FORT DRUM, NEW YORK

BIOLOGICAL ASSESSMENT FOR THE INDIANA BAT (*Myotis sodalis*)

2009 – 2011

November 2008

Updated January 2009

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Executive Summary

Fort Drum is a 107,000+ ac U.S. Army installation in northern New York. Fort Drum 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 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, 2009 – December 31, 2011. 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 consultation with the USFWS. This BA was prepared in accordance with legal requirements set forth under Section 7 of the Endangered Species Act (16 U.S.C. 1536 (c)).

Indiana bats were first confirmed on Fort Drum in 2006. The nearest known Indiana bat hibernaculum is Glen Park where approximately 2,000 Indiana bats hibernate annually. Glen Park is approximately 6.5 mi (10.5 km) from Fort Drum's Cantonment Area. During the summers of 2007 and 2008, 122 mist net surveys have been conducted on Fort Drum following USFWS guidelines. Twenty Indiana bats were captured—17 in the Cantonment Area, two in Training Area (TA) 3, and one in TA4. Additionally,15 Indiana bats have been captured opportunistically (7 captured before August 15 and 8 captured after August 15). Acoustical surveys using Anabat echolocation detectors have been conducted since 2003 and have identified potential Indiana bat call sequences throughout much of the installation. For the purposes of this BA, it is assumed that two maternity colonies with up to 100 Indiana bats in each are present on Fort Drum—one is known to exist in the Cantonment Area and an undiscovered maternity colony is assumed in the Training Area. Section 1 provides relevant information on Fort Drum, the status of the Indiana bat, and consultation history.

Activities on Fort Drum that have potential to impact the Indiana bat include: construction; military training; forest management; vegetation management; prescribed burning; use of pesticides; wildlife management/vertebrate pest control; and outdoor recreation. Section 2 describes the actions and assesses the potential to affect the Indiana bat including conservation measures to reduce or eliminate adverse impacts of proposed activities.

Conservation measures are consolidated and detailed in Section 3. The primary conservation measures include 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 and time-of-year restrictions for various activities (e.g., land clearing, tree falling, prescribed fire). The primary impact to military training will be avoiding the use of smokes and obscurants near known Indiana bat maternity roosts during certain times of the year. To implement this BA, Fort Drum will provide annual reports of habitat impacts to the U.S. Fish & Wildlife Service (USFWS). Research and monitoring efforts will continue to provide information for future management actions. All conservation measures and beneficial activities are included in Appendix J.

After reviewing all of its proposed activities, the action agency has determined its actions may effect, and are likely to adversely affect, the federally endangered Indiana bat. Primarily, the loss of habitat is anticipated to harass and potentially harm individual bats and maternity colonies.

1.0 Background

This section provides background information on Fort Drum and Indiana bat life history as it relates to this Biological Assessment (BA).

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, 2009 – December 31, 2011. 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 the identified activities for the next three years without having to initiate or re-initiate Section 7 consultations for individual projects or activities. However, individual Section 7 consultations will still occur for activities specifically identified in this BA or for other unforeseen activities. The period of 2009-2011 was chosen because of the difficulty of determining activities and construction projects beyond three years due to rapidly changing mission priorities as well as changing funding priorities by Congress.

This document was prepared in accordance with Section 7 of the Endangered Species Act (16 U.S.C. 1536 (c)). The Indiana bat is the only 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 Fort Drum Mountain Community Homes (FDMCH) 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 U.S. Army; U.S. Army Corps. of Engineers (Engineering – New York District); U.S. Army Corps. of Engineers (Clean Water Act Section 404 Permits); U.S. Air Force (Range 48); and all other military and law enforcement agencies training at Fort Drum. FDMCH is a private entity that leases Fort Drum property and is responsible for Soldier housing. See Appendix A for a letter of concurrence from FDMCH.

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). Any correspondence prior to December 1998 is unknown.

December 23, 1998

Fort Drum sent a letter to the USFWS requesting an update of its Threatened and Endangered Species status as it related to US Army Corps of Engineers nationwide permits.

