the operation.
4. Where possible, skid trail grade will be maintained at less than 15%. Where higher grade is unavoidable, the grade will be broken, drainage structures will be installed, and soil stabilization practices will be used where needed to minimize runoff and erosion.
5. Debarking and other damage to residual trees will be minimized wherever possible.
6. Stream crossings will be used only when absolutely necessary. If necessary, bridges will be deployed to minimize damage to bed and bank of the stream.
7. Streams will be crossed by the most direct route.

8. Ruts will be filled in, and water bars and erosion barriers will be installed to prevent or minimize erosion and sedimentation from roads, skid trails and log landings.
9. Erosion control measures will be inspected within 24 hours after a rain event and checked once per week. Erosion controls will be maintained or removed as needed.
10. No machinery will be operated in streams protected under Article 15 of the New York State Environmental Conservation Law without first obtaining a permit from NYSDEC.

Firewood Cutting

The Forest Management Program issues approximately 300 firewood permits annually, which results in the removal of about 400 cords of firewood per year. Firewood is collected only from trees that are dead AND downed (i.e., laying on the ground) throughout the installation. The Main Impact Area, active construction sites, and environmental or archeological sensitive areas marked with "Off-Limits by Order of the Commander" signs or Seibert Stakes are off-limits to firewood collection. Firewood may be removed via tractors, four wheelers, bobcats, or other mechanical means. Historically, soil disturbances and water quality concerns from these activities have been minimal.

2.3.2 Conservation Measures for Forest Management Activities

To minimize the risks of impacting Indiana bats during forest management activities, while benefiting Indiana bat habitat, several conservation measures have been implemented.

1. Bat Conservation Area. Approximately 2,200 ac (890 ha) have been set aside for Indiana bats. Timber harvests will not occur within the BCA until an appropriate management plan is developed and the plan has been consulted on. If timber harvesting is needed within the BCA, then consultation with the USFWS is needed.
2. Roost Tree Protection. No female roost trees, including roosts identified in the future, will be felled for the lifespan of the roost. This includes roost trees in and outside of the BCA.
3. Roost Tree Avoidance. Clearcutting and overstory roost tree removal will not occur within 0.75 mi (1.2 km) of known maternity roost trees located outside the BCA without further consultation with the USFWS. Selective thinning will not occur within one tree height of the known roost tree to minimize the risk of accidentally felling a known maternity roost during the non-hibernation season. Tree height is based on the average height of the stand (~80 ft (24 m)) surrounding the roost tree. For selective thinning harvests within 0.75 mi of a known maternity roost, all snags and live trees > 16 in DBH that have noticeable cracks, crevices, or exfoliating bark will be retained. Currently, all known Indiana bat roost trees are within the BCA or in Training Area 3. No timber harvests are planned to occur in the Cantonment Area in the next three years. Further consultation will be needed with the USFWS for timber harvests that do not follow this conservation measure.

4. Firewood Cutting Restriction. The known primary roosting areas (those areas behind Guthrie Clinic and Cool Road) have been made off limits to firewood cutting during April 15- October 15. Although firewood harvest only removes trees that are lying on the ground, this restriction will help avoid any associated noise or disturbance in the roosting areas from chainsaws and/or tractors used in the harvest of the wood.
5. Time of Year Restriction. A time of year restriction for clearing trees (> 4 in DBH) has been established to protect roosting bats during non-hibernation seasons. Felling of trees must take place between October 15 - April 15 while most Indiana bats are at the hibernaculum with the exception of 500 ac (202 ha) of early successional forests or conifer forests north and east of US Military Highway which may be harvested between August 15 - October 14. This will reduce the risk of accidentally harming Indiana bats that may potentially be present in trees scheduled to be removed. Specifically, the known maternity colony and any associated non-volant young will be protected from this disturbance.
6. For timber harvests that may occur in August -October, all snags will be left standing and an adequate amount of live residual trees will be left around each snag to minimize the effects of windthrow. In addition, live trees that are >16 in DBH that have noticeable cracks, crevices, or exfoliating bark will not be felled and also have adequate amounts of live residual trees surrounding it to minimize windthrow. This conservation measure seeks to reduce the risk of felling a tree with roosting Indiana bats.
7. Snag Retention. Indiana bats select areas that have high snag densities for establishment of maternity colonies, so snag retention will benefit roosting Indiana bats by providing areas to rear young. All snags will be left in silvicultural treatments unless there is a safety concern for the contractor, or unless the treatment is a salvage harvest or clearcut. Snags should be distributed and retained throughout the landscape. At a minimum, contractors are required to leave a minimum of three snags > 9 in DBH every five acres for all silvicultural treatments. Two snags must be "hard" (i.e., a snag expected to stand for a number of years and more than likely has exfoliating bark) and one snag must be "soft" (i.e., a snag that may or may not have exfoliating bark and has the potential to fall within a couple of years).
8. No cutting of trees will occur within or along the bed or bank of streams protected under Article 15 of the New York State Environmental Conservation Law unless required to meet specific management goals and only after obtaining a permit from NYSDEC.
9. A minimum of 70 sq ft of residual basal area, all snags, and all live trees > 16 in DBH that have noticeable cracks, crevices, or exfoliating bark will be retained around all perennial streams and open waterbodies (2 ac or greater in size) on Fort Drum. A perennial stream is defined as having flowing water year-round during a typical year. The water table is located above the stream bed for most of the year. Groundwater is the primary source of water for stream flow. Runoff from rainfall is a supplemental source of water for stream flow. If silvicultural treatments are needed that do not meet this conservation measure and that do not have a "no effect" determination, then individual consultation will be required with the USFWS. This buffer protects water quality and provides foraging habitat for Indiana bats. Indiana bats are known to utilize riparian corridors that have suitable vegetative cover for foraging and for roosting in nearby trees (Garner & Gardner 1992).

10. For annual reporting purposes, the Forest Management Program will provide shapefiles of harvested areas, vegetative cover types pre- and post-harvest (within a scaled map), and the harvesting method used (i.e., clearcut, selective thinning of 50% of aspen under 4 in DBH, etc) to Fort Drum's Fish and Wildlife Management Program. This information will be used to describe the vegetative cover types and habitat modification on Fort Drum and will be reported annually to the USFWS.

2.3.3 Effects to Indiana Bats

2.3.3.1 Direct Effects

Hibernation

No hibernacula are known to exist on Fort Drum, and the nearest known hibernaculum to Fort Drum is 6.5 mi (10.5 km) away. Therefore forest management activities are not anticipated to have any known direct effects on hibernating Indiana bats.

Roosting

Spring/Summer Tree Clearing

No tree clearing will occur before 15 August to avoid impacts to non-volant pups. In addition, because most tree clearing will occur from October 15 – April 15 when most Indiana bats are absent from the installation, the potential to remove a summer maternity roost with large numbers of Indiana bats present is unlikely. Additionally, although other projects (e.g., Interstate 81 Connector) have identified some individual Indiana bats roosting both within and outside the boundaries of the Bat Conservation Area, all but 7 of 120 summer roosts found from Fort Drum-initiated studies have been located inside the Bat Conservation Area. Because all known primary and most secondary roosts fall within the BCA, the potential for timber harvests to directly affect maternity colonies with non-volant young is unlikely and effects are discountable.

Fall Tree Clearing

Studies conducted on Fort Drum (2007-2010) have documented the presence of 13 (6 juvenile females, 3 adult males, 2 adult females, and 2 juvenile males) roosting and foraging Indiana bats utilizing the Cantonment Area later than August 15 (ESI 2008b, USFS 2011). One juvenile female was present on Fort Drum until October 10 and was subsequently tracked to the Glen Park hibernaculum, where it presumably spent the winter (ESI 2008b). Two other Indiana bats (1 juvenile female, 1 adult male) were present on Fort Drum until at least October 2, one adult male was present until at least October 8, and one adult female was present until at least October 12. Unfortunately, it is unknown whether these four bats left Fort Drum for the hibernaculum on their last recorded date or whether the transmitters fell off or their batteries died. In total, 62 fall roosts were located after August 15 within the Cantonment Area during surveys in 2007-2010, and 16 of these roosts were located between October 1 and October 12 (ESI 2008b, ESI 2011, USFS 2011). Five years of radio tracking female and male juvenile and adult Indiana bats has documented approximately 95% (113/120) of all roosts, including all fall roosts in the BCA or off-post. Given the conservation measures established for the BCA and timber harvesting, known fall roost locations/areas would not be cleared during timber harvests. Therefore, Indiana bats that use the BCA for fall roosting will not be adversely affected by timber harvests.

Still, the possibility exists that timber harvests may occur in undiscovered Indiana bat fall roosting areas during October. Undiscovered roost locations that may be present outside the BCA and within timber harvests could potentially be adversely affected by cutting activities if roosts are removed before all Indiana bats have returned to the hibernaculum.

The likelihood of this happening is small. It is assumed fall swarming activities are mostly completed by October 15 of any given year primarily based on the drop in temperatures experienced in this area of northern New York. Over an 11 year period from 2000-2010, the average minimum temperature on Fort Drum from October 1 – October 15 was 44 °F (6.7 °C), with 18 out of a possible 165 days (or on average 1.6 out of every 15 days) during that period dropping to or below freezing at night. Conversely, during the same period in 2000-2010, from October 16 – October 31, the average minimum temperature was 38 °F (3.3 °C), with 54 of a possible 176 days (or on average 4.9 out of every 16 days) during the period dropping to or below freezing. Additionally, from November 1 – November 15, the average minimum temperature on Fort Drum was 33.8 °F (1 °C), with 80 of a possible 165 days (or on average 7.3 out of every 15 days) during the period dropping to or below freezing (Fort Drum, unpublished data). It would be unlikely that bats would still be active in the landscape after October 15, given the lack of insect abundance that would be present and the energy that it would require to adequately deal with these low temperatures.

In order to minimize soil disturbance, erosion, and water quality, the Forest Management Program may need to harvest up to 500 ac (202 ha) total (between 2012- 2014) of early successional and/or mixed hardwood/conifer forests in the Training Area during the time of year bats may be present on the property (August 15 - October 14). It is expected that the average patch size that may be harvested would be 50 ac (20 ha) per site and the maximum patch size will not exceed 200 ac (81 ha) per site. No more than 500 forested ac (202 ha) over the 3 year period would be cut and harvest would now only occur north and/or east of US Military Highway to minimize potential impacts to Indiana bats. All Indiana bats present on the installation after August 15 are volant and should be capable of flying from a roost tree during disturbances. In addition, a conservation measure, retaining all snags and live trees > 16 in DBH with noticeable cracks, crevices, or exfoliating bark will be implemented. The majority of all Indiana bat roosts found on Fort Drum has been in snags with a few in dead tree limbs. This conservation measure attempts to minimize the likelihood that a roost tree, particularly with multiple Indiana bats, will be felled. Further, there are no known roost sites within approximately 12 km of US Military Highway, and no Indiana bats have ever been captured north and/or east of this highway. To ensure that this information stays up to date, Fort Drum will also monitor for the presence of Indiana bats prior to any cutting and will follow protocols established above. Therefore, cutting this acreage north and/or east of US Military Highway between August 15-October 14 may affect, but is not likely to adversely affect Indiana bats.

Noise

Noise is likely to be a by-product of all timber harvests, however, to our knowledge, no study has analyzed the impacts of timber harvest noise on bats. However, Callahan (1993) noted that bats abandoned a primary roost when a bulldozer cleared brush adjacent to the tree. But there is also evidence of Indiana bat tolerating noise. For example, a primary maternity colony identified along I-81 in Jefferson County did not appear to be affected by noise from travelling vehicles (USFWS 2008). Because the noise will not be continuous, such as with highway traffic noise, and because harvesting equipment and falling trees are likely to cause heavy vibrations, Indiana bats that are within the harvest site or adjacent to the harvest site may

abandon the roost site temporarily. However, timber harvests conducted within the known range of the maternity colony will occur between October 15 - April 15, so the likelihood that Indiana bats will be present and disturbed by noise is low. Additionally, based on the comparatively higher number of roosts that have been documented in the fall per bat on Fort

Drum (see *Section 1.5 Indiana Bat- Fort Drum*) it does not seem that bats exhibit the same level of site fidelity to roost trees as they may during the maternity season. Therefore, noise from timber harvests may affect, but is unlikely to adversely affect Indiana bats from the known maternity colony.

Firewood permits are issued for dead and downed timber only. Indiana bats are not known to use fallen timber for roosts (primary, maternity, or singly), thus it is unlikely that firewood cutting will result in injury or mortality to Indiana bats. Noise from chainsaws and equipment used to move firewood (i.e., tractors, trailers, etc.) has the potential to disturb roosting Indiana bats during spring, summer, and fall seasons. Callahan (1993) noted that the likely cause of bats in his study area abandoning a primary roost tree was disturbance (i.e., potentially noise, vibrations, exhaust) from a bulldozer clearing brush adjacent to the tree. However, there is also evidence of roosting Indiana bats tolerating various levels of noise. For example, a primary maternity colony identified along I-81 in Jefferson County did not appear to be affected by noise from travelling vehicles (USFWS 2008). Firewood cutting is unlikely to occur near the known primary roosting areas (those areas found behind Guthrie Clinic or Cool Road), as these areas have been made off limits to firewood cutting during April 15 – October 15. Although cutting may potentially occur near satellite roosts of the the known maternity colony on Fort Drum, and the noise or vibrations may result in short-term disturbance to Indiana bats potentially resulting in the temporary abandonment of a roost. This activity should not have any long term impacts to bats. Therefore, the potential effects of firewood cutting are discountable.

Foraging

Forest management activities are anticipated to have no direct effects to foraging Indiana bats. Forestry actions are not expected to occur in the evening, during the night, or in the early morning when Indiana bats are active, so foraging Indiana bats are unlikely to be directly affected by timber harvests. Therefore, no known direct effects to foraging Indiana bats are anticipated to occur.

2.3.3.2 Indirect Effects

Hibernation

No hibernacula are known to exist on Fort Drum, and the nearest known hibernaculum to Fort Drum is 6.5 mi (10.5 km) away. Therefore, forest management activities are expected to have no known indirect effects to hibernating Indiana bats.

Roosting

Unlike construction, forest management actions are not designed to result in the permanent loss of habitat. In fact, forest management has potential to provide long-term beneficial effects for Indiana bats with short-term negative effects.

Harvesting for training purposes generally encourages growth of large diameter trees, which may lead to future recruitment of large diameter live trees and snags for Indiana bat maternity

colonies in new areas. Additionally, harvesting for training creates a forest structure that has minimal understory. As the large diameter trees die, the newly created snags will receive large amounts of sunlight due to the distance between large trees. Indiana bats may benefit from this harvesting scenario as they most often select roosts that are exposed to solar radiation and have few understory trees (Kurta et al. 1993, Kurta et al. 2002). Although long-term training in these forest stands may suppress forest regeneration, the Forest Management Program is aware of the concern and appropriate measures will be taken to remedy the situation.

Harvesting for timber production/forest health using uneven-aged harvesting may reduce some trees in an area immediately, but will allow remaining trees to grow to a large size which will potentially provide additional roosting habitat for Indiana bats. Due to the conservation measures in place, snags will be retained for future roost sites. Managing forests for timber production/forest health on Fort Drum is unlikely to adversely affect (indirect) roosting habitat for Indiana bats.

Harvesting for early successional wildlife habitat is conducted in areas composed of mature early successional species—trees typically not associated with ideal Indiana bat habitat. These early successional forests are characterized by a dense forest structure and smaller trees, which are not optimal for Indiana bat roost locations, but may be beneficial for foraging. In the long-term, a mosaic of forest types and structures across the landscape will benefit Indiana bats by providing a variety of foraging and roosting opportunities.

Firewood permits are issued for dead and downed timber only. Indiana bats are not known to use fallen timber for roosts (primary, maternity, or singly), and firewood cutting is off limits in the known primary roosting areas. Thus firewood cutting is expected to have no known indirect effects to Indiana bats.

No forest management actions are planned within the Cantonment Area in the next three years, so no known impacts (indirect) to roosting Indiana bats in this area are anticipated. However, forestry actions are planned within the range of the known maternity colony (Figure 2.13). Timber harvesting in these areas may alter the forest structure and composition, which could impact Indiana bats either positively or negatively. Depending on harvest methods, remaining snags could become more exposed to incremental weather (i.e., winds, snow) and therefore more susceptible to falling, however they could also become more exposed to solar penetration, making them more attractive and suitable for use by bats. Timber harvesting could inadvertently remove an undiscovered roost, which can negatively impact Indiana bats, however, harvesting may open the understory of the stand, improving potential utilization of that forested area for movement. The removal of woodlands or previous roost sites during winter hibernation may cause additional stress after Indiana bats emerge in the spring since Indiana bats must find new roost locations. Research has suggested that big brown bats (*Eptesicus fuscus*) may suffer more than a 50% decline in reproductive success when excluded from a maternity area (Brigham & Fenton 1986). By needing to find new roosts, Indiana bats may be further stressed after hibernation which may result in lower reproductive success. However, 95% of all known roosts that have been found over the past 5 years have been located in the BCA or off post in the lands of the Town of LeRay. The closest known Indiana bat roost is approximately 4,500 m away to the nearest timber harvest. Although Indiana bats have been found in the Training Areas as far as Training Area 8, each bat has been tracked back to the known maternity use area in the BCA. Additionally, conservation measures are in place to protect known maternity roosts and areas surrounding known maternity roosts, and to minimize overall potential roost loss. Snags are to be retained in most timber harvesting activities ensuring available roost sites throughout the installation where ample forests remain for

foraging and roosting bats. All of these measures help to minimize potential adverse effects to Indiana bats. Therefore, timber harvesting may affect, but should not adversely affect Indiana bats.

Overall, forest management actions could have some positive and some negative indirect effects to Indiana bats and their roosts if large amounts of habitat were removed over a large area at one time and if snag recruitment was low. However, timber harvests are not expected to exceed 2,295 ac (929 ha) in the next three years and are spread over the entire installation. No documented roosts will be impacted by forest management actions, no harvests will occur within the BCA, and the closest harvest to a known roost tree is 4500 m away. With ample acreage of forested habitat available and given the conservation measures, it is unlikely that there will be a significant loss of potential current or future roosting habitat. Thus, the cumulative loss of potential roosting habitat is likely to be insignificant. Given that all known roosts are currently permanently protected, forest management activities will not remove any documented roosting habitat and will remove a small percentage of potential or future roosting habitat available to the maternity colony, we do not anticipate Indiana bats to be impacted by the loss or modification of approximately 2,300 ac (930 ha) of forests through forest management actions.

Foraging

Even-aged management, such as clearcuts could potentially have a negative temporary impact on Indiana bats if conducted over a large area. Indiana bats are known to forage near forest edges and within forest interiors (Menzel et al. 2001). Initially, creation of large open areas would create areas that Indiana bats avoid and could cause them to alter their foraging into nearby forests. Shifts in foraging could increase time and energy spent foraging. This is of particular note in the spring when Indiana bats are emerging from hibernation with low body weights and are under stress due to pregnancy and relocation to summer roosts. Additional stress could lead to lower reproductive success, increase risk to disease and/or predation, or result in death.

Regardless of the potential temporary negative impact, Fort Drum has ample vegetative cover throughout the Training Areas suitable for foraging by Indiana bats, and there are no documented foraging locations within 4,500 m of the closest timber harvest. Additionally, the majority of the documented foraging area for the maternity colony is permanently protected in the BCA. Because of the amount of available natural habitat throughout the installation, the amount of permanently protected foraging area, and the fact that no timber harvest is planned within 4,500 m of the known colony, even-aged management may affect, but is unlikely to adversely affect Indiana bats. Effects are discountable.