January 12, 1999

The USFWS sent a letter to Fort Drum in response to the December 23, 1998 letter stating no federally listed or proposed endangered or threatened species were known to exist in the project impact area, therefore no further Section 7 consultation under the Endangered Species Act was required. The USFWS recommended this determination be reviewed on an annual basis.

November 14, 2000

Fort Drum sent a letter to the USFWS requesting an annual update of its Endangered Species status as it related to US Army Corps of Engineers individual and nationwide permits.

December 13, 2000

The USFWS sent a letter to Fort Drum in response to the November 14, 2000 letter stating no federally listed or proposed endangered or threatened species were known to exist in the project impact area, therefore no further Section 7 consultation under the Endangered Species Act was required.

January 28, 2002

Fort Drum sent a letter to the USFWS requesting an annual update of its Endangered Species status.

February 22, 2002

The USFWS sent a letter to Fort Drum in response to the January 28, 2002 letter stating no federally listed or proposed endangered or threatened species were known to exist in the project impact area, therefore no further Section 7 consultation under the Endangered Species Act was required.

December 30, 2002

Fort Drum sent a letter to the USFWS requesting an annual update of its Endangered Species status.

January 16, 2003

The USFWS sent a letter to Fort Drum in response to the December 30, 2002 letter stating no federally listed or proposed endangered or threatened species were known to exist in the project impact area, therefore no further Section 7 consultation under the Endangered Species Act was required.

December 18, 2003

Fort Drum sent a letter to the USFWS requesting an annual update of its Endangered Species status.

January 13, 2004

The USFWS sent a letter to Fort Drum in response to the December 18, 2003 letter stating no federally listed or proposed endangered or threatened species were known to exist in the project impact area, therefore no further Section 7 consultation under the Endangered Species Act was required. However, the letter noted that the federally endangered Indiana bat was found within approximately 7 mi (11 km) of Fort Drum.

May 20, 2004

The USFWS sent a letter to Fort Drum due to additional information obtained regarding the Indiana bat since the January 13, 2004 letter. The USFWS focus on Indiana bats intensified due to two proposed wind power projects—one on Fort Drum (which had been canceled at the time of the letter) and one in the Lowville area. The USFWS acknowledged the last Indiana bat mist-net survey on Fort Drum was in 1999 and the USFWS considered data from Indiana bat surveys only reliable for no more than three years. The letter also announced the intention of NYSDEC to conduct a radio telemetry study on Indiana bats in the Glen Park hibernaculum in the spring of 2005.

November 9, 2004

Fort Drum sent a letter to the USFWS requesting information on the presence of endangered or threatened species in the vicinity of Jadwin State Forest.

December 1, 2004

Fort Drum sent a letter to the USFWS requesting an annual update of its Endangered Species status.

February 9, 2005

The USFWS sent a letter to Fort Drum in response to the November 9, 2004 letter stating there was a potential for the Indiana bat to occur within Jadwin State Forest and vicinity. Furthermore, the USFWS stated it was the responsibility of the Army as a federal entity to consult with the USFWS regarding projects that may affect federally listed species.

February 22, 2005

The USFWS sent a letter to Fort Drum in response to the December 1, 2004 letter stating the potential for the Indiana bat to occur within Fort Drum due to the close proximity of the Glen Park hibernaculum and suitable Indiana bat habitat present on the installation. The USFWS provided comments and recommendations to assist the Department of Army with responsibilities under Section 7(a)(2) of the Endangered Species Act of 1973.

April 17, 2006

Fort Drum acknowledged the February 22, 2005 letter as to the potential of the Indiana bat to occur on the installation due to the proximity of the Glen Park hibernaculum. Furthermore, Fort Drum recognized its obligation to consult with the USFWS under Section 7(a)(2) of the Endangered Species Act of 1973 to ensure actions would not jeopardize the Indiana bat.

June 27, 2006

USFWS personnel came to Fort Drum to discuss Endangered Species Act requirements and Indiana bat issues, and toured the installation.

July 18, 2006

Fort Drum sent a letter to the USFWS to assume presence of the Indiana bat (Appendix B1). In the letter, a restrictive tree falling policy was established between April 15 – September 30. Fort Drum also stated that funding would be pursued to analyze data from past bat acoustical surveys and to conduct a mist net survey in FY07.

August 23, 2006

Fort Drum sent a letter to the USFWS confirming presence of the Indiana bat on the installation as a result of mist-netting and radio-tracking efforts conducted at a proposed housing development site in the Town of LeRay. At least four Indiana bats (three males and one female) were found utilizing the area in and around the Cantonment Area on three different days (August 18-20). Fort Drum staff continued to track the same at to the same roost site on August 21. This letter also confirmed that the U.S. Army Garrison at Fort Drum was the lead agency for all activities occurring on Fort Drum pursuant to Section 7 of the Endangered Species Act (Appendix B2).

February 20, 2007 - October 2008

Fort Drum conducted approximately 52 Section 7 consultations on various construction projects and land management activities with the USFWS.

August 15, 2007

Fort Drum and the USFWS met to discuss the development of this BA. Potential impacts to Indiana bats were discussed as well as potential conservation measures.

August 31, 2007

Fort Drum and the USFWS had a teleconference to discuss how to address Ft. Drum's Main Impact Area and cumulative effects off-post in the BA.

September 21, 2007

Fort Drum hosted the first official meeting for the Army Compatible Use Buffer (ACUB) program. Enrolling land parcels into the ACUB program for the benefit of the Indiana bat was mentioned.

October 11, 2007

Fort Drum and the USFWS had a teleconference to discuss the military training section of the BA and the extent of the action area.

February 4, 2008

Fort Drum and the USFWS had a teleconference to discuss the construction and forest management sections of the BA, the overall status of the BA, and the current status of "white-nose syndrome" and Indiana bats.

March 6, 2008

Fort Drum sent a letter to the USFWS establishing a 2200+ ac (891 ha) Bat Conservation Area (BCA) mostly in the undeveloped portion of the Cantonment Area with a small portion in Training Areas 3A and 4A (Appendix B3). General parameters of restricted and permitted activities were outlined. The BCA was a conservation measure for this BA as well as Section 7 consultation underway for RCI Site #3.

May 2, 2008

Fort Drum and the USFWS had two meetings. First, to discuss a potential parcel of land to be enrolled in the ACUB program. Second, to discuss various sections and overall status of the BA.

June 13, 2008

Fort Drum sent USFWS a working draft of the BA for comment.

July 15, 2008

Fort Drum and USFWS met to discuss working draft BA.

July 22, 2008

USFWS sent comments to Fort Drum regarding the working draft of the BA received June 13.

1.3 Fort Drum Military Installation

For the purposes of this BA, only certain relevant information about Fort Drum is included. For more information, see the Fort Drum Integrated Natural Resources Management Plan (INRMP; U.S. Army in progress).

1.3.1 Regional Description of Fort Drum

Fort Drum officially encompasses 107,265 contiguous acres (43,408 ha) in northern New York State (approximate center: 44° 7' N 75° 35' W) (Figure 1.1). The installation is 10 mi (16 km) wide and 20 mi (32 km) long. Approximately 83% of Fort Drum is located in the northeastern corner of Jefferson County, and the remaining portion of the installation is in the northwestern corner of Lewis County. Towns within or adjoining Fort Drum include Wilna, Antwerp, Philadelphia, LeRay, Champion, and Rutland in Jefferson County; Diana in Lewis County; and Fowler and Rossie in St. Lawrence County (Figure 1.2).

Figure 1.1 Fort Drum in New York State.