Smaller stands harvested under even-aged management is beneficial for a variety of shrub and early forest species, and it can provide habitat that promotes a diversity of insects (e.g. Werner & Raffa 2000). Indiana bats may also benefit from the available abundant food source and from the creation of edges between forest types. Eventually, high tree density in areas of even-aged management may impede bat flight and increase energetic costs associated with foraging. However, harvesting some trees in a stand that has been regenerated by even-aged methods (e.g. thin from below) can reduce the density of trees on site, and encourage healthier, larger individual trees (Spurr & Barnes 1980). Thinning from below is a standard method used for even-aged management on Fort Drum, because it opens up more forest for military training, a primary goal on Fort Drum. With the opening of dense forest structures and the presence of a

variety of habitat types needed for insect production, Indiana bat foraging areas are unlikely to be negatively impacted by even-aged forest management activities and effects to Indiana bats from these actions are discountable.

Uneven-aged management will create forest openings for the benefits of Indiana bats. Uneven-aged management retains many trees and opens the forest structure. These aspects may be beneficial to Indiana bats as more solar radiation may reach potential roost sites. Thus uneven-aged management is unlikely to negatively impact Indiana bats and is discountable.

Although decreased water quality may lead to declines in insect diversity and abundance (Hilsenhoff 1982), as well as drinking water, the conservation measures in place for forest management activities should not increase sediment run-off, damage stream banks, or leak fuel or oil into aquatic ecosystems. In the unlikely event that contamination does occur, the impacted area will be small in size and ample water sources are available throughout Fort Drum for Indiana bats and their prey. Therefore, Indiana bats are not likely to be adversely affected by water quality impacts from forest management actions and effects are discountable.

Some timber harvests are located within the foraging area of the known maternity colony. These timber harvests could temporarily shift Indiana bat foraging behavior to adjacent woodlands. However, due to the amount of available habitat and time of year restrictions for cutting trees, the impact to foraging bats is discountable in the short-term and ultimately positive in the long-term. Timber harvests may alter the components of a forest resulting in a diversity of forest types and structure. The diversity of forest types and structures may be beneficial to Indiana bats. Indiana bats utilize a variety of forest types and structure for foraging (Menzel et al. 2001). Studies have shown that bat activity is highest along edges and within forest openings, and Indiana bats are known to use gaps in the forest (Crampton & Barclay 1998; Menzel et al. 2001). Owen et al. (2004) noted *Myotis* spp. activity was higher in closed canopy forests and lower in open habitats. In general, the effects of forest management activities (during the hibernation season) are discountable, if not actually beneficial, for foraging bats as long as adequate forest habitat remains.

On Fort Drum, up to 1,300 ac (2,295 acres planning for contingencies) of timber may be harvested over the next three years. Clearcuts are not expected to exceed 300 ac (121 ha) in size and will be distributed throughout the installation. Ample forests of varying size classes and types are present in the Training Areas and are adjacent to proposed timber harvest units. Thus, sufficient habitat is available nearby for foraging bats. Clearcuts and other timber harvest could temporarily cause a shift in foraging behavior of Indiana bats, however, overall long term impacts could also be positive for foraging bats as areas are opened up. Regardless, given the amount of natural habitat remaining, the effects are expected to be discountable.

2.3.4 Conclusion

Forest management on Fort Drum is expected to benefit Indiana bats in the long-term by manipulating the structure, species composition, and ages of forests. Although tree harvesting may temporarily reduce optimal roosting and foraging habitat, based on the type of silvicultural treatment, the area may actually become more suitable for foraging or roosting over a longer period of time. Conservation measures such as time of year restrictions, snag retention and recruitment, and avoidance of known bat roosting and foraging locations, as well as the vast size of Fort Drum and available forests, reduces potential impacts to Indiana bats when performing forest management actions after October 14. Although some forestry actions will

occur during the time of year Indiana bats are present on the property, these actions are greater than 12 km away from known roosting. No Indiana bats have been captured in the areas that

in-season harvesting could occur. Regardless, these sites will be monitored prior to harvests for the presence of bats. Given this information and conservation measures that will be employed, potential impacts to Indiana bats from in-season harvests should be minimal. These actions may affect, but should not adversely affect Indiana bats.

2.4 Mechanical Vegetation Management

2.4.1 Mechanical Vegetation Activities

Fort Drum does not anticipate that there will be any significant change from the amount, type, and/or duration of mechanical vegetation management that was previously analyzed in the 2009-2011 BA that will occur on Fort Drum over the next 3 years. Therefore, we affirm that the effects analysis and conservation measures are appropriate from the previous BA. Please see Appendix A for more information. There is only one change to the conservation measures required for the implementation of this BA. This change to Conservation Measure # 1 should not have any impact on the analysis or implementation of this particular section.

2.4.2 Conservation Measures for Vegetation Management Activities

1. Time of Year Restriction for Tree Falling. A time of year restriction for clearing trees (> 4 in DBH) and removing low- to medium-risk hazard trees has been established to protect roosting bats during non-hibernation seasons. Felling of trees must take place between October 15 - April 15 while most Indiana bats are at the hibernaculum. This will greatly reduce the risk of accidentally harming Indiana bats that may potentially be present in trees scheduled to be removed. Specifically, maternity colonies and their associated non-volant young will be protected from this disturbance.
2. Roost Tree Protection. No female roost trees, including roosts identified in the future, will be removed unless determined to be high risk hazard trees (see #3 below). Hazard trees that are not considered high risk, will be removed during the winter. Roost trees may not be removed for any other reason (e.g., aesthetically unappealing).
3. High Risk Hazard Trees. For hazard trees that are determined to be high or critical classified between April 16 – October 14, Fort Drum's Fish and Wildlife Management Program personnel will be notified in advance, so they may assess the hazard tree. If appropriate, an emergence survey will be conducted and if no bats are observed, then the roost tree will be promptly removed. This will reduce the risk of removing an undiscovered roost tree. If bats are observed, then further consultation with the USFWS is needed.
4. Reporting. Personnel responsible for each vegetation management action must provide a scaled map of the treated area, specify the type of management action that occurred, report the total acreage of impacted habitat, and the vegetative cover types that were managed (i.e., number of hazard trees removed, amount of shrubland habitat cleared) to Fort Drum's Fish and Wildlife Management Program for annual reporting requirements to the USFWS. Mowing of landscaped grass in the Cantonment Area does not need to be documented.

2.4.3 Effects to Indiana bats

Please see Appendix A for the effects analysis for Mechanical Vegetation Management.

2.4.4 Conclusion

In general, given the size of Fort Drum and abundant natural habitats, vegetation management on Fort Drum may affect, but is not likely to adversely affect Indiana bats with the time-of-year restriction for clearing of most trees. Vegetation management of grass, shrubs, and trees < 4 in DBH has the potential to alter insect diversity and possible abundance, however, given the vast amount of natural areas remaining, Indiana bats may be affected but are unlikely to be adversely affected.

2.5 Prescribed Fire

2.5.1 Prescribed Fire Activities

Fort Drum does not anticipate that there will be any significant change from the amount, type, and/or duration of prescribed fire activities that were previously analyzed in the 2009-2011 BA that will occur on Fort Drum over the next 3 years. Therefore, we affirm that the effects analysis and conservation measures from the previous BA remain appropriate. Please see Appendix A for more information.

2.5.2 Conservation Measures for Prescribed Fire Activities

1. Development and Implementation of the Prescribed Fire Plan. Protocols are established within the prescribed fire work plans to closely control where, when, and how fires are set. This helps to control where flames and smoke occur on the landscape. Because both flames and smoke could negatively impact Indiana bats, it is important to try and minimize potential impacts from both. Currently, no known maternity areas are known to exist within close proximity to any of the burn units, however, if new maternity roosts are discovered near proposed burn sites, then burn plans may be written to include additional provisions that protect maternity roosts by diverting smoke or flames from the roost, when possible.
2. Wet Lines. Wet lines will be established around forested areas to preclude fire from entering, to the maximum extent practicable.
3. Time of Year Restriction. No burning may occur from May 15 - September 15 to prevent smoke and possible fires from penetrating forested areas where non-volant young bats may be present. Therefore, even if a prescribed fire enters a forested area, there should be no non-volant young present.
4. Time of Day Restriction. Whenever possible, all efforts will be made to have all flames extinguished and smoke generation minimized by sunset to reduce potential direct impacts to foraging Indiana bats.

5. Record-keeping and Reporting. For annual reporting purposes, all entities responsible for prescribed fire activities on Fort Drum will submit electronic shapefiles of prescribed fire limits to Fort Drum's Fish and Wildlife Management Program. This information will be used to describe vegetative cover types and habitat modification on Fort Drum and reported annually to the USFWS.

2.5.3 Effects to Indiana bats

See Appendix A for the detailed effects analysis for prescribed fire activities. Fort Drum no longer asserts that there would be impacts to an undiscovered maternity colony (see Section 1.5 Indiana Bat-Fort Drum), therefore any potential impacts for the next three years are only to the known maternity colony.

2.5.4 Conclusion

Prescribed fire may affect, but is not likely to adversely affect the Indiana bat given the time-of-year restrictions, distance to known roosts, and habitat types likely to be burned. In summary, we would not expect any Indiana bats to be exposed to smoke, heat, etc. associated with prescribed fire. Roosting and foraging habitats will not be negatively impacted and may actually benefit from the use of prescribed fires.

2.6 Pesticides

In this section, pesticides used on Fort Drum to control vegetation and invertebrates are assessed.

2.6.1 Pesticide Activities

Pesticide use on the installation is regulated by a variety of federal and state laws, Department of Defense directives (DoD Instruction 4150.07), and Army Regulations (AR 200-1), as well as the Fort Drum Integrated Pest Management Plan (Fort Drum 2008). All pesticide applications must be done in accordance with label instructions.

Government employees who apply or oversee the application of pesticides are DoD-certified for pesticide application. Certified personnel are recertified every three years. Installation pest management personnel will be certified in the appropriate EPA categories forest pest control (EPA category 2), ornamental and turf pest control (EPA category 3), aquatic pest control (EPA category 5), right-of-way pest control (EPA category 6), industrial, institutional, structural and health-related pest control (EPA category 7), public health pest control (EPA category 8), and aerial application (EPA category 11). Contractor personnel performing pest management services on Fort Drum are certified by the State of New York in the appropriate categories for which work is performed.

All pesticide products, except for those sold over the counter or used by Field Sanitation Teams, go through an annual review and approval process by the pest management staff at the Army Environmental Command. Pesticide use that is implemented by individual Fort Drum programs (e.g. Integrated Training Area Management Program) or that will occur on a large scale (i.e., aerial spraying) must undergo review and approval through the NEPA process (Appendix P). Pesticides used along fence lines, utility corridors, or within and around buildings are reviewed generically by NEPA through an Environmental Assessment of the Integrated Pest Management

Plan. The types and amounts of pesticides used are reported to PW-Pest Management and are applied in accordance with the label and with the Integrated Pest Management Plan (Fort Drum 2008). During the NEPA process, potential pesticide actions are analyzed to determine their impacts to wetlands, vegetation, and wildlife. Proper disposal in accordance with the product label will be followed. Fort Drum will minimize the need for disposal by reusing pesticide rinsate, whenever possible.

Vegetation Control

Herbicides are used to control vegetation for the following purposes:

- 1) Prevent woody vegetation encroachment on maneuver areas.
- 2) Remove vegetation on ranges where line-of-sight is impeded for target shooting or along utility corridors where mechanical vegetation control is not possible due to the presence of unexploded ordnance (e.g., ranges and Main Impact Area), uneven or sloped terrain, and/or the size of area.
- 3) Prevent vegetation from sprouting in paved areas, along fence lines, or in developed areas.
- 4) Control of invasive species.
- 5) Research (e.g., comparing tree regeneration between three treatment types).

Herbicides may be distributed via helicopter-mounted, ground vehicle-mounted, backpack, or pull-behind power sprayers. Ground application is the most commonly used method for herbicide application when treatment units are small or scattered, such as shrub clumps within a maneuver corridor, road vegetation, or spot applications to control invasive species. It is used in some forest management activities to selectively kill unwanted trees, in grounds and maintenance to prevent vegetation growth around paved areas or along fence lines, for clearing of select training areas, and a multitude of other small-scale projects. Because herbicides may be selectively/spottily applied, it is difficult to determine an estimated amount of acreage that may be treated via ground applications, however approximate locations are identified in Figure 2.16. Although there is approximately 1,200 ac (486 ha) identified in this coverage, only approximately 100 ac (40 ha) of specific vegetation (e.g., shrubs or invasive plants) within the identified footprints is expected to be treated annually.

Aerial applications are most likely to occur in large treatment units and units that are inaccessible due to unexploded ordnance or other safety concerns (i.e., ranges, Main Impact Area). Between 2009-2011, it was anticipated that up to three applications of herbicides would be aurally applied, primarily over the Ranges and Main Impact Area, for line-of-sight issues. Up to 1,500 ac (607 ha) per year were anticipated to be treated outside the Main Impact Area. However, because of various factors (e.g., amount of training, problems with funding, etc.) aerial application outside the Main Impact Area was only completed in 2009 and 2011 (Figure 2.14), when approximately 15.8 and 2,117 ac were treated, respectively--an additional consultation was completed in April 26, 2011 (Appendix J) to increase the overall acreage per year allowance from 1,500. Approximately 3,697 ac within the Main Impact Area were treated for line of sight control between 2009-2011 (Figure 2.14).

Between 2012-2014 it is anticipated that approximately 2,000 ac (809 ha) per year will be aurally treated outside the Main Impact Area and approximately 2,000 ac (809 ha) per year will be aurally treated within the Main Impact Area (Figure 2.15). All aerial spraying is subject to funding, mission priorities, and other factors, and although approximately 4,000 ac per year are proposed, this number may fluctuate. No aerial applications will occur over the Cantonment Area or Bat Conservation Area without further consultation with the USFWS.

Arthropod Control

Most insect control is conducted in and around buildings or warehouses for human health and safety issues (e.g., fleas, flies, bees), building integrity issues (i.e. termites, carpenter ants), or for nuisance complaints (e.g., ants, cockroaches) (Fort Drum 2008). Refer to Appendix A for a list of potential insecticides that will be used and in what quantities.

Insecticides are primarily applied via hand applications and occur in localized areas. Most insecticides proposed to be used on Fort Drum are not expected to affect Indiana bats because of the limited quantity used, the specific manner of application, the targeted pests, or the location that will be treated. Many insecticides are used in and around food preparation areas or are primarily located indoors. These pesticides are likely to have no effects to Indiana bats and will not be discussed in further detail.

There are three insecticides that merit further discussion due to their potential to affect (indirectly or directly) on Indiana bats. These include Altosid (methoprene), Thuricide (*Bacillus thuringiensis* v. Kurstaki (BTK)), and Summit Bactimos (*Bacillus thuringiensis* v. Israelensis (BTI)). These insecticides are used to control mosquitoes, moths/caterpillars, and general insects. Altosid and Summit Bactimos are applied to standing water (i.e., Remington Pond, storm retention ponds) within the Cantonment Area or in areas near ranges to control mosquitoes in the larval stage (see Material Safety Data Sheets for more information). These pesticides are applied monthly in tablet form during the summer months. Controlling larvae or eliminating the source of mosquitoes are the recommended practices for managing mosquitoes. These insecticides are primarily used to minimize the risk of spreading disease (i.e., West Nile Virus).

Thuricide has not been previously used on Fort Drum, however it may be used in the future to manage for gypsy moths (*Lymantria dispar*) or American tent caterpillars (*Malacosoma americanum*), which can cause significant damage to trees. If aerial application is needed to control these species, then further consultation is needed with the USFWS.

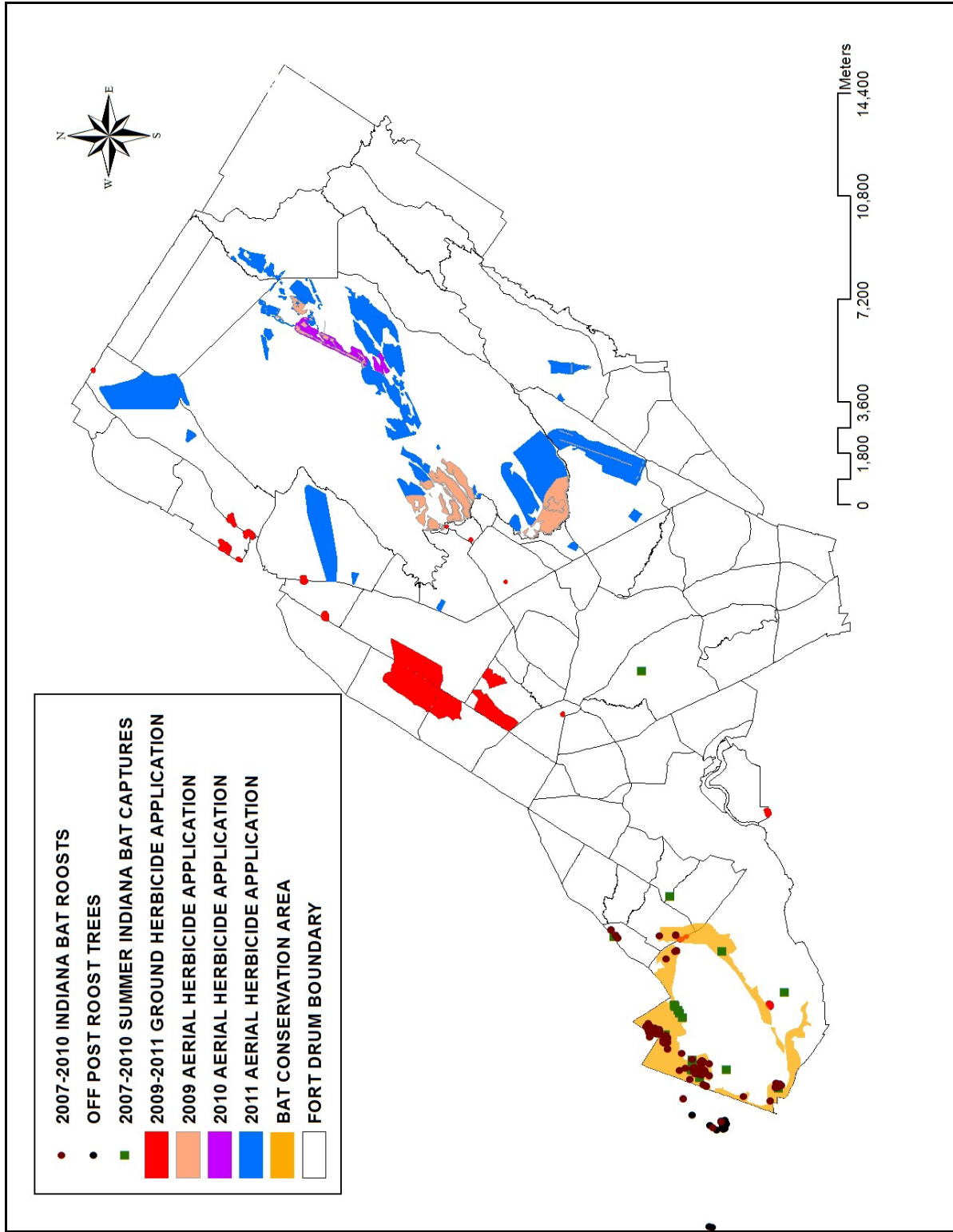


Figure 2.14. Completed herbicide application on Fort Drum Military Installation, 2009-2011.