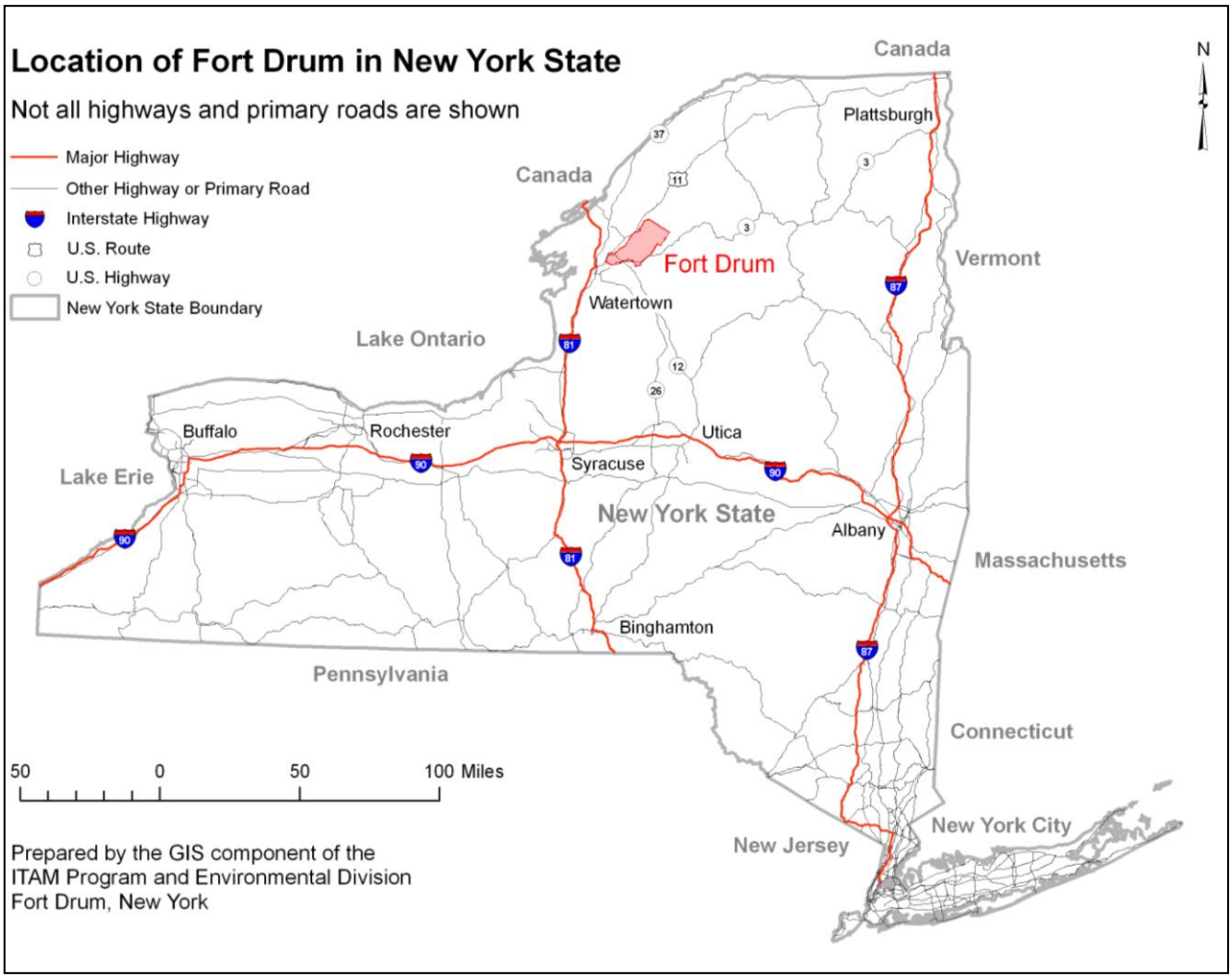
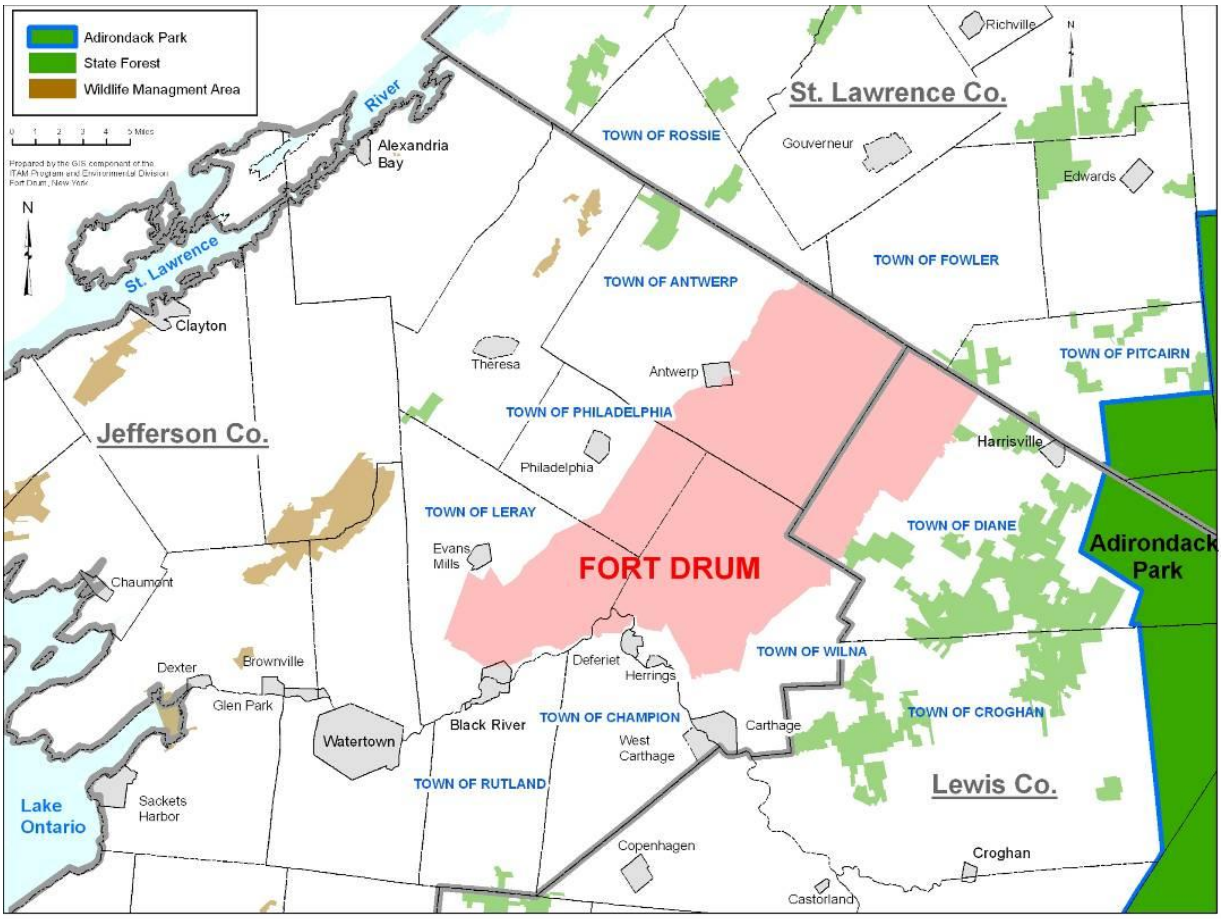