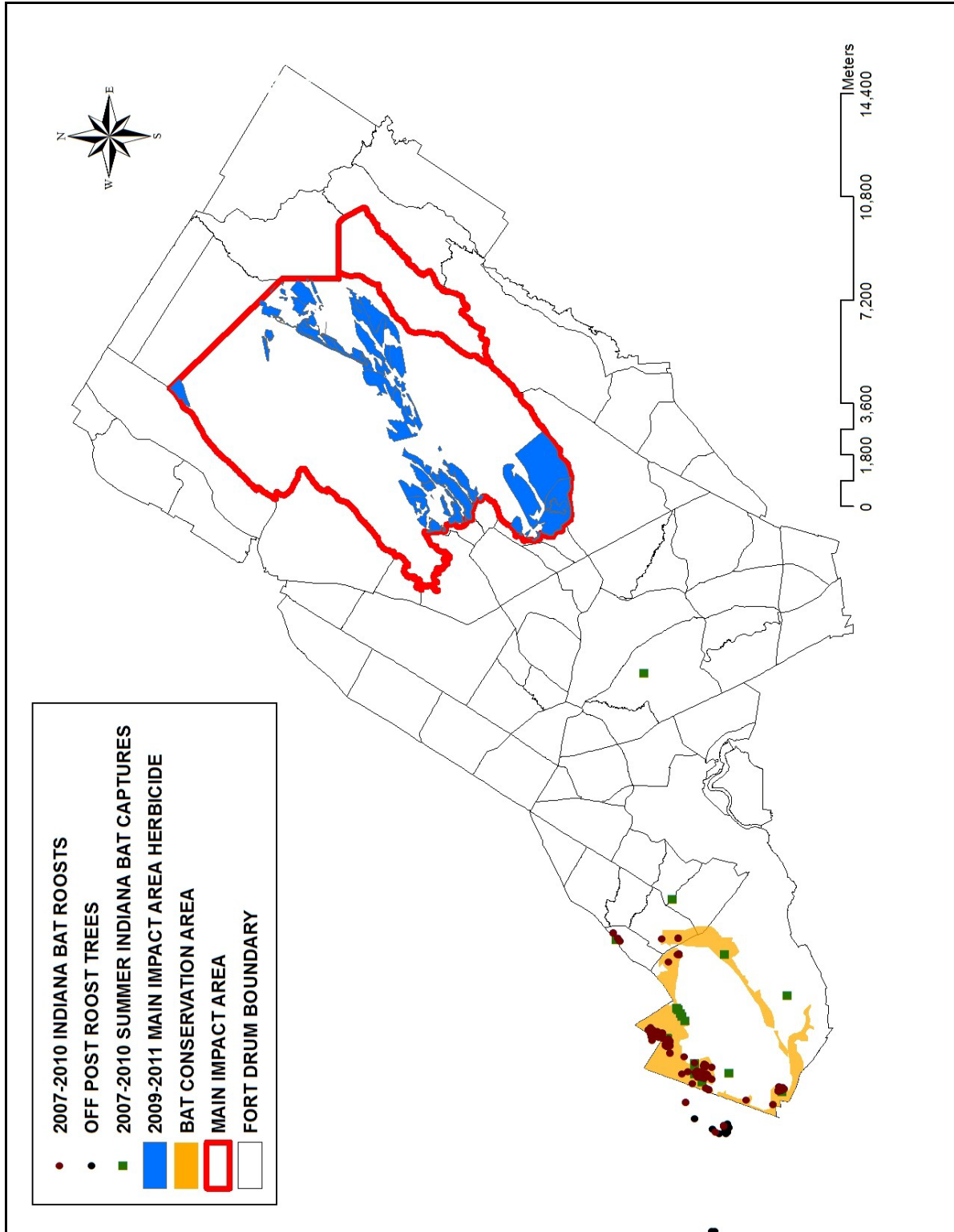


Figure 2.15. Completed herbicide application within the Main Impact Area on Fort Drum Military Installation, 2009-2011.

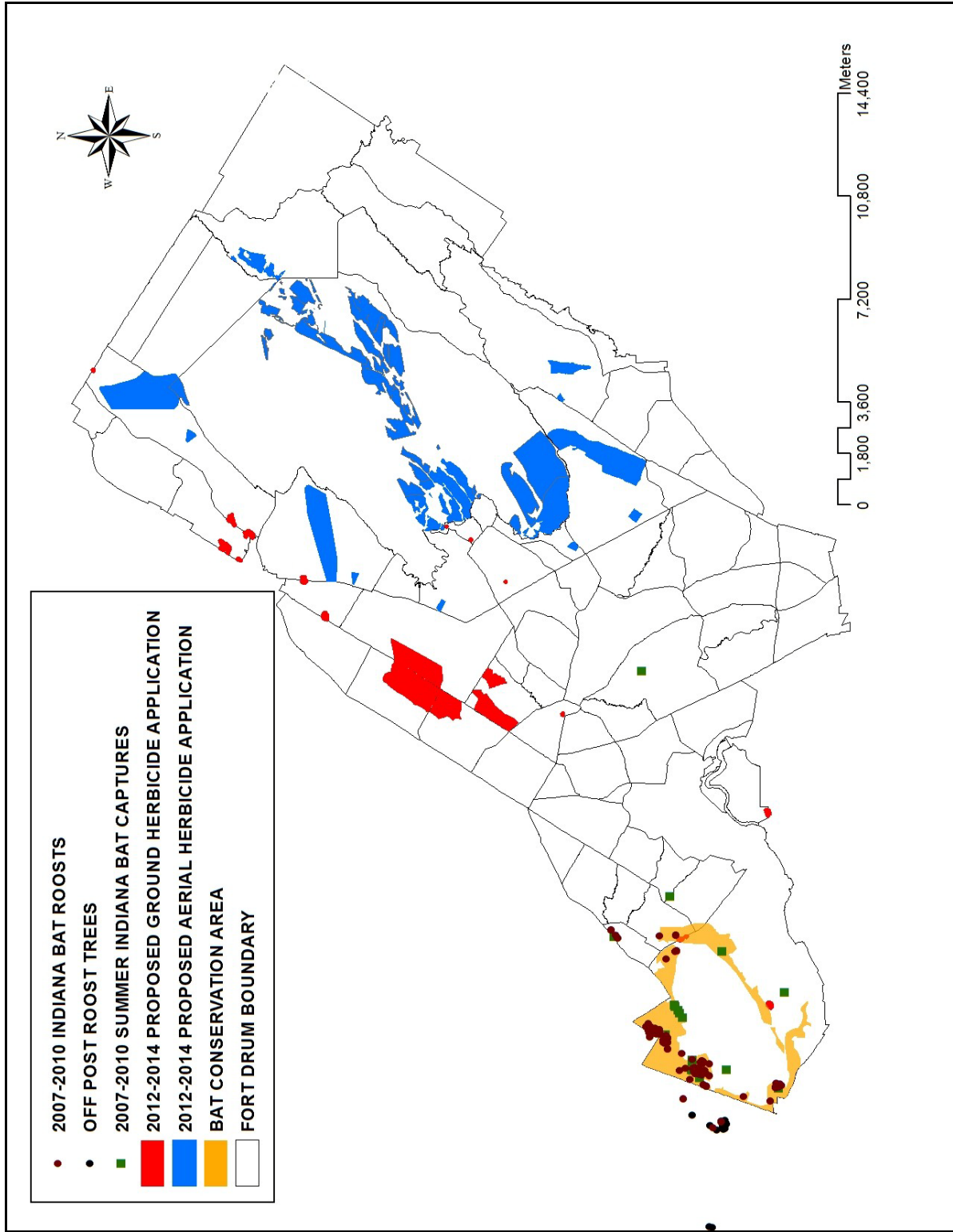


Figure 2.16. Proposed herbicide application locations on Fort Drum Military Installation, 2012-2014.

2.6.2 Conservation Measures for Pesticide Application Activities

1. Only pesticides registered by the EPA and State of New York may be applied and only in accordance with their label.
2. Aerial applications will occur between the hours of sunrise and one hour before sunset. This will protect foraging bats in undiscovered foraging areas from direct exposure.
3. Aerial application of pesticides in the BCA is prohibited without further consultation with the USFWS.
4. Application of pesticides that result in broad dispersal (i.e., vehicle mounted spraying) will be conducted at least 100 ft (30 m) away from known roost trees (including roosts identified in the future) and 250 ft (76 m) from known primary roosts. Pesticides will be applied between sunrise and one hour before sunset. Location-specific applications (i.e. hatchet injections of trees, individual application to specific plants) may be used within 100-250 ft (30-76 m) of known roosts. This measure minimizes the risk of exposure to Indiana bats and potential effects from pesticides.
5. Pesticides will not be applied outdoors when the wind speed exceeds 8 mi/hr. This is to reduce the risk of pesticide drift, which could impact water quality or non-target areas. Care will be taken to make sure that any spray drift is kept away from non-target areas and individuals. Additionally, aerial application would deploy large droplets through special nozzles on drop tubes that ensures the herbicide stays on target better than previous, conventional small droplet size technology.
6. If a bat colony is found roosting in a building, then insecticides will be used sparingly and no foggers will be used. This will minimize impacts to roosting Indiana bats if they are found within a building. Currently, only one colony of bats has been located on Fort Drum. The LeRay Mansion houses several hundred little brown bats according to a survey conducted in 2007. No Indiana bats were identified in the survey.
7. For each pesticide application, Pest Control will report the total amount of PAI used for each pesticide, the size of the treated area (within a scaled map), and the vegetative cover types that were treated to Fort Drum's Fish and Wildlife Management Program for annual reporting purposes to the USFWS. For pesticides applied indoors or immediately along the exterior of the building, only the PAI needs to be reported—no map is required or vegetation types need to be reported.

2.6.3 Effects to Indiana bats

2.6.3.1 Direct Effects

Hibernation

No hibernacula are known to exist on Fort Drum, and the nearest known hibernaculum to Fort Drum is 6.5 mi (10.5 km) away. Therefore, pesticide application activities have no known direct effects to hibernating Indiana bats.

Roosting

Pesticides will be applied during daylight hours when Indiana bats are roosting. Insecticides are primarily applied by hand individually or by hand-held sprayers in and around buildings. Known Indiana bat roosts on Fort Drum have been primarily within snags in woodland areas in the Cantonment Area and in Training Area 3, so insecticides applied within a building should have no effect on known primary or maternity colonies. Also, it is unlikely that insecticides applied indoors will directly affect undiscovered roosting Indiana bats, given the conservation measure that no broad dispersal of insecticides (i.e., no foggers) be applied within a building that has bats. For this reason, indoor insecticide application is expected to have no known direct effects on Indiana bats.

BTK and BTI are bio-pesticides that are bacteria specifically designed for the target pest with minimal non-target impacts (Swadener 1994). BTK and BTI can cause mild skin and eye irritation. The USDA Forest Service conducted a risk assessment for the use of BTK and found that through all means of exposure BTK would not adversely impact terrestrial vertebrates as determined through pesticides analysis with mice (Syracuse Environmental Research Associates 2004a). These bio-pesticides are not known to cause birth defect in mammals and are considered non-carcinogenic (<http://pmep.cce.cornell.edu/profiles/extoxnet/24d-captan/bt-ext.html>). These bio-pesticides are expected to be applied via hand methods in localized areas and will only be applied during favorable weather conditions. This reduces the risk of exposure to Indiana bats, thus further minimizing the low impacts BTK and BTI may directly have on Indiana bats. BTK and BTI may affect, but are unlikely to adversely affect known and undiscovered roosting Indiana bats during the non-hibernation seasons.

Aerial applications of herbicides will typically be conducted during the growing season on ranges and in and the Main Impact Area, which are typically greater than 7.5 mi (12 km), from known roosting locations. All of the acreage scheduled for treatment within the maintained range facility and target areas are mostly areas that have been previously and continually disturbed and consist primarily of grass and shrubs. Therefore the likelihood of spraying potential roost trees is extremely low. Although there is potential roosting habitat within the Main Impact Area, the nearest known roost use to this area is approximately 8.5 mi (13.7 km) away. Regardless, this area is off limits and not accessible to determine any potential use by, or impacts to, Indiana bats. Therefore, while we will consider the potential impacts of drift from applied herbicide to areas outside the Main Impact Area, no additional consideration will be given to potential impacts actually within the Main Impact Area, and it will not be included in any further analysis for herbicide use. With the type of herbicide application currently utilized, the likelihood of drift is extremely low. Large droplets of herbicide is deployed through special nozzles on drop tubes that ensures the herbicide stays on target better than previous, conventional small droplet size technology. This technology, combined with wind speed restrictions during application, reduce the likelihood of drift substantially.

Because of the distance from the colony (greater than 7.5 mi away), the lack of large amounts of suitable habitat within the range areas, and measures to control pesticide drift, the known maternity colony is unlikely to be directly affected by pesticides. Although known roosting and foraging areas are not likely to be directly affected, undiscovered roost locations within the Main Impact Area may be potentially affected by aerial spraying of pesticides, however, there is currently no way to determine this. Regardless, there is small likelihood of this happening, as the closest known use (capture) is still greater than 3.5 mi (5.6 km) away, and all known roosts found over the past 5 years are greater than 8.5 mi (13.7 km) from the nearest aerial application area within the Main Impact Area.

Herbicide applications via ground methods are more controlled. As a conservation measure, no pesticides will be applied within 100 ft (30 m) of known roost trees and 250 ft (76 m) of known primary roosts unless specifically applied to a pre-identified plant or groups of plants; and care will be taken to minimize drift towards roosts. This reduces risk of direct exposure to known Indiana bat roosts and protects both juveniles and adults from chemical exposure. Thus, herbicides applied via ground methods are unlikely to negatively impact known Indiana bat roosts, and thus effects are discountable.

Hand application of pesticides for invasive species or individual unwanted trees within 100-250 ft (30-76 m) of roosts will be applied directly to the targeted plant and will not be broadly dispersed. By direct application, the risk of drift and the risk of exposing roosting Indiana bats to pesticides are minimal. With limited to no contact with herbicides, Indiana bats are not likely to be negatively impacted by herbicides applied within 100-250 ft (30-76 m) and thus effects are discountable.

Although known roosts should not be negatively impacted, there is a possibility that impacts to undiscovered roosting bats from ground dispersal could occur. Undiscovered roosting Indiana bats may inhale or could come in direct contact with pesticides, which could result in mild skin irritations or could contribute to body weight loss if exposed to high levels. There is small likelihood of this happening, however. Given the small amount, type (spraying for shrubs or invasive plants) and proposed locations of most ground application, the likelihood of encountering an unknown roost is unlikely. If spraying did occur around an unknown roost, there should be no direct exposure to the bat, as most roost locations (i.e., where the bats physically roost) are typically greater than 3 m from the ground (Fort Drum, unpublished data), well above where any herbicide would be sprayed from the ground. Additionally, the toxicity ratings of the herbicides to be used on Fort Drum are very low to low for small mammals and the half-lives are relatively short. Herbicides will be applied according to label requirements and will not be applied in excess of what is recommended for a given area. With all these considerations, it is unlikely that undiscovered roosts would be negatively affected. Therefore, Indiana bats may be affected but are unlikely to be adversely affected by herbicides applied via ground application.

Foraging

Foraging Indiana bats are unlikely to be directly affected by pesticides because all pesticides will be applied during the day when Indiana bats are not typically active. The risk of exposure to foraging Indiana bats is not likely given the time of day restrictions in applying pesticides, therefore no known direct effects are anticipated.

2.6.3.2 Indirect Effects

Hibernation

No hibernacula are known to exist on Fort Drum, and the nearest known hibernaculum to Fort Drum is 6.5 mi (10.5 km) away. Therefore pesticide application activities have no known indirect effects to hibernating Indiana bats.

Roosting

Using herbicides in forested areas may indirectly provide additional roosting habitat for Indiana bats on Fort Drum. As trees die, snags are created, with associated exfoliating bark and cavities suitable for use by bats. However, currently the only forested areas where herbicides would be applied in large amounts (i.e., aerial spraying) are in the Main Impact Area. This area currently has no known use by Indiana bats, nor would we be able to document use in the future. If other unwanted trees are killed (e.g., through herbicide injection into individual trees or groups of trees), potential roosts could be created for Indiana bats throughout the installation. Indiana bats utilize areas with high snag densities during non-winter seasons as they are known to be frequent roost switchers. These high snag areas are used by Indiana bats to raise and rear young, so herbicide application could be beneficial to reproductive Indiana bats.

Foraging

Indiana bats are insectivores that may ingest insects that have been exposed to insecticides or herbicides, thus potentially exposing Indiana bats to the effects of bioaccumulation. Bioaccumulation of toxic substances has been a concern for many cave roosting bats, because it has been suggested that toxins may reach lethal levels in a bat's body as its body weight declines during migration or hibernation (Geluso et al. 1981). This is of particular concern for cave roosting bats in New York where white-nose syndrome (WNS) has been reported. White-nose syndrome may compound the effects of pesticides, as it too has been associated with high levels of mortality and low body weights. A combination of chemical toxicity and disease may further increase mortality levels in hibernating bats. Of the pesticides used on Fort Drum, methoprene is the only chemical that has been known to bioaccumulate, however, it has not been documented to bioaccumulate in mammals and showed low toxicity even at high oral doses (Csondes 2004). Subsequently bioaccumulation of pesticides may affect, but is not likely to adversely affect Indiana bats. Effects to Indiana bats are discountable.

Another concern of using pesticides is the loss of potential prey for Indiana bats. Decreased prey after spring migration and before fall migration may further stress traveling individuals, including reproductive females. Additional stress could result in reduced body weight gain during pregnancy and before entering hibernation. Lower weight gain raises the risks of pup mortality in the spring/early summer and the risk of mortality during hibernation. Indiana bats may expend extra energy searching for food if insect levels are not adequate for the population in the area. On Fort Drum, insecticides and some of the proposed herbicides have the potential to cause mortality in both aquatic and terrestrial invertebrates. Most insecticides applied on Fort Drum will be used in small doses and applied to localized areas, BTI typically targets dipterans and BTK is used to control lepidopterans, both known prey of Indiana bats. These insecticides are expected to be selectively applied in areas near known and undiscovered foraging areas. Because of the small scale application, these insecticides may reduce some insect abundance, but not of sufficient numbers to result in noticeable effects to the food web. Additionally, the majority of known foraging areas will not be treated with insecticides, thus proposed insecticides to be used on Fort Drum are unlikely to adversely affect Indiana bats and effects are discountable.

When applied in accordance with the label, herbicide impacts to aquatic invertebrates and other non-target organisms should be minimized. Because all pesticides will be applied in accordance with their label and because of the relatively low toxicity to invertebrates, herbicides proposed for Fort Drum are unlikely to have adverse effects on potential prey for the Indiana bat, thus effects to Indiana bats are discountable.

2.6.4 Conclusion

The closest known roosting areas are greater than 7.5 mi (12 km) away from any planned aerial application of herbicide on the range areas and Main Impact Area, and there is limited suitable roosting habitat in the range areas. These herbicides are only sprayed a few times a year, and would not be sprayed at night. Thus, the likelihood of direct exposure to Indiana bats is discountable. Pesticide application is not anticipated to reduce any prey within known or unknown foraging areas. There are adequate foraging locations throughout Fort Drum. Given these considerations and the proposed conservation measures, the use of pesticides may affect, but is not likely to adversely affect the known Indiana bat colony on Fort Drum.

2.7 Wildlife Management/Vertebrate Pest Control

2.7.1 Wildlife Management/ Vertebrate Pest Control Activities

Fort Drum does not anticipate that there will be any significant change from the amount, type, and/or duration of wildlife management/vertebrate pest control management that was previously analyzed in the 2009-2011 BA that will occur on Fort Drum over the next 3 years. Therefore, we affirm that the effects analysis and conservation measures from the previous BA remain appropriate. Please see Appendix A for more information.