Figure 1.2 Fort Drum in relation to towns and state lands.

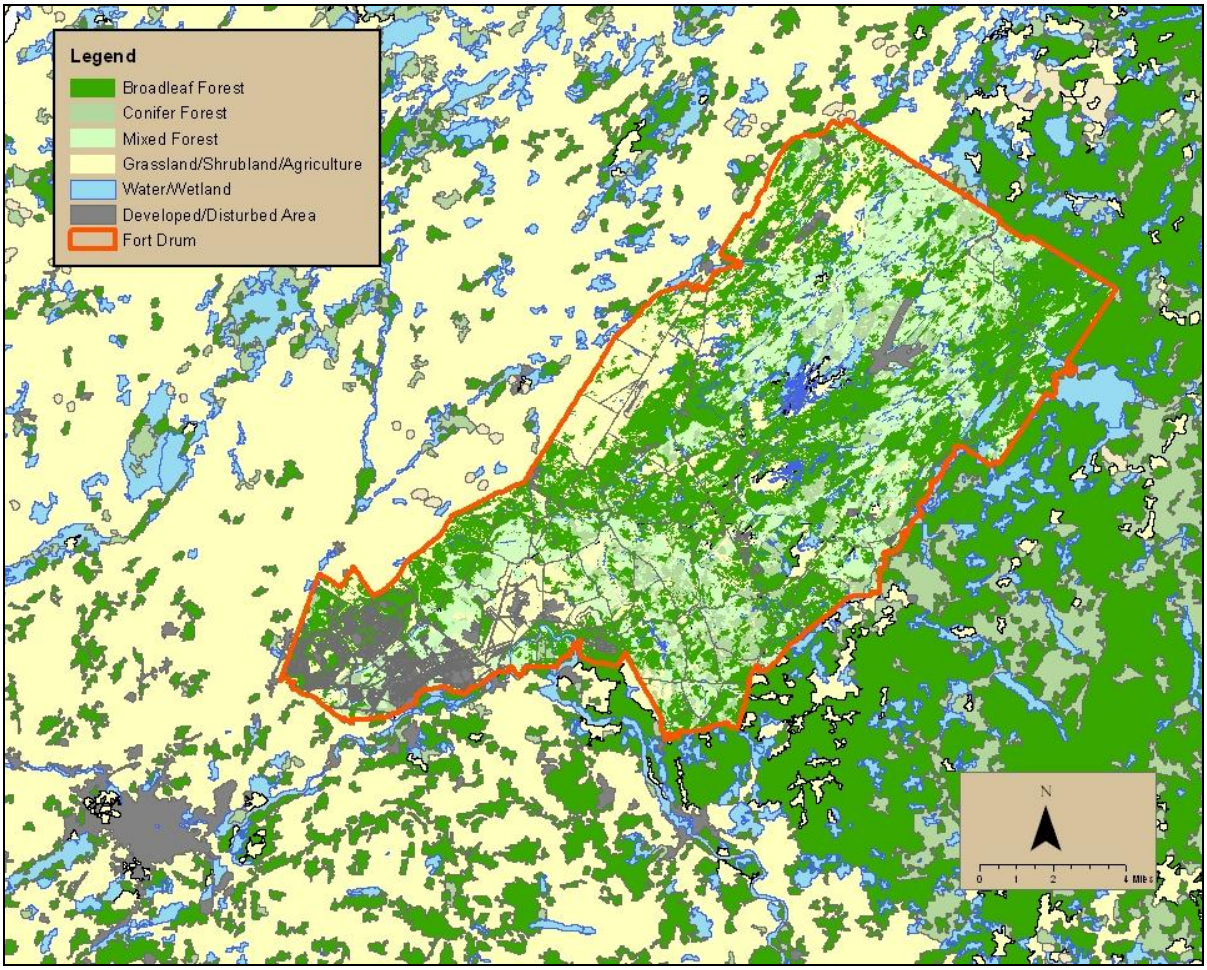


The City of Watertown is the largest U.S. city within a 50-mile radius of Fort Drum. The population census conducted in 2000 enumerated 26,705 people in Watertown. The population of the tri-county area was 250,613 people with 111,738 in Jefferson Co.; 26,944 in Lewis Co.; and 111,931 in St. Lawrence Co.

The area surrounding Fort Drum is generally rural with small concentrations of residential, commercial, and industrial areas mainly within the villages. The region's economy has traditionally been resource-based, with many economic opportunities afforded by its water, agricultural and forest resources. Dairy farming, food processing, and papermaking are major industries with a long tradition in the area.

Historical land use in the region resembles that of all of New York State—undeveloped forest followed by intense agriculture and woodlots, and now a return to forested land (Figure 1.3). For example, land in Jefferson County was characterized as 57% farmland in 1910 but it had declined to 20% by 1992; conversely, forested land in Jefferson Co. increased from 40% in 1910 to 75% in 1992 (Stanton & Bills 1996). Land uses in Lewis Co. and St. Lawrence Co. are similar with 20% and 22% in farmland and 75% and 73% in forested land, respectively (Stanton and Bills 1996).

Figure 1.3 Regional land cover types in and around Fort Drum (Dr. Lee Herrington, SUNY ESF, 2002).



Although there are few federal lands near Fort Drum, state lands are numerous including state forests, forest preserves, wildlife management areas, and state parks (Figure 1.2). The majority of protected land is in large forest tracts (primarily state forests, wilderness areas, wild forests, and primitive areas) located in Adirondack Park. State forest lands border some areas of Fort Drum; the nearest state wildlife management area is Perch River (7,800 ac (3,157 ha)) approximately 5 mi (8 km) to the northwest of Fort Drum's Cantonment Area.

1.3.2 Military Mission & History

Fort Drum is the largest military installation in the northeastern United States. Fort Drum is home of the 10th Mountain Division-Light Infantry (LI) and serves as the primary training facility for National Guard and Army Reserve units throughout the region.

Military training began in the area in 1907 when elements of the New York State National Guard conducted the first documented large-scale maneuvers on lands that would eventually become Fort Drum. In 1909, 10,000 ac (4,047 ha) of land was purchased by the War Department and Pine Camp was established. For the next 30 years, Pine Camp was primarily a summer training facility. The War Department made additional land purchases from 1935-39 adding another 9000 ac (3,642 ha) of land to the installation. In 1940, large scale maneuvers featured the

introduction of mechanized “tanks” alongside the horse-mounted cavalry and horse-drawn artillery.

In 1940, Pine Camp was selected for a major expansion and an additional 75,000 ac (30,351 ha) of land was purchased. In a period of 10 months at a cost of $20 million, 800 buildings were constructed. An additional 5,600 ac (2,266 ha) of land, mostly in Lewis Co., were purchased in 1942 and 8,600 ac (3,480 ha) were purchased in 1948 which completed the boundary of present-day Fort Drum. After World War II, Fort Drum continued to be mostly used as a summer training facility until the 10th Mountain Division was stationed at Fort Drum in 1985.

Between 1985 and 1992, Fort Drum experienced a $1.3 billion construction boom making it the largest peacetime military construction expansion in the continental United States since World War II. Construction activities included a new cantonment area and improved airfield, 130 new buildings, 35 mi of roads, and 4,272 family housing units.