2.7.2 Conservation Measures for Wildlife Management/Vertebrate Pest Control Activities

1. No Lethal Control. No lethal control methods are permitted for bats unless there is a suspected human health risk for exposure to rabies or other disease. If individual bats are in buildings and there is no evidence of maternity use, then all efforts will be made to safely capture and release individual bats. Or, the bats will be excluded by establishing one-way valves over the roost's exit (if feasible).
2. Time of Year Restriction for Exclusion. The exclusion will only be done during times of the year when pups are not present or when they are volant (i.e., August - early May). The time of year restriction will minimize the risk of separating mothers from non-volant young, so it will prevent potential pup mortality during exclusion activities. Sealing cracks and crevices in buildings will also be done during the late fall or early spring. This is based on the assumption that no bats hibernate in buildings on Fort Drum, which is a valid assumption given the narrow temperature requirements necessary for hibernating bats and the heating of buildings (Tuttle & Kennedy 2002) and the fact that no bats have been found hibernating in buildings to date. Sealing cracks and crevices prevents bats from entering a building and reduces human/bat conflicts.
3. Adhesive Trap Restrictions. No adhesive traps used for rodents or insects will be placed in such a manner that they could capture bats—glue traps will not be placed in any crawl space or attic compartment within buildings or in areas where bats are known to occur.

2.7.3 Effects to Indiana bats

Please see Appendix A for the detailed effects analysis that was performed for the 2009-2011 BA. Fort Drum does not anticipate any change in activities that would require any change to the analysis.

2.7.4 Conclusion

With conservation measures in place, wildlife management/vertebrate pest control activities may affect, but are not likely to adversely affect Indiana bats.

2.8 Outdoor Recreation

2.8.1 Outdoor Recreation Activities

Fort Drum does not anticipate that there will be any significant change from the amount, type, and/or duration of outdoor recreation that was previously analyzed in the 2009-2011 BA that will occur on Fort Drum over the next 3 years. Therefore, we affirm that the previous BA analysis is appropriate. Please see Appendix A for more information.

2.8.2 Conservation Measures for Outdoor Recreation Activities

1. Skeet Range. Skeet shooting at the current skeet range is located adjacent to the BCA and fires over a known fall, summer, and assumed spring foraging location of Indiana bats. From April 15 - October 15, the skeet range's hours of operation will be no earlier than 30 minutes after sunrise and no later than one hour before sunset. This measure will prevent the accidental shooting of an Indiana bat during the non-hibernation seasons.

2.8.3 Effects to Indiana bats

Please see Appendix A for the detailed effects analysis that was performed for the 2009-2011 BA. Fort Drum does not anticipate any change in activities that would require any change to the analysis.

2.8.4 Conclusion

Only ATV use, hunting, and skeet shooting are expected to have any potential impacts to Indiana bats. However, because of the current restrictions for ATV use, the timing and nature of hunting, and the Conservation measure for skeet shooting, these recreational activities may affect but are not likely to adversely affect Indiana bats. Please see Appendix A for additional information.

3.0 Conservation Activities

Conservation measures for each action are in the appropriate section throughout *Section 2.0*. (A complete list of conservation measures and other beneficial actions from *Section 2.0* can be found in Appendix K) This section elaborates on the Bat Conservation Area, outlines future monitoring and research efforts, and notes outreach activities and the Army Compatible Use Buffer program.

3.1 Bat Conservation Area

A 2,202 ac (891 ha) Bat Conservation Area (BCA) has been established on Fort Drum for the benefit of Indiana bats (Figure 3.1).

The majority of the BCA occurs in undeveloped portions of the Cantonment Area (2,051 ac (830 ha)) and follows Pleasant Creek northward into Training Areas 4A and 3A (151 ac (61 ha)). These areas were selected for the BCA in order to provide protection for the majority of known Indiana bat roosting and foraging areas based on mist-netting and radio-tracking efforts (ESI 2008a, 2008b) and past acoustical surveys. The BCA now contains 90% (108 out of 120) of all roosts identified on Fort Drum in the past five years (2007-2011). Three of the roosts not found in the BCA are located within 20 m of the boundary of the BCA, four are located in Training Area 3B, and five of the roosts are located off Fort Drum, within approximately 1,000 m of the BCA.

The BCA is an important area for Indiana bats on Fort Drum and in the adjacent Town of LeRay. Indiana bats that have been captured off-post (Fort Drum-I-81 connector project – USFWS 2008, Eagle Ridge housing project – ESI 2006) were noted to roost on Fort Drum for multiple days. In addition, Indiana bats captured and roosting on Fort Drum regularly went off-post into the Town of LeRay to forage (ESI 2008b, USFS 2011).

The BCA includes a variety of habitat types and water bodies, including Pleasant and West Creeks. The BCA was configured to allow for continued development approximately 150 m along existing roads and around the Guthrie Ambulatory Health Care Clinic.

Permitted & Restricted Activities in BCA

The intention of the BCA is to not prohibit all actions in the identified areas, but to protect known roosting and foraging habitat from permanent loss to the greatest extent possible. Many activities that currently occur will continue to be conducted within the BCA. The following discusses in detail permitted and restricted activities within the BCA.

1. Roost Tree Protection. No viable roost trees identified within the boundaries of the BCA will be felled. This includes roost trees identified in the future.

2. Construction. The primary activity not allowed in the BCA is construction activities resulting in the permanent loss of natural habitat. No permanent facility will be constructed within the BCA with the exception of some additional facilities (e.g., cabins, picnic shelters, parking lots, a campground, etc.) that may impact up to 8 ac (3 ha) in and around Remington Park. Remington Park is located along the Pleasant Creek corridor of the BCA. The construction of park facilities is included in *Section 2.1 Construction* of this BA. Conservation measures in *Section 2.1 Construction* will also apply. Construction of temporary facilities, primarily for training purposes, may be constructed within the BCA if the impacts to habitats are minimal. Temporary structures are defined as structures that are easy to assemble and disassemble, and easy to move.

If construction of other permanent structures must occur within the BCA in the future, further consultation with the USFWS is required.

Although currently not expected to occur within the next three years, the potential exists for the Installation Restoration Program (IRP) to remove trees in order to access contaminated ground water sites in response to a contamination episode. Individual consultation will occur with the USFWS and trees would only be removed during the October 15 - April 15 tree clearing window if in a non-emergency situation.

By restricting construction within the BCA, habitat connectivity, water sources, and suitable roost and foraging sites are maintained for the known maternity colony in the spring and summer and for individuals associated with the maternity colony in the fall. The BCA provides habitat for all sexes and ages of bats.



Figure 3.1 Bat Conservation Area on Fort Drum Military Installation

3. Military Training. Relatively low impact military training (e.g., land navigation and small unit tactics) is conducted in the northern portion of the BCA within Local Training Areas (LTAs). No live fire is allowed, however, weapons that fire the equivalent of paintball rounds are used. Occasionally artillery (with blanks) and other simulated explosives are also used. Current training allowed in the Cantonment Area will continue which may include the construction of small temporary buildings (e.g., mock villages for urban warfare training) as long as no trees or large areas of natural habitat are removed.

Category 2 smoke may not be used within 100 m of any forested areas within the LTAs between April 16 - October 14 to minimize impacts to roosting Indiana bats. The prior time of year restriction identified within *Fort Drum Regulation 350-6 Assignment and Operational Use of Local Training Areas (LTAs)* was April 16 - September 30, however because of the new information about the temporal use of Fort Drum by Indiana bats, this restriction has been modified. Approval from Range Control and NEPA review is required prior to any use of Category 2 smoke in the LTAs, and these reviews will help ensure that Category 2 smoke use is in line with this conservation measure. See *Section 2.2 Military Training* for more information on impacts.

Category 2 smoke may be periodically used at three mobile MOUTs within the LTAs – (one mobile MOUT is in an open area of the BCA and one is in an open area near the BCA) during April 15 - October 15. Only infrequent use of colored smoke is expected to be used in around the mobile MOUTs. The closest known roost tree to the Mobile MOUTs is approximately 550m away. With the exception of the Category 2 colored smoke used at the mobile MOUTS, no other smoke or obscurant may be used in the BCA. Currently, all known maternity roosts are found within the BCA or within a 1,000 m from the installation boundary.

4. Vegetation Management. Limited tree removal is expected as part of required maintenance activities for the perimeter fence and/or utilities (Refer to *Section 2.4 Vegetation Management*). This is expected to be no more than 20 ac (8 ha). Hazard trees may also be removed for safety concerns along roadways, trails, or parking areas. Conservation measures in *Section 2.4 Vegetation Management* will apply.

Spraying of herbicides will continue to be conducted along the perimeter fence and utility line corridors to manage vegetation. Conservation measures in *Section 2.6 Pesticides* will also apply.

5. Recreation. Most of the BCA is currently used for recreational purposes. The primary recreational use is Physical Training (PT) by Soldiers, hiking and cross-country skiing throughout an extensive trail system, and archery hunting during the big game season.

There are currently plans to improve the trail system—both in quantity and quality. Any new trails will avoid trees and wetlands if at all possible—if trees > 4 in DBH must be removed, only the minimum required will be removed during the October 15 - April 15 tree clearing window.

6. Natural Resources Management. The management of natural resources is expected to continue throughout the BCA including the control/eradication of invasive species using pesticides, biocontrol and physical removal, as well as, surveys, inventories, and research. In the future, there may be potential to create or enhance wetland and/or stream mitigation sites (one wetland mitigation site is already located within the BCA) and future forest management activities may occur. Mitigation and forest management activities will be addressed in future consultations, biological assessments, and/or management plans.

3.2 Monitoring & Research

Past and Ongoing Efforts

Fort Drum first surveyed for Indiana bats at eight sites during a two-week period in July 1999, but no Indiana bats were captured (BHE 1999).

Acoustical surveys using Anabat echolocation detectors have been conducted from 2003-2011. Although these detectors cannot identify an Indiana bat with 100% accuracy, detectors can provide strong evidence that Indiana bats are utilizing an area. These identifications provide a general idea where Indiana bats may be foraging and identify areas that should be mist-netted to confirm the presence of Indiana bats. Acoustical surveys conducted on Fort Drum have identified potential Indiana bat call sequences throughout much of the installation. Passive acoustical surveys will be utilized into the foreseeable future, and a more detailed multiple

acoustical device placement sampling project will be utilized to delineate habitat associations and temporal variation by species and compare cost and logistical considerations of acoustical methods in comparison to mist-netting generally and in the context of declining catch and cost efficiencies following the onset of WNS. This project will also help to track temporal and spatial variation associated with the known Indiana bat maternity colony. The project was initiated in summer 2011 and will be run through summer 2012.

From 2007-2011, mist net surveys have been conducted at 323 sites on Fort Drum following USFWS guidelines. Of the 323 sites 246 sites were surveyed once, while the remaining 77 sites were surveyed two or more times. Twenty two Indiana bats were captured during protocol surveys—18 in the Cantonment Area, two in Training Area 3, one in Training Area 4, and one in Training Area 8. An additional 15 Indiana bats have been captured during other surveys, with seven captured before August 15 and eight captured after August 15. All bats captured in the Training Area were subsequently radio tracked back to roosts in the known maternity colony use area.

Please see *Section 1.0 Background* or Appendices D-I for additional information regarding mist-netting studies performed on Fort Drum since 2007. No large scale mist-netting projects are planned on Fort Drum in the next 3 years.

Future Planned Efforts

Fort Drum will continue the Indiana bat maternity colony monitoring and multiple Anabat sampling project into 2012. This will be primarily accomplished through monitoring areas around the known maternity colony with Anabat detectors and mist net efforts.

Fort Drum will continue to assist with WNS related research when able (Dobony et al. 2011 or Appendix L) and other projects and funding opportunities will be explored with NYSDEC, other military installations, universities, etc.

3.3 Outreach Efforts

Fort Drum has participated in and facilitated several outreach efforts including publishing articles in local outlets, cooperating with local media, and participating in community and school events. Below are some of the highlights:

- March 2009: Spring 2009 Fort Drum Fish & Wildlife Management Program *Blaze Orange* newsletter featured a short article entitled *Bat White-nose Syndrome Update* [The *Blaze Orange* newsletter is a semi-annual newsletter published by Fort Drum's Fish & Wildlife Management Program and sent to all residents on Fort Drum and all recreation permit holders.
- 16 April 2009: Article in *The Mountaineer* [Fort Drum weekly newspaper] titled: *US Fish, Wildlife Service issues opinion on treatment of Indiana bat* [re: issuance of Biological Opinion]
- 30 April 2009: Article in *The Mountaineer* titled: *Accommodations will expand near LeRay Mansion* [re: installation of new bat hotel].
- 13 May 2009: Featured presentation at the meeting of the North Country Bird Club in Watertown, NY re: bats and bat management at Fort Drum.
- 04 June 2009: Article in *The Mountaineer* titled: *White-Nose Syndrome threatens bat populations: Fort Drum joins research project* [re: NYSDEC project at LeRay bat house]

- August 2009: Fall 2009 Fort Drum Fish & Wildlife Management Program *Blaze Orange* newsletter featured a three articles related to bats on Fort Drum titled: *New Bat House at LeRay*, *Year 3 for Indiana Bat Surveys*, and *Activities of the Fort Drum Fish & Wildlife Management Program: Bat Management & White-nose Syndrome*.
 - October 2009: Article in Department of Defense Legacy Resource Management Program *Natural Selections* monthly newsletter titled: *Impacts of White-nose Syndrome to Bat Populations and Management*.
 - March 2010: Spring 2010 *Blaze Orange* newsletter featured an article entitled *Bats & White-nose Syndrome on Fort Drum Update* [The newsletter is a semi-annual newsletter published by Fort Drum's Fish & Wildlife Management Program and sent to all housing residents on Fort Drum and all recreation permit holders.]
 - April 2010: A Town Hall Meeting for the public was conducted by Fort Drum's Fish & Wildlife Management Program—information about bat management and white-nose syndrome was presented.
 - August 2010: Fall 2010 *Outdoor News* newsletter had a short article entitled: *White-nose Syndrome Update* [Formerly known as the *Blaze Orange*, the newsletter is a semi-annual newsletter published by Fort Drum's Fish & Wildlife Management Program and sent to all housing residents on Fort Drum and all recreation permit holders.]
 - October 2010: A presentation was given to a group at the Fort Drum Library entitled *Bats and Fort Drum*
 - November 2010: Fort Drum helped to coordinate (with Bat Conservation International) a meeting addressing white-nose syndrome concerns on Military Installations.
 - June 2011: Fort Drum had a peer-reviewed publication (*Little Brown Myotis Persist Despite Exposure to White-Nose Syndrome*) accepted at the *Journal of Fish and Wildlife Management*. This manuscript outlined some of the results from the studies going on at the little brown maternity colony at LeRay.
 - July 2011: Fort Drum worked with the local Watertown Channel 7 News, the Watertown Daily Times, the Fort Drum Mountaineer, and North Country Public Radio to distribute information about WNS and some of the results of studies ongoing at the little brown maternity colony at LeRay.
 - August 2011: Fort Drum helped to coordinate (with Bat Conservation International) a meeting addressing white-nose syndrome concerns on Military Installations.
- Future plans consist of including relevant information pertaining to Indiana bats in the new Fort Drum Environmental Handbook which will be made available to all users—civilian employees and Soldiers on Fort Drum. An information paper and/or pamphlet will be developed regarding the Indiana bat on Fort Drum and will be made available on the Fish & Wildlife Management Program web site. Efforts are underway to create a poster to integrate the Indiana bat with 10th Mountain Division Soldiers under the common theme of “We Own the Night” similar to the successful US Marine Corps “We’re Saving A Few Good Species” posters.

3.4 Army Compatible Use Buffer (ACUB) Program

Under the authority provided in Section 2811, National Defense Authorization Act of 2003 (codified at 10 United States Code Sec. 2684a), Fort Drum received approval August 2007 to work with non-government organizations and/or other government agencies to develop an Army Compatible Use Buffer (ACUB) program.

The ACUB Program was primarily created to establish buffer areas around Army installations to limit effects of encroachment and maximize land use inside the installation to sustain and protect an installation's accessibility, capability and capacity for Soldier training and testing. The ACUB Program can also be used to help meet environmental regulatory requirements for endangered species conservation and off-post wetland mitigation to further minimize the loss of training lands due to environmental restrictions. As a secondary benefit, the ACUB program can conserve agricultural and forestry lands, as well as other wildlife habitats. It is an integral component of the Army's sustainability triple bottom line: mission, environment and community.

Army Headquarters has formalized an ACUB process that is initiated locally at the installation level but reviewed, approved and funded centrally from Army Headquarters. For ACUBs, the Cooperating Partner purchases easements with funding contributed by the Army and other partners. These areas provide a permanent natural buffer between military training lands and residential or commercial activities. The partner, not the Army, receives the deeded interest in the property and provides for long term habitat management. Conservation partners will work directly with willing landowners to secure conservation easements and will also be responsible for recording, monitoring, managing and enforcing the easements. These conservation easements would prohibit incompatible development in perpetuity, while keeping the land in private ownership and allowing for traditional land uses such as farming, forestry, and recreation.

The ACUB program allows Fort Drum to work with partners to provide land easements to protect habitat and training without acquiring any new land for Army ownership. Fort Drum reaches out to partners to identify mutual objectives of land conservation and to protect critical open areas. The program allows the Army to contribute funds to the partner's purchase of easements or properties from ready and willing landowners. The conservation easement allows the property title to be retained by the owner. However, pursuant to the terms of the Cooperative Agreement, Fort Drum and/or the partner may acquire access rights to conduct land management activities. Additionally, the Army retains a contingent right in the deed of conservation easement in the event that the partner organization is unable to uphold the terms of the easement. In this situation, the Army would attempt to find another eligible entity to enforce the easement.

Fort Drum's Planning, Analysis, and Integration Office is responsible for the ACUB program. Natural resources professionals assist in a supporting role whenever called upon and work with the USFWS to ensure that all ESA Section 7 requirements are met. ACUB partners at Fort Drum currently include Ducks Unlimited Great Lakes/ Atlantic Regional Office; Thousand Islands Land Trust; and Tug Hill Tomorrow Land Trust.

As of 2011 the Fort Drum ACUB program has made six unique partnerships possible and is working on approximately 20 more. These landowners have had the opportunity to expand on their farmlands and help sustain the mission and secure the future. Approximately 1,383 ac (560 ha) have been protected to date (Figure 3.2).

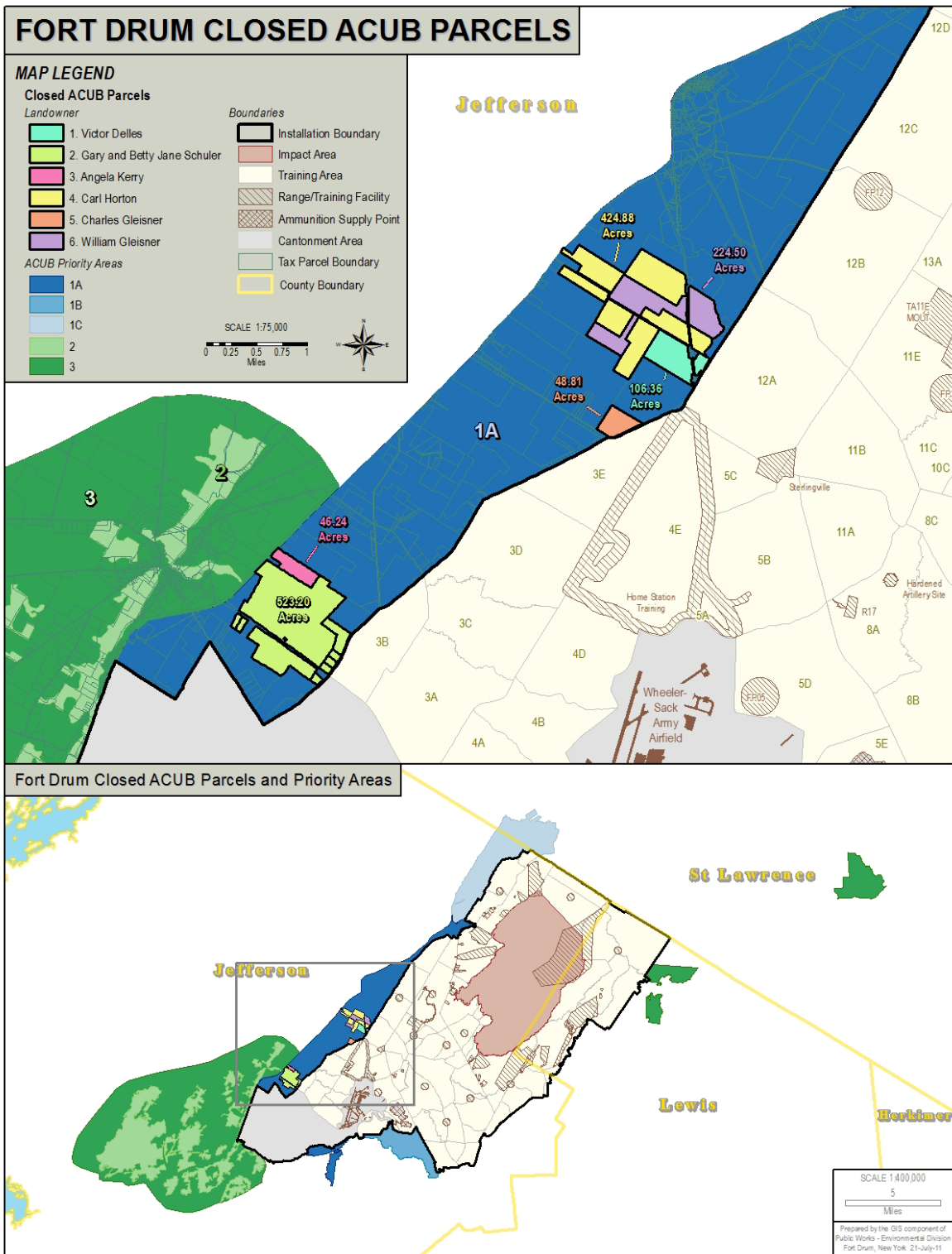


Figure 3.2. Protected Parcels currently within the Army Compatible Use Buffer Program at Fort Drum Military Installation.

For the purposes of this BA, the ACUB program has been reviewed to: (1) ensure that the inclusion of easements primarily acquired to establish buffer areas around Fort Drum to limit effects of encroachment and maximize land inside the installation that can be used to support the mission do not adversely affect the Indiana bat; and (2) ensure that the inclusion of easements primarily acquired to sustain natural habitats for the benefit of the Indiana bat will beneficially affect the species and assist Fort Drum to meet its environmental regulatory requirements for endangered species conservation. The USFWS has identified undeveloped wooded areas near Fort Drum as priority ACUB areas to provide potential habitat for the Indiana bat. It is anticipated that up to 1,300 ac (526 ha) of land along Fort Drum's border with Evans Mills, LeRay, and Philadelphia could be incorporated into the program for the benefit of the species if funding became available for Priority 2 and 3 parcels (Figure 3.3).

Easements primarily incorporated into the ACUB program to establish buffer areas around Fort Drum to limit effects of encroachment typically consist of agricultural land, either in row crops or dairy production. These lands are typically open landcover types (i.e., grasslands, shrubs, agricultural crops, etc.) that have limited utility for Indiana bats. However, there may be woodlots on the properties of various sizes and tree species compositions that may have potential roosting habitat that Indiana bats may utilize throughout the year. Therefore, these "Agricultural" easements contain specific language that has been developed between Fort Drum's Planning, Analysis, and Integration Office; Fort Drum's Fish and Wildlife Management Program; and the USFWS to assist a landowner in understanding how they can avoid negative impacts to Indiana bats if they have this type of habitat on their property. A fact sheet is also provided to the landowner (Appendix M) to help them understand who they should contact should they wish to undertake any type of land management activity on their property, and that there may be state and federal laws to consider prior to their actions.

As Fort Drum determines potential new parcels for inclusion in the program, we will coordinate with the USFWS to ensure that the latest information about the distribution of the Indiana bat is utilized to make the best decisions to avoid adverse affects to the species. Appendix N is the most recent easement, and this will be the model for these types of "Agricultural" easements for the foreseeable future. As long as this model easement is utilized, "Agricultural" ACUB parcels may affect, but will not adversely affect the Indiana bat. In the long term, some of these parcels may actually benefit the Indiana bat if they are protected from development and have suitable roosting and foraging habitat present.

Fort Drum will work with the partners and the USFWS to develop specific easement language that will be used to incorporate parcels into the ACUB program for the specific benefit of the Indiana bat. This language will help ensure that these easements will be wholly beneficial for the Indiana bat. Language will be developed in the next six months and will include such provisions as roosting and foraging area protection. Once this language is developed, this will be used for the foreseeable future.

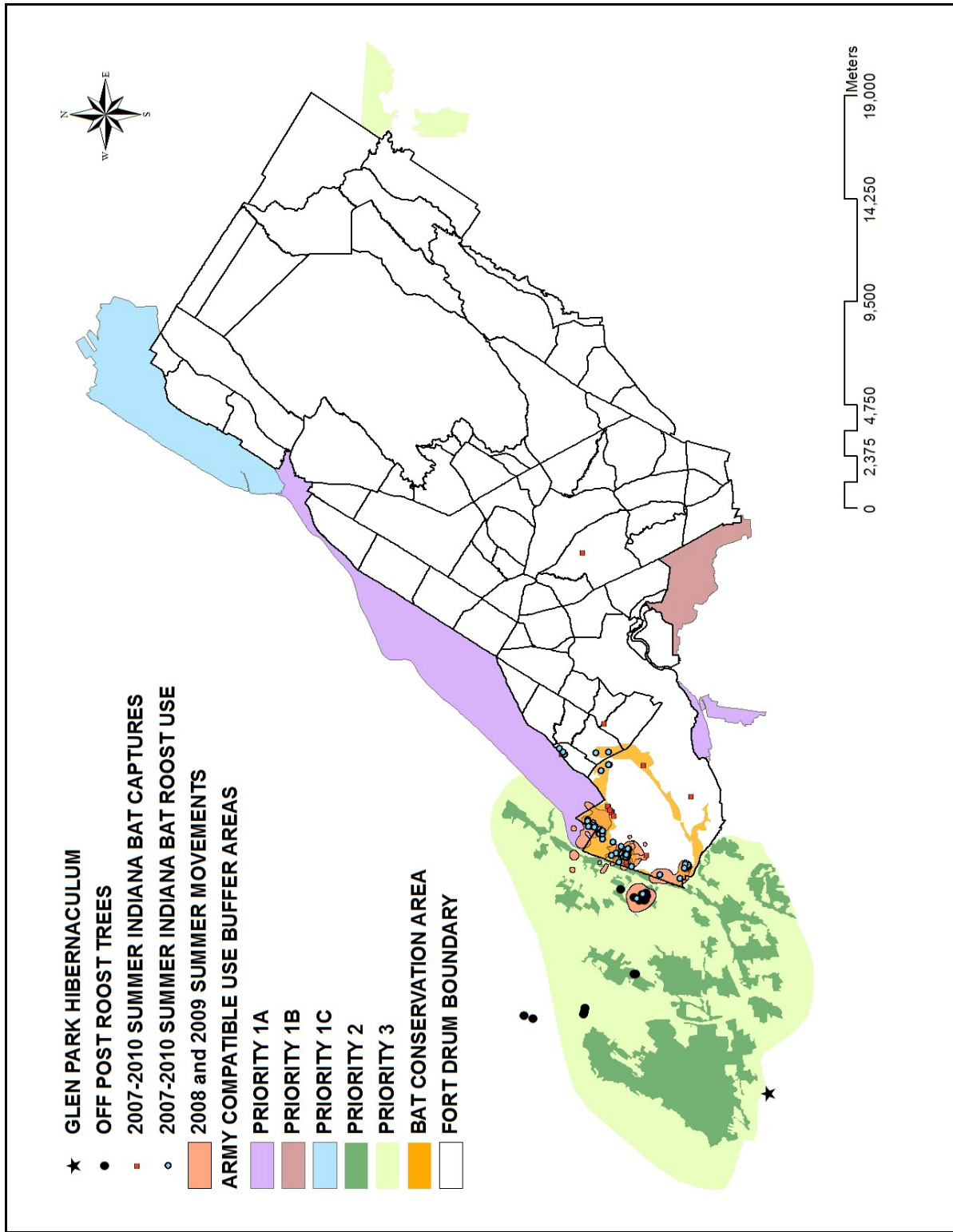


Figure 3.3. Army Compatible Use Buffer Program priority areas at Fort Drum Military Installation.

3.5 Conclusion

The establishment of the Bat Conservation Area, monitoring and research efforts, and outreach efforts will all have discountable or wholly beneficial impacts to the Indiana bat and other forest bat species. The establishment of ACUB areas for noise buffer or encroachment concerns (aka "Agricultural easements") may affect, but should not adversely affect the Indiana bat as long as the easement language is followed and the landowners contact the NYSDEC or USFWS prior to completing any type of forest clearing or land management action. The establishment of ACUB areas between the Glen Park hibernaculum and Fort Drum will have wholly beneficial impacts to the Indiana bat and other forest bat species as the forested areas will be conserved as part of the easement agreement.

4.0 Cumulative Effects

All future actions on Fort Drum are subject to federal agency involvement, and federal involvement is anticipated in all or most future actions within the Action Area (see *Section 1.4*).

Besides those activities occurring on Fort Drum addressed in this BA, there are numerous activities that occur in the action area off-post that affect the Indiana bat. These activities include residential and commercial development associated with the expansion at Fort Drum (see Appendix A), agriculture, timber harvesting, and outdoor recreation. Although many of these are private actions, some involve permitting through the US Army Corps of Engineers due to impacts to waters of the United States. Because of the permitting requirements, the USFWS is engaged in consultation with many of these off-post projects. The USFWS is also engaged with the Town of LeRay in ongoing development in the area, and is actively involved with reviewing most, if not all, development projects within the Town (regardless of USACE involvement). The USFWS are working with the Town and developers to conserve and connect suitable Indiana bat habitat whenever possible and hope to work with other towns in the area in a similar fashion.

Because of the active Federal agency involvement in the immediate area, no detailed cumulative effects analysis is presented here. However, off-post activities in the action area are likely to have direct, indirect, and cumulative effects to Indiana bats known to utilize Fort Drum.

5.0 Overall Conclusion

Over the past 5 years (2007-2011), Fort Drum has conducted mist net surveys at more than 300 sites throughout the installation and captured more than 3,000 bats, of which, 41 were Indiana bats. Although three of those bats were captured in Training Areas 3 and 4, it was subsequently determined that these bats were part of the known maternity colony within the Cantonment Area. Still, given the evidence from Anabat recordings across the installation and the amount of available suitable habitat, it was still assumed that there was a second maternity colony somewhere within the Training Area.

In 2010, an Indiana bat was captured in Training Area 8, marking the first time an Indiana bat had been captured outside the Cantonment Area or the adjacent Training Areas 3 or 4. However, this bat was subsequently tracked back to roosts in the known maternity colony, approximately 8 mi (13 km) away. Although the possibility exists that a second, undiscovered maternity colony is still present in the Training Area, the best available information now suggests that suspected Indiana bat use within the Training Area is most likely periodic foraging or exploratory movement activity by bats from the known colony in the Cantonment Area. Therefore, we now believe there is only one maternity colony on Fort Drum located in the Cantonment area.

Utilizing this new information and revised assumptions, Fort Drum contends that only the operation of small wind turbines as part of the small wind study on Fort Drum and the deployment of smoke and obscurants as part of military training are anticipated to adversely affect Indiana bats on Fort Drum Military Installation during 2012-2014.

Little information exists to determine the likelihood of direct mortality associated with small wind turbine use, however, large turbines operated during the time of year bats are active (either migrating or resident) are known to cause large numbers of mortalities. While only two Indiana bats are known to have been killed by large wind projects, there have been many other myotine bats killed by wind turbines. Daily mortality monitoring will be performed to establish any potential mortality of Indiana or other bats. If an Indiana or any other myotine bat is found to have been killed by the turbines, turbine use will be immediately curtailed to avoid any further negative impacts. However, if these types of turbines are found to be suitable for use with no or limited negative environmental consequences, they may be established at more locations on Fort Drum during the next 3 years.

Although there are sufficient Conservation measures in place to minimize potential adverse effects of smoke and obscurants to Indiana bats using the known roosting and foraging locations, it is difficult to predict where bats may choose to roost in the Training Area outside of protected areas. Therefore, the likelihood exists that smoke operations could be deployed near bats within unknown roosts in the Training Area, and these bats will be adversely affected by smoke inhalation.

There are suitable conservation measures or restrictions in place to minimize potential adverse affects from all other proposed activities on Fort Drum Military Installation during 2012-2014. These activities will have no effect or are likely to affect, but not adversely affect Indiana bats.

Table 5.1 summarizes the effects analysis of each activity in this BA.

Table 5.1 Overall Effects Summary. (0 = No effect; 1 = may affect, but not likely to adversely affect; 2 = may affect, likely to adversely affect; + = beneficial effect)

ACTIVITY	ATTRIBUTE	DIRECT EFFECT	INDIRECT EFFECT
Construction	Hibernation	0	0
	Roosting	1	1
	Foraging	1	1
Wind Development – Small Wind Study	Hibernation	0	0
	Roosting	0	0
	Foraging	2	0
Military Training – All Except Smoke/Obscurants	Hibernation	0	0
	Roosting	1	1
	Foraging	1	1
Military Training – Smoke/Obscurants	Hibernation	0	0
	Roosting	2	2
	Foraging	1	1
Forest Management	Hibernation	0	0
	Roosting	1	1
	Foraging	1	1
Mechanical Vegetation Management	Hibernation	0	0
	Roosting	1	1
	Foraging	0	1
Prescribed Fire	Hibernation	0	0
	Roosting	1	1
	Foraging	1	1
Pesticide Application	Hibernation	0	0
	Roosting	1	1
	Foraging	1	1
Wildlife Management/ Vertebrate Pest Control	Hibernation	0	0
	Roosting	1	1
	Foraging	0	1
Outdoor Recreation	Hibernation	0	0
	Roosting	1	1
	Foraging	1	1
ACUB – Non Indiana Bat Easements	Hibernation	0	0
	Roosting	1	1
	Foraging	1	1
ACUB – Indiana Bat Easements	Hibernation	0	0
	Roosting	+	+
	Foraging	+	+

6.0 Literature Cited

- 3D/International Inc.. 1996. Environmental Fate of Fog Oil at Fort McClellan, Alabama. Prepared for U.S. Army Corps of Engineers, Kansas City, Missouri.
- 3D/International, Inc. 1997. Biological Assessment: Relocation of U.S. Army Chemical School and U.S. Army Military Police School to Fort Leonard Wood, Missouri. Prepared for U.S. Army Corps of Engineers, Kansas City, Missouri. 155 pp.
- Barbour, R. W. and W. H. Davis. 1969. Bats of America. University Press of Kentucky, Lexington. 286 pp.
- Belwood, J. 1996. An unusual *Myotis sodalis* nursery colony in Ohio. Bat Research News 37: 126-127.
- BHE. 1999. Indiana bat (*Myotis sodalis*) Mist Net Survey at Fort Drum, New York. Prepared by: BHE Environmental, Inc., Cincinnati, OH. 23 pp.
- Blehert, D. S., A. C. Hicks, M. Behr, C. U. Meteyer, B. M. Berlowski-Zier, E. L. Buckles, J. T. H. Coleman, S. R. Darling, A. Gargas, R. Niver, J. C. Okonkiewski, R. J. Rudd, and W. B. Stone. 2009. Bat White-Nose Syndrome: An Emerging Fungal Pathogen? Science 323(5911):227.
- Brack, V. 1983. The nonhibernating ecology of bats in Indiana with an emphasis on the endangered Indiana bat, *Myotis sodalis*. Purdue University, West Lafayette, IN.
- Brack, V. 2006. Autumn activity of *Myotis sodalis* (Indiana Bat) in Bland County, Virginia. Northeastern Naturalist 13:421-434.
- Brigham, R. M., and B. Fenton. 1986. The influence of roost closure on the roosting and foraging behaviour of *Eptesicus fuscus* (Chiroptera: Vespertilionidae). Canadian Journal of Zoology 64:1128-1133.
- Britzke, E., A. Hicks, S. von Oettingen, and S. Darling. 2006. Description of spring roost trees used by female Indiana bats (*Myotis sodalis*) in the Lake Champlain Valley of Vermont and New York. American Midland Naturalist 155:181-187.
- Callahan, E. V. 1993. Indiana bat summer habitat requirements. M.S. Thesis. University of Missouri, Columbia. 84 pp.
- Callahan, E., R. Drobney, and R. Clawson. 1997. Selection of summer roosting sites for Indiana bats. Journal of Mammalogy 78:818-825.
- Carter, T., S. Carroll, J. Hofmann, J. Gardner, and G. Feldhamer 2002. Landscape analysis of roosting habitat in Illinois. Pages 160-164 in A. Kurta and J. Kennedy, editors. The Indiana Bat: Biology and Management of an Endangered Species. Bat Conservation International, Austin, TX.

- Copperhead. 2009. Summer 2008 bat survey and radiotelemetry study conducted at Fort Drum, Jefferson and Lewis counties, New York. Prepared by: J. A. Hawkins and M. W. Gumbert. Copperhead Environmental Consulting, Inc. Paint Lick, KY. 26 pp.
- Cope, J., and S. Humphrey. 1977. Spring and autumn swarming behavior in the Indiana bat, *Myotis sodalis*. *Journal of Mammalogy* 58:93-95.
- Crampton, L. H., and R. M. R. Barclay. 1998. Selection of roosting and foraging habitat by bats in different-aged aspen mixedwood stands. *Conservation Biology* 12:1347-1358.
- Csondes, A. 2004. Environmental Fate of Methoprene. Department of Pesticide Regulations. Sacramento, CA.
- Dobony, C. A., A. C. Hicks, K. E. Langwig, R. I. von Linden, J. C. Okoniewski, and R. E. Rainbolt. 2011. Little brown myotis persist despite exposure to white-nose syndrome. *Journal of Fish and Wildlife Management* 2(2):xx-xx; e1944-687X. doi: 10.3996/022011-JFWM-014.
- Driver, C. J., M. W. Ligothke, W.G. Landis, J. L. Downs, B. L. Tiller, E. B. Moore, Jr., D. A. Cataldo. 1993. Environmental and Health Effects Review for Obscurant Fog Oil. ERDEC-CR-071. Edgewood Research, Development, and Engineering Center. Aberdeen Proving Ground, MD.
- Driver, C. J., M. W. Ligothke, H. Galloway-Gorby, G. Dennis, K. A. Reinbold and H. E. Balbach. 2002. Acute Inhalation Toxicity of Fog Oil Smoke in the Red-winged Blackbird, a Sizespecific Inhalation Surrogate for the Red-cockaded Woodpecker. ERDC/CERL Technical Report, TR-02-6, Engineer Research and Development Center, U.S. Army Construction Engineering Research Laboratory, Champaign, Illinois.
- ENSR. 1999. Final Biological Assessment for the Fielding of M56 and M58 Smoke Generators at Fort Lewis and Yakima Training Center. Prepared for the Department of Army, Fort Lewis, Washington.
- ENSR. 2006. Draft Environmental Assessment for the Fielding of M56 and M58 Smoke Generators at Fort Drum. Prepared for the Department of Army, Fort Drum, NY.
- ESI. 2006. Mist Net and Radio-telemetry Surveys for the Indiana Bat (*Myotis sodalis*) on Clover Construction Management's Proposed Eagle Ridge Townhouses Project, Jefferson County, New York. Prepared by J. Duffey, A. Mann, T. Pankiewicz, and V. Brack, Jr., Environmental Solutions & Innovations, Inc. Cincinnati, OH. 69 pp.
- ESI. 2008a. Summer mist net and radio-telemetry surveys for the Indiana bat (*Myotis sodalis*) on Fort Drum, Jefferson and Lewis Counties, New York. Prepared by: A. Mann, E. Pfeffer, P. Kudlu, and V. Brack, Jr. Environmental Solutions & Innovations, Inc. Cincinnati, OH. 74 pp.
- ESI. 2008b. Fall Mist Net and Radio-telemetry Surveys for the Indiana Bat (*Myotis sodalis*) on Fort Drum, Jefferson and Lewis Counties, New York. Prepared by E. Pfeffer, P. Kudlu, A. Mann, and V. Brack, Jr. Environmental Solutions, Inc., Cincinnati, OH. 65 pp.

- ESI. 2010. Summer mist net surveys for the Indiana bat (*Myotis sodalis*) on Fort Drum Military Installation, Jefferson and Lewis Counties, New York. Prepared by: J. Timpone, A. Mann, and V. Brack, Jr. Environmental Solutions & Innovations, Inc. Cincinnati, OH. 55 pp.
- ESI. 2011. Summer mist net surveys for the Indiana bat (*Myotis sodalis*) on Fort Drum Military Installation, Jefferson and Lewis Counties, New York. Prepared by: L. Winhold, A. Mann, and V. Brack, Jr. Environmental Solutions & Innovations, Inc. Cincinnati, OH. 79 pp.
- Farmer, A., B. Cade, and D. Stauffer. 2002. Evaluation of a habitat suitability index model. Pages 172-179 in A. Kurta and J. Kennedy, editors. The Indiana Bat: Biology and Management of an Endangered Species. Bat Conservation International, Austin, TX.
- Fort Drum. 2005. Integrated Wildland Fire Management Plan, Fort Drum, New York. Prepared by: Directorate of Emergency Services. Fort Drum, New York. 75pp.
- Fort Drum. 2008. Integrated Pest Management Plan. Prepared by: Directorate of Public Works. Fort Drum, New York. 71pp.
- Fort Drum. 2009. Fort Drum, New York Biological Assessment for the Indiana bat (*Myotis sodalis*) 2009-2011. Prepared by: USDA Forest Service and US Army Garrison Fort Drum, NY. 160 pp.
- Fort Drum. 2011. Integrated Natural Resources Management Plan 2011. Prepared by: Natural Resources Branch, Environmental Division, Directorate of Public Works and Integrated Training Area Program, Range Branch, Training Division, Directorate of Planning, Training, Mobilization & Security, Fort Drum, New York. 388pp.
- Gargas, A, Trest MT, Christensen M, Volk TJ, and Blehert DS. 2009. *Geomyces destructans* sp. nov. associated with bat white-nose syndrome. Mycotaxon 108:147-154.
- Garner, J. and J. Gardner. 1992. Determination of Summer Distribution and Habitat utilization of the Indiana Bat (*Myotis sodalis*) in Illinois. Division of Natural Heritage and the Center for Biogeographic Information (Illinois Natural History Survey) Final Report: Project E-3. 22pp.
- Geluso, K. N., J. S. Altenbach, and D. E. Wilson. 1981. Organochlorine residues in young Mexican free-tailed bats from several roosts. American Midland Naturalist 105:249-257.
- Getz, L., K. Reinbold, D. Tazik, T. Hayden, and D. Cassels. 1996. Preliminary Assessment of the Potential Impact of Fog Oil Smoke on Selected Threatened and Endangered Species. CERL-TR-96/38. U.S. Army Corps of Engineers, Construction Engineering Research Laboratory, Champaign, IL.
- Guelta, M., and H. E. Balbach. 2006. Modeling Fog Oil Obscurant Smoke Penetration into Simulated Tortoise Burrows and Bat Colony Trees. ERDC/CERL TR-05-31. U.S. Army Corps of Engineers, Construction Engineering Research Laboratory, Champaign, IL.
- Gumbert, M. W., J. O'Keefe, and J. MacGregor. 2002. Roost fidelity in Kentucky. Pages 143-152 in A. Kurta and J. Kennedy, editors. The Indiana Bat: Biology and Management of an Endangered Species. Bat Conservation International, Austin, TX.

- Hicks, A. 2006. Annual Report of Indiana bats in New York. New York State Department of Environmental Conservation, Albany, NY.
- Hilsenhoff, W. L. 1982. Using a Biotic Index to Evaluate Water Quality in Streams. Technical Bulletin 182:22.
- Humphrey, S., A. Richter, and J. Cope. 1977. Summer habitat and ecology of the endangered Indiana bat, *Myotis sodalis*. Journal of Mammalogy 58:334-345.
- Karr, J. R., and I. J. Schlosser. 1977. Impact of nearstream vegetation and stream morphology on water quality and stream biota. Environmental Protection Agency Report Number 600/3-77-097. National Technical Information Service, Springfield, VA.
- Klein, R. D. 1979. Urbanization and stream quality impairment. Journal of the American Water Resources Association 15:948-963.
- Kunz, T. H. Kunz, E. B. Arnett, W. P. Erickson, A. R. Hoar, G. D. Johnson, R. P. Larkin, M. D. Strickland, R. W. Thresher, and M. D. Tuttle. 2007. Ecological Impacts of Wind Energy Development on Bats: Questions, Research Needs, and Hypotheses. Frontiers in Ecology and the Environment 5:315–324.
- Kurta, A., D. King, J. Teramino, J. Stribley, and K. Williams. 1993. Summer roosts of the endangered Indiana bat (*Myotis sodalis*) on the northern edge of its range. American Midland Naturalist 129:132-138.
- Kurta, A., J. Caryl, and T. Lipps. 1997. Bats and Tippy Dam: species composition, seasonal use, and environmental parameters. Michigan Academician 24:473-490.
- Kurta, A., S. Murray, and D. Miller. 2002. Roost selection and movement across a landscape. Pages 118-129 in A. Kurta and J. Kennedy, editors. The Indiana Bat: Biology and Management of an Endangered Species. Bat Conservation International, Austin, TX.
- Lenat, D. R., and J. K. Crawford. 1993. Effects of land use on water quality and aquatic biota of three North Carolina Piedmont streams. Hydrobiologia 294:185-199.
- Liljegren, J.C., W.E. Dunn, G.E. DeVaul, and A.J. Policastro. 1988. Field Measurement and Model Evaluation Program for Assessment of the Environmental Effects of Military Smokes: Field Study of Fog-Oil Smokes. AD-A205 344. Argonne National Laboratory, Argonne, Ill.
- Menzel, M., J. Menzel, T. Carter, W. M. Ford, and J. Edwards. 2001. Review of the forest habitat relationships of the Indiana bat (*Myotis sodalis*). General Technical Report NE-284. USDA Forest Service Northeastern Research Station.
- Miller, N., R. Drobney, R. Clawson, and E. V. Callahan. 2002. Summer habitat in northern Missouri. Pages 165-171 in A. Kurta and J. Kennedy, editors. The Indiana Bat: Biology and Management of an Endangered Species. Bat Conservation International, Austin, TX.
- Murray, S., and A. Kurta. 2002. Spatial and temporal variation in diet. Pages 182-192 in A. Kurta and J. Kennedy, editors. The Indiana Bat: Biology and Management of an Endangered Species. Bat Conservation International, Austin, TX.

- Murray, S., and A. Kurta. 2004. Nocturnal activity of the endangered Indiana bat (*Myotis sodalis*). *Journal of Zoology*, London 262: 1-10.
- National Research Council. 1997. Toxicity of Military Smokes and Obscurants. Volume 1. National Academy Press, Washinton, D. C.
- National Research Council. 1999a. Toxicity of Military Smokes and Obscurants. Volume 2. National Academy Press, Washington, D.C.
- National Research Council. 1999b. Toxicity of Military Smokes and Obscurants. Volume 3. National Academy Press, Washington, D.C.
- O'Shea, T., and D. Clark. 2002. An overview of contaminants and bats, with special reference to insecticides and the Indiana bat. Pages 237-248 in A. Kurta, and J. Kennedy, editors. *The Indiana Bat: Biology and Management of an Endangered Species*. Bat Conservation International, Austin, TX.
- Owen, S. F., M. A. Menzel, J. W. Edwards, W. M. Ford, J. M. Menzel, B. R. Chapman, P. B. Wood, and K. V. Miller. 2004. Bat activity in harvested and intact forest stands in the Allegheny mountains. *Northern Journal of Applied Forestry* 21:154-159.
- Policastro, A. J., D. M. Maloney, W. E. Dunn, J. C. Liljegren, G. E. DeVauil. 1989. Field Measurement and Model Evaluation Program for Assessment of the Environmental Effects of Military Smokes. Technical Report. Argonne National Laboratory, Argonne, Ill.
- Schmidt, A., V. Brack, Jr., R. Romme, K. Tyrell, and A. Gehrt. 2002. Bioaccumulation of pesticides in bats from Missouri. Pages 8-20 in John Johnston, editor. *Pesticides and Wildlife*. American Chemical Society. New Orleans, LA.
- Smith, T., M. G. Hohmann, and R. H. Melton. 2005. Ecological Risk Assessment of the Effects of Military Fog Oil Obscurant Smoke on the Red-cockaded Woodpecker. ERDC/CERL TR-05-4. U.S. Army Corps of Engineers: Strategic Environmental Research and Development Program, Champaign, IL.
- Smith, D.A. and S.D. Gehrt. 2010. Bat response to woodland restoration within urban forest fragments. *Restoration Ecology* 18:914-923.
- Sparks, D. W., C. Ritzi, and J. Whitaker. 2003. Behavioral Response of Indiana Bats to Roost Loss. Dissertation, Indiana State University, Terre Haute, IN.
- Sparks, D., C. Ritzi, J. Duchamp, and J. Whitaker. 2005. Foraging habitat of the Indiana bat (*Myotis sodalis*) at an urban-rural interface. *Journal of Mammalogy* 86:713-718.
- Speakman, J. R. 1995. Chiropterian nocturnality. *Symposia of the Zoological Society of London* 67:187-201.
- Spurr, S., and B. Barnes. 1980. *Forest Ecology*. John Wiley & Sons, New York.
- Swadener, C. 1994. *Bacillus thuringiensis* (B.t.): A fact sheet. *Journal of Pesticide Reform* 14:13-20.

- Syracuse Environmental Research Associates, Inc 2004a. Control/eradication agents for the gypsy moth: Human health and ecological risk assessment for *Bacillus thuringiensis* var. *kurstaki* (*B.t.k.*)-Final Report. SERA TR 03-43-05-02c. Prepared for USDA Forest Service, Arlington, VA.
- Tuttle, M., and J. Kennedy. 2002. Thermal requirements during hibernation. Pages 68-78 in A. Kurta, and J. Kennedy, editors. The Indiana Bat: Biology and Management of an Endangered Species. Bat Conservation International, Austin, TX.
- Tuttle, N., D. Benson, and D. Sparks. 2006. Diet of the *Myotis sodalis* (Indiana Bat) at an urban/rural interface. *Northeastern Naturalist* 13: 435-442.
- USFS. 2011. Fort Drum Military Installation Cantonment Area Indiana Myotis Survey. USDA, US Forest Service Green Mountain Agreement #09-PA-11092000-106. Prepared by J.B. Johnson, J.W. Edwards, W.M. Ford, K. Cunningham, and J. L. Rodrigue. 61 pp.
- USFWS. 1999. Agency Draft Indiana Bat (*Myotis sodalis*) Revised Recovery Plan. USDI, US Fish and Wildlife Service, Fort Snelling, MN. 53 pp.
- USFWS. 2007. Indiana Bat (*Myotis sodalis*) Draft Recovery Plan: First Revision. USDI, US Fish and Wildlife Service, Fort Snelling, MN. 258 pp.
- USFWS. 2008. Biological Opinion on the Proposed Construction, Operation, and Maintenance of the Fort Drum Connector Project (NYSDOT PIN 7804.26) for the Federally Endangered Indiana Bat. USDI, US Fish and Wildlife Service, New York Field Office. Cortland, NY. 84 pp.
- USFWS. 2009. Biological Opinion on the Proposed Activities on the Fort Drum Military Installation (2009-2011) for the Federally-Endangered Indiana Bat (*Myotis sodalis*) in the Towns of Antwerp, Champion, LeRay, Philadelphia, and Wilna, Jefferson County and the Town of Diane, Lewis County, New York. Originally Submitted 24 Mar 2009; revised 01 Jun 2009. USDI, US Fish and Wildlife Service, New York Field Office. Cortland, NY. 108 pp.
- USFWS. 2011a. 2009 Rangewide Population Estimate for the Indiana Bat (*Myotis sodalis*) by USFWS Region. USDI, US Fish and Wildlife Service, Fort Snelling, MN. 5 pp. Available: <http://www.fws.gov/midwest/Endangered/mammals/inba/index.html> .
- USFWS. 2011b. White-nose Syndrome: Something is killing our bats. Available: <http://www.fws.gov/whitenosesyndrome> .
- Werner, S. M., and K. F. Raffa. 2000. Effects of forest management practices on the diversity of ground-occurring beetles in mixed northern hardwood forests of the Great Lakes Region. *Forest Ecology and Management* 139:135-155.
- WEST. 2011. Bat Monitoring Studies at the Fowler Ridge Wind Energy Facility, Benton County, Indiana April 13 – October 15, 2010. Prepared by: Rhett E. Good, Wally Erickson, Andy Merrill, Sandra Simon, Kevin Murray, Kimberly Bay, and Chris Fritchman, Western EcoSystems Technology, Inc. 2003 Central Avenue Cheyenne, Wyoming 8200. 143pp.

Yates, E. D., D. F. Levia, and C. L. Williams. 2004. Recruitment of three non-native invasive plants into a fragmented forest in southern Illinois. *Forest Ecology and Management* 190:119-130.

7.0 Appendices

- Appendix A. Fort Drum, New York Biological Assessment for the Indiana Bat (*Myotis sodalis*) 2009-2011.** Provided on Accompanying DVD/CD
- Appendix B. Biological Opinion on the Proposed Activities on the Fort Drum Military Installation (2009-2011) for the Federally-Endangered Indiana Bat (*Myotis sodalis*) in the towns of Antwerp, Champion, LeRay, Philadelphia, and Wilna, Jefferson County and the Town of Diane, Lewis County, New York.** Provided on Accompanying DVD/CD
- Appendix C. Fort Drum, New York Integrated Natural Resources Management Plan 2011.** Provided on Accompanying DVD/CD
- Appendix D. Summer Mist Net and Radio-Telemetry Surveys for the Indiana Bat (*Myotis sodalis*) on Fort Drum, Jefferson and Lewis Counties, New York – 2007.** Prepared by Environmental Solutions & Innovations, Inc. Provided on Accompanying DVD/CD
- Appendix E. Fall Mist Net and Radio-Telemetry Surveys for the Indiana Bat (*Myotis sodalis*) on Fort Drum, Jefferson and Lewis Counties, New York – 2007.** Prepared by Environmental Solutions & Innovations, Inc. Provided on Accompanying DVD/CD
- Appendix F. Summer 2008 Bat Survey and Radiotelemetry Study Conducted at Fort Drum, Jefferson and Lewis Counties, New York.** Prepared by Copperhead Environmental Consulting. Provided on Accompanying DVD/CD.
- Appendix G. Summer Mist Net and Radio-Telemetry Surveys for the Indiana Bat (*Myotis sodalis*) on Fort Drum, Jefferson and Lewis Counties, New York – 2009.** Prepared by Environmental Solutions & Innovations, Inc. Provided on Accompanying DVD/CD
- Appendix H. Summer Mist Net and Radio-Telemetry Surveys for the Indiana Bat (*Myotis sodalis*) on Fort Drum, Jefferson and Lewis Counties, New York – 2010.** Prepared by Environmental Solutions & Innovations, Inc. Provided on Accompanying DVD/CD
- Appendix I. Fort Drum Military Installation Cantonment Area Indiana Myotis Survey, 2008 and 2009.** Prepared by West Virginia University Under US Forest Service Agreement # 09-PA-11092000-106. Provided on Accompanying DVD/CD

Appendix J. Section 7 Consultation April 26, 2011. Addendum to the January 2009 Biological Assessment (BA) for activities on Fort Drum Military Installation. Change in Project Description and Conservation Measure for Herbicide Application. Provided on Accompanying DVD/CD

Appendix K. Conservation Measures and Beneficial Actions for Indiana Bats on Fort Drum.

This appendix includes all conservation measures and other beneficial actions that are implemented on Fort Drum which directly or indirectly benefit the Indiana bat. These measures and actions are consolidated from Section 2. *Proposed Actions* are in addition to those outlined in Section 3 *Conservation Measures*.

Conservation Measures for Construction Activities

1. **Bat Conservation Area.** A 2,200+ ac (890 ha) Bat Conservation Area (BCA) is established to protect known Indiana bat roosting and foraging areas from permanent development within the Cantonment Area. The BCA attempts to provide connectivity of existing habitat in the Cantonment Area along the West Creek and Pleasant Creek corridors and the relatively undeveloped northern portion of the Cantonment Area where most of the known primary and maternity roosts are known. The BCA accounts for more than 20% of the total land area in the Cantonment Area. See *Section 3.1* for more information about the BCA.
2. **Roost Tree Protection.** All female roosts, including roosts identified in the future, will be protected from construction for the lifespan of the roost tree. Additionally, a buffer will be placed around all female roosts to protect the roost from disturbance and to maintain a semblance of a natural environment for Indiana bats. The size and shape of a buffer will be determined on a case by case basis by Fort Drum's Fish and Wildlife Management Program in consultation with the USFWS. Factors that will be considered will include surrounding landscape, habitat connectivity, distance to other roosts, distance to known foraging areas, and any other issue important to Indiana bats.
3. **Time of Year Restriction for Tree Falling.** A time of year restriction for clearing trees (> 4 in DBH) has been established to protect roosting Indiana bats during non-hibernation seasons. For the majority of construction activities, felling of trees must take place between October 15 - April 15 while most Indiana bats are at the hibernaculum. This will greatly reduce the risk of accidentally harming Indiana bats that may potentially be present in trees scheduled to be removed. Specifically, maternity colonies and their associated non-volant young will be protected from disturbance. Tree felling that will occur during the non-hibernation season (August 15 – October 14) and north and east of US Military Highway will be monitored for Indiana bats prior to clearing. If Indiana bats are found to be utilizing the site, Fort Drum will reinitiate consultation to determine the best course of action.
4. **Flagging or signs** will be used to demarcate forested areas to be cleared vs. not cleared prior to any construction activities for a given project. Flagging will be removed upon completion of the project.
5. **Via Environmental Protection Plans, Scope of Works, Contracts, etc.,** all personnel responsible for construction activities will be informed about the need to follow design plans, stay within flagging, minimize impacts to wildlife and other environmental concerns.

6. **Outdoor Lighting Minimization.** For all future projects, Fort Drum will evaluate the use of outdoor lighting and seek to minimize light pollution by angling lights downward or via other light minimization measures following Appendix O. Structures surrounding the BCA are in the final phases of being retrofitted to reduce lighting impacts in this known area of Indiana bat use. These areas should be completed by early 2012. High light levels may deter Indiana bats from areas as their nocturnal behavior may have evolved in response to predation risks (Speakman 1995, Sparks et al. 2005). By angling the light away from potential foraging and roosting areas, the area would be darker thus providing Indiana bats more protection from predators.
7. **Demolition.** If the building has pre-existing known bat colonies, then Fort Drum's Fish and Wildlife Management must be contacted before demolition is to occur. If during the course of demolition, bats of any species are discovered, then all work must cease and Fort Drum's Fish and Wildlife Management Program must be immediately contacted. If bats are identified as Indiana bats, then additional steps will be taken to try and minimize impacts to the species. If the structure is safe to leave as is, then it will be left until after October 15, or until bats have stopped using the structure. If the structure is unsafe and poses a risk to human health and safety, Fort Drum will attempt to exclude the bats immediately. If this is not possible, or bats are found to be using the structure during the maternity season when pups are not volant, the Fort Drum Fish and Wildlife Management Program will contact USFWS to discuss the most appropriate next course of action.
8. **Water Quality.** All construction activities with ground disturbance greater than one acre or that meets another requirement of the New York State Department of Environmental Conservation, are required to follow standards in New York State Pollutant Discharge Elimination System: Storm water General Permit for Storm water Discharges (Permit No. GP-0-08-001 Issued Pursuant to Article 17, Titles 7, 8 and Article 70 of the Environmental Conservation Law). All construction projects over an acre are required to prepare a sediment and erosion control plan or a storm water pollution prevention plan (SWPPP), which details all erosion and sediment control practices and, when necessary, post-construction storm water management practices. Practices mentioned within the SWPPP will be in accordance with the New York State Stormwater Management Design Manual ("Design Manual") dated August 2003, or the most current version or its successor. Erosion and sediment controls vary, depending on individual impacts from each project. Some temporary examples of erosion and sediment controls include silt fences, check dams, and sediment traps. Permanent controls may include retention ponds, detention ponds, and grass lined swales. With water quality control measures in place, it is expected that declines in water quality will be minimal and thus will continue to provide adequate habitat for Indiana bat prey and drinking water for Indiana bats. In fact, water quality may actually improve during the construction of future projects due to new stormwater practices that mitigate for old water quality issues when no conservation measures were required or implemented.
9. **Record-keeping and Reporting.** For annual reporting purposes, all entities responsible for construction activities on Fort Drum will submit electronic shapefiles of clearing limits to Fort Drum's Fish and Wildlife Management Program. This information will be used to describe vegetative cover types and habitat loss on Fort Drum and reported annually to the USFWS.

10. Only small wind turbines similar in nature to the ones described in *Section 2.1.1.4* will be used on Fort Drum during 2012-2014. All turbines will have a programmable break. If any myotine bat is killed due to operation of the two wind turbines on Fort Drum, the appropriate turbine will be immediately shut off during the time of year Indiana bats are assumed to be present on the property (April 15 - October 14). If both turbines are found to be causing negative impacts, both will be shut off during the time of year or day Indiana bats are present on, or utilizing the property, respectively.

Beneficial Actions for Construction Activities

1. Time of Year Restriction for Land Clearing. For all construction activities requiring the removal of natural vegetation, a time of year restriction for clearing vegetation (i.e. shrubs, trees < 4 in DBH) has been established between April 15 - August 1. This time of year restriction has been in place since 2003 in order to minimize take of migratory birds and their young in accordance with the Migratory Bird Treaty Act. All attempts are made to avoid land clearing during this time period, but due to unforeseen shifts or changes in projects, it may be necessary to remove non-forested vegetation during this time.
2. Minimizing Building Footprints. To minimize environmental impacts, construction activities attempt to minimize building footprints by combining infrastructure (i.e. roads, utility lines, etc.) for multiple buildings or by constructing multi-story versus multiple or expanded single story buildings whenever possible
3. Bat Roost Minimization in Buildings. Buildings will be appropriately designed and constructed so cracks and crevices are not created, vents are screened, etc. Properly constructed buildings will discourage bats from roosting in buildings, thus minimizing human/bat conflicts in occupied dwellings.
4. Stormwater Management. Fort Drum anticipates reviewing stormwater management plans with the objective of moving towards integrated infrastructure to reduce the number or completely eliminate the need for stormwater retention ponds and the excessive land use required.

Conservation Measures for Military Training Activities

1. a) No Category 1 smoke operation will be conducted within 1,000 m of the installation boundary, public roads, Cantonment Area, ammunition supply point or WSAAF in accordance with *Fort Drum Regulation 350-4 Range Regulation* and *Fort Drum Regulation 350-6 Assignment and Operational Use of Local Training Areas (LTAs)*. This restriction currently protects all known Indiana roosts and the majority of the known maternity use area (i.e., roosting and core foraging area) from close proximity smoke exposure (Figure 2.8).

b) In the Training Area, Category 1 smoke and obscurants must be used >100 m from any known Indiana bat maternity roost areas between April 16 – October 15. This will help to protect Indiana bat roosts into the future. The 100 m buffer serves to minimize

the effects of smoke and obscurants by providing distance between the roost and the densest amount of the smoke/obscurants. Training missions will be aware of maternity areas via the NEPA process and will be directed to avoid these areas (Appendix P).

c) Category 1 smoke operations must also be rotated among training areas to minimize impacts to any one area.

d) The use of Category 2 smoke (aka pyrotechnics) may be used in the Training Areas at any time within 1,000 m of the installation boundary, but will not be used within 100 m of any known Indiana bat maternity roost areas between April 16 - October 15.

e) Category 2 smoke may not be used within 100 m of any forested areas within the LTAs between April 16 - October 14. The prior time of year restriction identified in *Fort Drum Regulation 350-6 Assignment and Operational Use of Local Training Areas (LTAs)* was April 16 - September 30, however because of the new information about the temporal use of Fort Drum by Indiana bats, this restriction has been modified. Approval from Range Control and NEPA review is required prior to any use of Category 2 smoke, and these reviews will help ensure that Category 2 smoke use is in accordance with this conservation measure.

f) Category 2 smoke may be periodically used at three mobile MOUTs within the LTAs – (one mobile MOUT is in an open area of the BCA and one is in an open area near the BCA) during April 15 - October 15. Only infrequent use of colored smoke is expected to be used in around the mobile MOUTs. The closest known roost tree to the Mobile MOUTs is approximately 550m away. With the exception of the Category 2 colored smoke used at the mobile MOUTS, no other smoke or obscurant may be used in the BCA. Currently, all known maternity roosts are found within the BCA or within a 1,000 m from the installation boundary.

2. In the Training Area and LTAs, the cutting of trees and tree removal is prohibited without approval by Fort Drum's Forest Management Program in accordance with current Environmental Guidelines. If approved, actions will be in accordance with all conservation measures in *Section 2.3 Forest Management*. In general, this is a relatively rare military training action. No female roosts, including roosts identified in the future, will be felled for training for the lifespan of the roost. No tree felling will occur in the BCA for training purposes.
3. In the LTAs, vehicular traffic is restricted to open grassy areas within easy access of the road in accordance with *Fort Drum Regulation 350-6 Assignment and Operational Use of Local Training Areas*. Vehicles are not permitted to cross streams, ditches, wetlands, or dense vegetation in order to reach grassy areas without prior NEPA review, thus minimizing impacts to natural habitats.
4. In the LTAs, POL operations are prohibited in accordance with *Fort Drum Regulation 350-6 Assignment and Operational Use of Local Training Areas*. This helps to minimize the risk of accidental water/ground contamination.

5. Fort Drum will abide by the Fort Drum Integrated Wildland Fire Management Plan (Fort Drum 2005) which includes fire danger ratings, unless under special circumstances that are approved by the commander. Military activities that may spark fires will not be conducted during moderate to high danger ratings in order to prevent unintentional wildfires. This will protect Indiana bats from smoke exposure and from roost destruction. Burn bans are most likely implemented during the summer months when reproductive Indiana bats are present on Fort Drum.
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Conservation Measures for Forest Management Activities

1. Bat Conservation Area. Approximately 2,200 ac (890 ha) have been set aside for Indiana bats. Timber harvests will not occur within the BCA until an appropriate management plan is developed and the plan has been consulted on. If timber harvesting is needed within the BCA, then consultation with the USFWS is needed.
2. Roost Tree Protection. No female roost trees, including roosts identified in the future, will be felled for the lifespan of the roost. This includes roost trees in and outside of the BCA.
3. Roost Tree Avoidance. Clearcutting and overstory roost tree removal will not occur within 0.75 mi (1.2 km) of known maternity roost trees located outside the BCA without further consultation with the USFWS. Selective thinning will not occur within one tree height of the known roost tree to minimize the risk of accidentally felling a known maternity roost during the non-hibernation season. Tree height is based on the average height of the stand (~80 ft (24 m)) surrounding the roost tree. For selective thinning harvests within 0.75 mi of a known maternity roost, all snags and live trees > 16 in DBH that have noticeable cracks, crevices, or exfoliating bark will be retained. Currently, all known Indiana bat roost trees are within the BCA or in Training Area 3. No timber harvests are planned to occur in the Cantonment Area in the next three years. Further consultation will be needed with the USFWS for timber harvests that do not follow this conservation measure.
4. Firewood Cutting Restriction. The known primary roosting areas (those areas behind Guthrie Clinic and Cool Road) have been made off limits to firewood cutting during April 15 – October 15. Although firewood harvest only removes trees that are lying on the ground, this restriction will help avoid any associated noise or disturbance in the roosting areas from chainsaws and/or tractors used in the harvest of the wood.
5. Time of Year Restriction. A time of year restriction for clearing trees (> 4 in DBH) has been established to protect roosting bats during non-hibernation seasons. Felling of trees must take place between October 15 - April 15 while most Indiana bats are at the hibernaculum with the exception of 500 ac (202 ha) of early successional forests or conifer forests north and east of US Military Highway which may be harvested between August 15 - October 14. This will reduce the risk of accidentally harming Indiana bats that may potentially be present in trees scheduled to be removed. Specifically, the known maternity colony and any associated non-volant young will be protected from this disturbance.

6. For timber harvests that may occur in August -October, all snags will be left standing and an adequate amount of live residual trees will be left around each snag to minimize the effects of windthrow. In addition, live trees that are >16 in DBH that have noticeable cracks, crevices, or exfoliating bark will not be felled and also have adequate amounts of live residual trees surrounding it to minimize windthrow. This conservation measure seeks to reduce the risk of felling a tree with roosting Indiana bats.
7. Snag Retention. Indiana bats select areas that have high snag densities for establishment of maternity colonies, so snag retention will benefit roosting Indiana bats by providing areas to rear young. All snags will be left in silvicultural treatments unless there is a safety concern for the contractor, or unless the treatment is a salvage harvest or clearcut. Snags should be distributed and retained throughout the landscape. At a minimum, contractors are required to leave a minimum of three snags > 9 in DBH every five acres for all silvicultural treatments. Two snags must be "hard" (i.e., a snag expected to stand for a number of years and more than likely has exfoliating bark) and one snag must be "soft" (i.e., a snag that may or may not have exfoliating bark and has the potential to fall within a couple of years).
8. No cutting of trees will occur within or along the bed or bank of streams protected under Article 15 of the New York State Environmental Conservation Law unless required to meet specific management goals and only after obtaining a permit from NYSDEC.
9. A minimum of 70 sq ft of residual basal area, all snags, and all live trees > 16 in DBH that have noticeable cracks, crevices, or exfoliating bark will be retained around all perennial streams and open waterbodies (2 ac or greater in size) on Fort Drum. A perennial stream is defined as having flowing water year-round during a typical year. The water table is located above the stream bed for most of the year. Groundwater is the primary source of water for stream flow. Runoff from rainfall is a supplemental source of water for stream flow. If silvicultural treatments are needed that do not meet this conservation measure and that do not have a "no effect" determination, then individual consultation will be required with the USFWS. This buffer protects water quality and provides foraging habitat for Indiana bats. Indiana bats are known to utilize riparian corridors that have suitable vegetative cover for foraging and for roosting in nearby trees (Garner & Gardner 1992).
10. For annual reporting purposes, the Forest Management Program will provide shapefiles of harvested areas, vegetative cover types pre- and post-harvest (within a scaled map), and the harvesting method used (i.e., clearcut, selective thinning of 50% of aspen under 4 in DBH, etc) to Fort Drum's Fish and Wildlife Management Program. This information will be used to describe the vegetative cover types and habitat modification on Fort Drum and will be reported annually to the USFWS.

Beneficial Actions for Forest Management Activities

1. If possible, new log landings will be constructed at least 200 ft (61 m) from water bodies and wetlands.
2. Spill kits and oil absorbent mats will be present on log landings in case of fuel, lubricant or hydraulic fluid spills or leaks.
3. If necessary, soil will be stabilized by seeding and mulching at the end of the operation.

4. Where possible, skid trail grade will be maintained at less than 15%. Where higher grade is unavoidable, the grade will be broken, drainage structures will be installed, and soil stabilization practices will be used where needed to minimize runoff and erosion.
5. Debarking and other damage to residual trees will be minimized wherever possible.
6. Stream crossings will be used only when absolutely necessary.
7. Streams will be crossed by the most direct route.
8. Ruts will be filled in, and water bars and erosion barriers will be installed to prevent or minimize erosion and sedimentation from roads, skid trails and log landings.
9. Erosion control measures will be inspected within 24 hours after a rain event and checked once per week. Erosion controls will be maintained or removed as needed.
10. No machinery will be operated in streams protected under Article 15 of the NYS Environmental Conservation Law without first obtaining a permit from NYSDEC.
11. Oak Tree Retention. During hardwood removals, dead or dying oak trees that may have been typically removed from the stand will be left in the targeted units. This would be limited to areas that receive large amounts of sunlight during the day (e.g. the edge of the stand, near an opening within the stand, etc.) to provide roost trees for Indiana bats and other wildlife.
12. Live Tree Retention near Wetlands. Whenever possible, a percentage of suitable live trees (i.e., trees that look as if they have the potential to develop into future snags) will be retained, so cavities appropriate for wildlife may develop and for future snag recruitment. Suitable trees will be long lived hardwoods >15 in DBH and have the greatest potential to develop cavities. In wetland areas 10 ac (4 ha) or larger with open water and shorelines greater than 30 m apart, 20 suitable trees will be left for every 50 ac (20 ha) harvested within 0.5 mi (0.8 km) of wetlands. Although this measure was originally developed to benefit cavity nesting waterfowl species (e.g., wood ducks and hooded mergansers), it can also benefit Indiana bats. By retaining trees near wetlands that have the potential to develop into snags, future potential Indiana bat roosts will be located near water sources and potential foraging areas.
13. Forest Openings. When possible, unique forest openings (e.g. patch cuts of aspen varying from 1-10 ac in size removed from the stand) will be provided. This action will create openings in wooded habitat that can provide foraging opportunities for Indiana bats (Brack 2006).

Conservation Measures for Mechanical Vegetation Management Activities

1. Time of Year Restriction for Tree Falling. A time of year restriction for clearing trees (> 4 in DBH) and removing low- to medium-risk hazard trees has been established to protect roosting bats during non-hibernation seasons. Felling of trees must take place between October 15 - April 15 while most Indiana bats are at the hibernaculum. This will greatly

reduce the risk of accidentally harming Indiana bats that may potentially be present in trees scheduled to be removed. Specifically, maternity colonies and their associated non-volant young will be protected from this disturbance.

2. **Roost Tree Protection.** No female roost trees, including roosts identified in the future, will be removed unless determined to be high risk hazard trees (see #3 below). Hazard trees that are not considered high risk, will be removed during the winter. Roost trees may not be removed for any other reason (e.g., aesthetically unappealing).
3. **High Risk Hazard Trees.** For hazard trees that are determined to be high or critical classified between April 16 – October 14, Fort Drum's Fish and Wildlife Management Program personnel will be notified in advance, so they may assess the hazard tree. If appropriate, an emergence survey will be conducted and if no bats are observed, then the roost tree will be promptly removed. This will reduce the risk of removing an undiscovered roost tree. If bats are observed, then further consultation with the USFWS is needed.
4. **Reporting.** Personnel responsible for each vegetation management action must provide a scaled map of the treated area, specify the type of management action that occurred, report the total acreage of impacted habitat, and the vegetative cover types that were managed (i.e., number of hazard trees removed, amount of shrubland habitat cleared) to Fort Drum's Fish and Wildlife Management Program for annual reporting requirements to the USFWS. Mowing of landscaped grass in the Cantonment Area does not need to be documented.

Beneficial Actions for Mechanical Vegetation Management Activities

1. Typically, clearing natural vegetation for maintenance purposes (e.g. not landscaped yards or open areas) is conducted between August 1 - April 15 to minimize the impact to migratory birds.
2. Vegetation management for military readiness is conducted year-round although it is recommended that shrubs and small trees (< 4 in DBH) not be removed between April 15 - August 1 in order to minimize impacts to migratory birds and to maintain foraging areas for bats.
3. If soils are impacted by vegetation clearing, degraded areas will be repaired via actions that may include grading, compacting, seeding, and application of fertilizer, lime, and mulch. In the past, vegetation management activities typically have not disturbed soils to such an extent that repair work was necessary. This minimizes erosion run-off into waterways, and thus protects water quality and associated invertebrate abundance, including possible prey for Indiana bats.
4. Vegetation management activities typically avoid delineated water bodies/wetlands. Although there is no formal buffer requirement around wetlands, a 20-30 ft (6-9 m) buffer is typically maintained around identified wetlands. By retaining shrubs and small trees around wetlands, it passively directs military activities (i.e. vehicle maneuvers) from these areas to more upland, drier sites. This leads to less military impacts to water quality and protects water sources for Indiana bats.

Conservation Measures for Prescribed Fire Activities

1. **Development and Implementation of the Prescribed Fire Plan.** Protocols are established within the prescribed fire work plans to closely control where, when, and how fires are set. This helps to control where flames and smoke occur on the landscape. Because both flames and smoke could negatively impact Indiana bats, it is important to try and minimize potential impacts from both. Currently, no known maternity areas are known to exist within close proximity to any of the burn units, however, if new maternity roosts are discovered near proposed burn sites, then burn plans may be written to include additional provisions that protect maternity roosts by diverting smoke or flames from the roost, when possible.
 2. **Wet Lines.** Wet lines will be established around forested areas to preclude fire from entering, to the maximum extent practicable.
 3. **Time of Year Restriction.** No burning may occur from May 15 - September 15 to prevent smoke and possible fires from penetrating forested areas where non-volant young bats may be present. Therefore, even if a prescribed fire enters a forested area, there should be no non-volant young present.
 4. **Time of Day Restriction.** Whenever possible, all efforts will be made to have all flames extinguished and smoke generation minimized by sunset to reduce potential direct impacts to foraging Indiana bats.
 5. **Record-keeping and Reporting.** For annual reporting purposes, all entities responsible for prescribed fire activities on Fort Drum will submit electronic shapefiles of prescribed fire limits to Fort Drum's Fish and Wildlife Management Program. This information will be used to describe vegetative cover types and habitat modification on Fort Drum and reported annually to the USFWS.
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Conservation Measures for Pesticide Application Activities

1. Only pesticides registered by the EPA and State of New York may be applied and only in accordance with their label.
2. Aerial applications will occur between the hours of sunrise and one hour before sunset. This will protect foraging bats in undiscovered foraging areas from direct exposure.
3. Aerial application of pesticides in the BCA is prohibited without further consultation with the USFWS.
4. Application of pesticides that result in broad dispersal (i.e., vehicle mounted spraying) will be conducted at least 100 ft (30 m) away from known roost trees (including roosts identified in the future) and 250 ft (76 m) from known primary roosts. Pesticides will be applied between sunrise and one hour before sunset. Location-specific applications (i.e. hatchet injections of trees, individual application to specific plants) may be used within 100-250 ft (30-76 m) of known roosts. This measure minimizes the risk of exposure to Indiana bats and potential effects from pesticides.

5. Pesticides will not be applied outdoors when the wind speed exceeds 8 mi/hr. This is to reduce the risk of pesticide drift, which could impact water quality or non-target areas. Care will be taken to make sure that any spray drift is kept away from non-target areas and individuals. Additionally, aerial application would deploy large droplets through special nozzles on drop tubes that ensures the herbicide stays on target better than previous, conventional small droplet size technology.
 6. If a bat colony is found roosting in a building, then insecticides will be used sparingly and no foggers will be used. This will minimize impacts to roosting Indiana bats if they are found within a building. Currently, only one colony of bats has been located on Fort Drum. The LeRay Mansion houses several hundred little brown bats according to a survey conducted in 2007. No Indiana bats were identified in the survey.
 7. For each pesticide application, Pest Control will report the total amount of PAI used for each pesticide, the size of the treated area (within a scaled map), and the vegetative cover types that were treated to Fort Drum's Fish and Wildlife Management Program for annual reporting purposes to the USFWS. For pesticides applied indoors or immediately along the exterior of the building, only the PAI needs to be reported—no map is required or vegetation types need to be reported.
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Conservation Measures for Wildlife Management/Vertebrate Pest Control Activities

1. No Lethal Control. No lethal control methods are permitted for bats unless there is a suspected human health risk for exposure to rabies or other disease. If individual bats are in buildings and there is no evidence of maternity use, then all efforts will be made to safely capture and release individual bats. Or, the bats will be excluded by establishing one-way valves over the roost's exit (if feasible).
2. Time of Year Restriction for Exclusion. The exclusion will only be done during times of the year when pups are not present or when they are volant (i.e. August - early May). The time of year restriction will minimize the risk of separating mothers from non-volant young, so it will prevent potential pup mortality during exclusion activities. Sealing cracks and crevices in buildings will also be done during the late fall or early spring. This is based on the assumption that no bats hibernate in buildings on Fort Drum, which is a valid assumption given the narrow temperature requirements necessary for hibernating bats and the heating of buildings (Tuttle & Kennedy 2002) and the fact that no bats have been found hibernating in buildings to date. Sealing cracks and crevices prevents bats from entering a building and reduces human/bat conflicts.
3. Adhesive Trap Restrictions. No adhesive traps used for rodents or insects will be placed in such a manner that they could capture bats—glue traps will not be placed in any crawl space or attic compartment within buildings or in areas where bats are known to occur.

Beneficial Actions for Wildlife Management/Vertebrate Pest Control Activities

1. Bat Houses. Two large bat structures have been successfully installed and utilized near LeRay Mansion. Additional bat houses may be erected throughout the Installation to provide alternate roosting opportunities for bats.

2. **Systematic Planning & Exclusion.** Any future exclusion of colonies of bats (such as the LeRay Mansion colony) will only be done through a systematic process. Exit counts will be performed to determine approximate numbers of bats utilizing the structure and alternate roosting structures with enough capacity for the colony will be provided in the area (when practicable) prior to any exclusions or sealing of exit holes. The exclusion will only be done during times of the year when pups are not present or when they are volant (i.e. August - early May) to avoid potentially trapping and killing any non-volant pups.
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Conservation Measures for Outdoor Recreation Activities

1. **Skeet Range.** Skeet shooting at the current skeet range is located adjacent to the BCA and fires over a known fall, summer, and assumed spring foraging location of Indiana bats. From April 15 - October 15, the skeet range's hours of operation will be no earlier than 30 minutes after sunrise and no later than 1 hour before sunset. This measure will prevent the accidental shooting of an Indiana bat during the non-hibernation seasons.

Appendix L. Little Brown Myotis Persist Despite Exposure to White-Nose Syndrome. Journal of Fish and Wildlife Management 2(2):xx–xx; e1944-687X. doi: 10.3996/022011-JFWM-014. Available: <http://www.fwspubs.org/toc/fwma/0/0>

Appendix M. Army Compatible Use Buffer Program Fact Sheet for Landowners.
Provided on Accompanying DVD/CD

Appendix N. Example Army Compatible Use Buffer Program “Agricultural Easement”. Provided on Accompanying DVD/CD

Appendix O. Outdoor Lighting Minimization Measures.

Purpose

The purpose of the Fort Drum Outdoor Lighting Guidelines is to regulate outdoor lighting in order to reduce or prevent light pollution. This means to the extent reasonably possible the reduction or prevention of glare and light trespass, the conservation of energy, and promotion of safety and security. These Guidelines will ensure appropriate outdoor lighting in compliance with the Endangered Species Act and in accordance with the Fort Drum's Army Strategic Plan for Sustainability.

Definitions

- a. **Fixture Height:** height of the fixture shall be the vertical distance from the ground directly below the centerline of the fixture to the lowest direct light emitting part of the fixture.
- b. **Foot-candles:** a unit of illumination of a surface that is equal to one lumen per square foot. For the purposes of these regulations, foot-candles shall be measured at a height of 3 ft. above finished grade.
- c. **Fully Shielded Light:** light fixtures shielded or constructed so that no light rays are directly emitted by the installed fixture at angles above the horizontal plane as certified by a photometric test report. The fixture must also be properly installed to effectively down direct light in order to conform with the definition.
- d. **Light Trespass:** the shining of light produced by a light fixture beyond the boundaries of the property on which it is located.
- e. **Lumen:** the unit of luminous flux, the total amount of light falling uniformly on or passing through an area of 1 square foot, each of which is 1 foot from a 1-candela source, yielding an illuminance of 1 foot candle at that distance (the output of lamps and bulbs is customarily measured in lumens, a common 100 watt incandescent light bulb, for example, having an output less than 1,800 lumens).
- f. **Point Light Source:** the exact place from which illumination is produced (i.e., a light bulb filament or discharge capsule).
- g. **Sag-lens or Drop-lens:** A clear or prismatic refracting lens that extends below the lowest opaque portion of a light fixture.

Applicability

All outdoor lighting fixtures installed, retro-fitted, or replaced on Fort Drum property shall comply with these regulations. These regulations do not apply to interior lighting.

Exemptions

The following are exempt from the provisions of these guidelines:

- a. Traffic control signals and devices.
- b. Temporary emergency lighting (i.e., fire, police, repair workers).
- c. Moving vehicle lights.
- d. Navigation lights (i.e., airports, heliports, radio/television towers).
- e. Seasonal decorations with individual lights in place no longer than 60 days.
- f. Lighting for flags. Efforts should be made in these areas to minimize sky glow and light trespass whenever feasible.
- g. Sports field outdoor lighting (i.e. ball fields, football, soccer, ice rink, etc.). Sports outdoor lighting is to be turned off when a sporting event is not occurring.
- h. Other special situations for temporary or periodic events (i.e. fairs, festivals, carnivals, night-time construction).
- i. Security lights of any wattage that are controlled by a motion-sensor switch and which do not remain on longer than 10 minutes after activation.
- j. Access points, Army Supply points, or other high security areas subject to AR 190-11 or TM-8-583-2. Efforts should be made in these areas to minimize sky glow and light trespass whenever feasible.

Additional exemptions may be provided after coordination with Fort Drum's Fish and Wildlife Management Program.

General Standards

The following general standards shall apply to all outdoor lighting installed, retrofitted, or replaced on Fort Drum, which is not exempted above:

- a. Outdoor lighting must be hooded, fully shielded (i.e. full cutoff fixtures), and/or aimed downward. Outdoor lighting used to illuminate parking spaces, driveways, maneuvering areas, or buildings shall conform to the definition for "fully shielded light fixtures" and be designed, arranged and screened so that the point light source shall not be visible from adjoining lots (i.e. woodlands) or streets.
- b. The intensity of light within a site shall not exceed two (2) footcandles at any property line, edge of pavement, or road.
- c. The hood or shield must mask the direct horizontal surface of the light source. The light must be aimed to insure that the illumination is only pointing downward onto the ground

surface, with no escaping light permitted to contribute to sky glow by shining upward into the sky.

- d. Any bright light shining onto adjacent properties (i.e. woodlands) or streets which would result in a nuisance glare or a disabling glare shall not be permitted. Light trespass beyond property boundaries or above the horizontal plane shall be considered non-compliant.
- e. Existing fixtures may be adapted to comply with these guidelines by adding a properly designed hood or shield, or by pointing any upward-mounted, shielded fixture downward onto the ground surface.
- f. All outdoor lighting fixtures shall be designed, installed, located and maintained such that nuisance glare onto adjacent properties (i.e. woodlands) or streets shall be minimized and all direct illumination kept within the boundaries of a building's property.
- g. Accent lighting shall be directed downward onto the building or object and not toward the sky or onto adjacent properties (i.e. woodlands). Direct light emissions shall not be visible above the roof line or beyond the building edge.
- h. Spotlighting on landscaping and foliage shall be limited to 150 watts (2220 lumens output) and lighting is to be angled downwards. The lamp shall be fully shielded and not create disabling or nuisance glare.
- i. No sag-lens or drop-lens are to be used.

Appendix P. Description of National Environmental Policy Program REC Process

IMNE-DRM-PWE

MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: Standard Operating Procedures (SOP) for Environmental Review Requirements.

1. PURPOSE: To outline the policies, procedures, and duties of all proponents involved with military and/or civilian training, construction, demolition, maintenance, repair, of facilities or equipment, land management, ground surveys, and mitigation actions, as well as other activities that may affect the environment IAW the National Environmental Policy Act (NEPA) on Fort Drum.

2. SCOPE: This SOP is applicable to all proponents including military and civilian personnel, government contractors and subcontractors.

3. REFERENCES:

a. 32 CFR Part 651, Environmental Analysis of Army Actions, 29 March 2002 (formerly AR 200-2).

b. 40 CFR Parts 1500-1508, Regulations for Implementing The Procedural Provisions of the National Environmental Policy Act. 1 July 1986.

c. 42 U.S.C. §§4321-4370c National Environmental Policy Act

d. AR 200-1, Environmental Protection and Enhancement, 28 August 2007.

e. AR 200-3, Natural Resources - Land, Forest and Wildlife Management, 28 February 1995.

f. Fort Drum Regulation 350-4, Range Regulation, Appendix 0, 1 March 2007.

g. Fort Drum Form 541, Record of Environmental Consideration. (Enclosure A)

4. RESPONSIBILITIES: Federal law and Army Regulation require environmental review of all actions and documentation for all federal actions that have the potential to affect the human environment (e.g. military training, new technology, equipment testing, construction projects, land management actions, and real property transactions, etc). All proponents are responsible for the documentation of their proposed actions and submission to the NEPA Program office of the Public Works Environmental Division, Fort Drum, NY. The level of documentation necessary is determined by criteria set forth in 32 CFR 651. Integration of NEPA procedures early in the planning process will ensure maximum efficiency while determining the appropriate level of documentation. No project can be started before the NEPA consultation/review takes place.

a. "Proponent" is defined as: "the unit, element, or organization (military or civilian, tenant or contractor) that is responsible for initiating and/or carrying out the proposed action. The proponent has the responsibility to prepare or secure funding for preparation of the appropriate level environmental documentation."

b. IAW 32 CFR 651, the environmental review process is to be initiated early in the concept/planning stages of a proposed action. The proponent is required to pay for the preparation of the necessary documentation and in some cases the associated surveys needed for site evaluation that outlines the description of the proposed action and alternatives to the proposed action.

c. Examples of proponents:

1) The G3/Ops community is the proponent of a Division FTX, development/use of new ranges and maneuver areas, fielding/testing of weapons systems, non-BRAC realignment and stationing.

2) The G4/Logistics community is the proponent for developing, testing, and producing new systems.

3) Directorate of Plans, Training and Mobilization (DPTM) is proponent of Military Construction Army (MCA) projects, range maintenance and field enhancement actions, etc.

4) Public Works (PW) is proponent for infrastructure, remediation, buildings, etc.

5. LEVELS OF DOCUMENTATION: There are three main levels for NEPA documentation. Each of which has specific levels of analysis and complexity and is dependent on the extent and significance of the impact.

a. The simplest level of documentation of an action is the Record of Environmental Consideration (REC). This document and its associated categorical exclusions are used when an action individually and cumulatively has already been determined not to have a significant impact on the human environment but does have effects that need to be documented.

b. A more complex level of documentation is the Environmental Assessment (EA). This document is intended to facilitate agency planning and decision-making by increasing the understanding of the potential effects of a proposed action and any alternatives to the action on the human environment.

1) An EA requires the publishing of a Finding of No Significant Impact (FNSI), which describes the EA's conclusions.

2) The FNSI requires a 30-day public comment period.

c. The most comprehensive level of NEPA documentation is the Environmental Impact Statement (EIS). This document is a detailed written statement required by NEPA for major federal actions that do have a significant impact on the human environment and includes an extensive analysis of the action and the alternatives. Public meetings and hearings as well as three published public documents are required components of an EIS.

- 1) Notice of Intent (NOI) - A public notice that an EIS will be prepared.
- 2) Notice of Availability (NOA) - Published to inform the public that the EIS is available for review.
- 3) Record of Decision (ROD) - A concise public document summarizing the findings and the basis for the decision.

6. DOCUMENTATION PROCEDURES:

a. Record of Environmental Consideration (REC) forms for military training and other actions (IAW Ref. a.) that qualify for established categorical exclusions shall be filed with the NEPA office of PW, Environmental Division a minimum of 14 business days (three weeks) prior to the start of a proposed project or training except those described in section 6.b. Large training missions (i.e., Division and Brigade Levels) or actions, and missions/actions of more than two-week duration, shall coordinate and submit REC forms a minimum of 30 business days prior to training as part of the planning process.

b. Actions that propose restoration, repair, maintenance, enhancement, construction, demolition, fielding, research and development, etc. are required to be coordinated with the NEPA Office for environmental review a minimum of 90 calendar days prior to expected start date of proposed action. The environmental review process may necessitate having PW personnel conduct site visits, natural resources surveys, cultural resource surveys, consultation with or submittal of permit applications to regulators, which may result in the requirement for additional information to be provided by the proponent.

c. An Annual Work Plan that includes actions to be performed on unimproved, improved and semi-improved areas (IAW Ref. e.), will allow for the review and documentation of a large number of actions with one REC form, thus reducing the time for review and paper work for these actions.

d. When a military mission is underway, a 24-Hour Notice is required for approval of changes in the scope of the project or mission components or locations. Units must realize that they may be moved to accommodate short notice requests.

e. **Whenever any action or project is modified or changed** the proponent is responsible to ensure the modification/change has been re-examined by Environmental Division for environmental compliance.

f. It is highly recommended that units request alternative locations on original REC forms whenever possible.

g. Units are asked to consolidate all actions for a training period onto one REC form (i.e., AT, Mountain Peak, etc.).

h. REC forms, once approved, shall be retained with the proponent in the field. Engineer and other support units are required to have in their possession a copy of the approved REC prior to project or support action. The unit receiving support is the proponent responsible for submitting the REC for review and approval.

i. The REC form (Fort Drum Form 541, 1 Nov 96) is available on Mountainet at <https://mountainet.drum.army.mil/garrison/forms> and from the PW, Environmental Division NEPA Office, at building 4848.

j. Emergency Situations are handled on a case-by-case basis in such a way as to address concerns while attending to the situation at hand. Emergency situations require documentation reference a noted above.

7. SUBMITTAL INFORMATION: The following is the information necessary for submittal of a REC form:

a. Provide the project name and work order number and/or name of the action (e.g. Bold Shift, Mountain Peak 03, Global Patriot, EZ-00003-3J Clean and Repair Oil Water Separators, CF-12345-5J Upgrade Range 19, etc.).

b. Specify the date and duration of the proposed action beginning with the field preparation date and ending with the field closure date. All surveys that have potential to impact the project site are to be disclosed for environmental review prior to undertaking (e.g. boring samples, drilling of wells, other resources surveys, any excavation, etc.).

c. List the proponent: unit/office name, address, point of contact, phone number, and email address.

d. Describe the proposed action:

1) Training Area, building or Natural Resources Management Unit (NRMU) and an 8-digit grid coordinate is required for all static positions.

2) Radial distance needed, in meters, from the center grid (no greater than 300m Radius).

3) Level of activity: number of personnel, number and type of equipment, number and type of weaponry, etc.

4) Describe the type of activity:

(a) Mess/shower/laundry: include the amount of gray water and the number of soakage pits requested (specify dimensions).

(b) Decontamination (DECON): All vehicles shall be washed at authorized wash rack prior to DECON activities. Use of soaps/solvents or other chemicals is strictly prohibited. Spraying of vehicle engines and undercarriages for any purpose is strictly prohibited. Include the water source, number/type of vehicles, and the number of gallons to be sprayed per day/mission.

(c) Water purification or treatment, etc.: water source point, number of gallons of water, chemicals used and at what concentration.

(d) Water crossing or bridging operations are prohibited unless all applicable Federal and State water/wetland permits are in hand. Coordination is therefore essential to assure permits are applied for, received and approved prior to the start of the action.

(e) Petroleum, Oils and Lubricants (POL): number of gallons on site, type of product and how stored (i.e., truck/tank/bladder, on or above the ground storage or fixed). Secondary containment of stored POL is required IAW GPM # 27 and New York State Law.

(f) Maintenance: specify the type/level of maintenance and detail the proposed activity (i.e., estimate gallons of waste fluids, storage methods, etc.). Locations for TM-10/20 and DS maintenance are approved on a case-by-case basis. Field spill kits are required (i.e., clear plastic bags, shovels, absorbent pads, etc.). Early coordination with the PW, Environmental Division POL Program is required for fluid collection and additional guidance.

(g) Excavation: type (i.e., borrow pit, grading, trenches, survivability positions: one-man, two-man, crew served, bunkers, tracked or wheeled vehicles, etc.). Provide dimensions, configurations, equipment required to accomplish task, supporting unit, preparation date, closure date, etc.

(h) Construction/Renovation: description of proposed action and purpose. This includes all contract, troop labor, self-help requests, Maintenance Repair Rehabilitation (MRR) projects, and Job Order Contract (JOC) projects, etc.

(i) Land and Habitat Management actions on unimproved ground (IAW Ref. e.), that restore, maintain or enhance land under federal control, should be included in an annual work plan, and submitted for environmental review a minimum of 90 calendar days prior to proposed start date of the action. Prior to review of project, a detailed description of the action, a map of location and an accurate footprint of the proposed action are required. Species lists and procedural components "sampling protocols" are a necessary component of this type of action. Early coordination through the NEPA process is essential for these types of activities. The environmental review process may necessitate site visits, surveys, consultation with, site visits by or submittal of permit applications to regulators, and may result in time delays, and the requirement for additional information to be provided by the proponent and the possibility that the level of NEPA documentation may need to be elevated. Actions on previously improved ground should also be included in an annual work plan but this action would generally only require the normal 14-business day review.

(j) All other actions not defined above shall require consultation with the PW, Environmental Division, NEPA Program to determine the appropriate course of action for NEPA compliance. Minimum of 90 calendar days prior to proposed action is required to initiate consultation process. It is required by regulation 32 CFR 651 for this office to be brought in at the concept phase of all proposed actions.

8. CONTACTS: For additional guidance and information please contact either the NEPA Program Manager at 315-772-5110 or the NEPA Biologist at 315-772-6899.

Encl
Fort Drum Form 541

KENNETH H. RIDDLE
Colonel, US Army
Garrison Commander