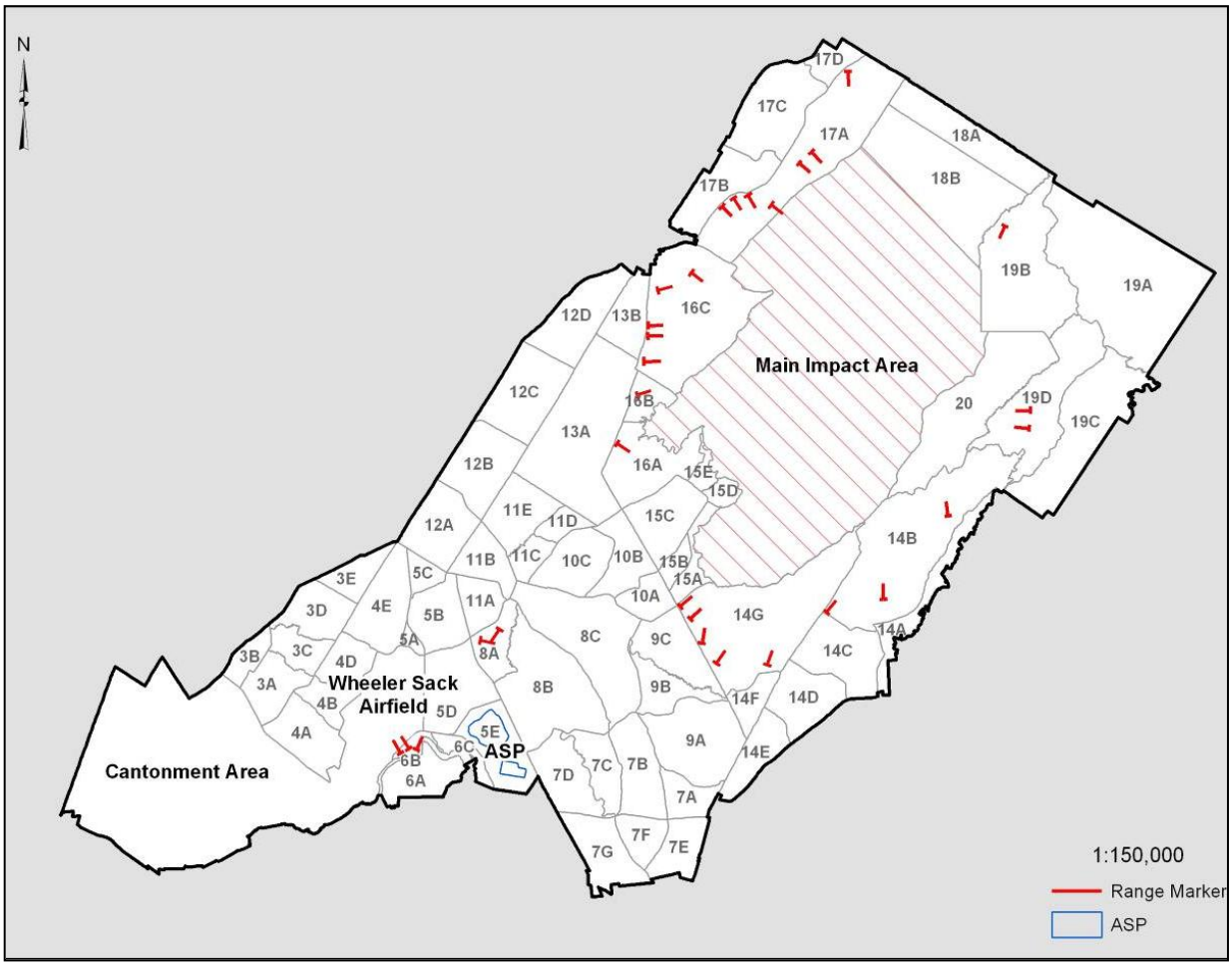
The latest construction boom on Fort Drum began in 2004. Army transformation has been the main driving force behind much of the construction which resulted in the 1st and 2nd Brigades being transformed into Brigade Combat Teams (BCTs) and the addition of a third Brigade Combat Team and other units at Fort Drum (Parsons 2005a). Other construction has resulted due to the Army’s missions since 2001, including Operation Enduring Freedom (Afghanistan), Operation Iraqi Freedom, and the Global War on Terrorism. Finally, the Residential Communities Initiative (RCI) privatizing Army housing was implemented on Fort Drum in 2004. Fort Drum via RCI granted a 50-year lease on approximately 1,796 ac (726 ha) in the Cantonment Area including all Army family housing units and selected ancillary supporting facilities to Fort Drum Mountain Community Homes (FDMCH) (US Army 2004). FDMCH is responsible for the continued construction and maintenance of Soldier housing on Fort Drum. Since 2004, Fort Drum has leased additional areas for FDMCH to construct new housing and to operate ancillary supporting facilities.

Transformation resulted in a population increase of more than 6,000 soldiers and 4,500 family members. To accommodate both the transformation and additional soldiers and family members, approximately 33 projects including roughly 599 buildings were constructed since 2004. Construction is planned to continue for the next several years.

1.3.3 General Description of Fort Drum

Fort Drum is comprised of the Cantonment Area, Wheeler-Sack Army Airfield (WSAAF), and the Training Area (including ranges, maneuver area, and the Main Impact Area) (Figure 1.4). The Cantonment Area and the area surrounding WSAAF consist of administrative offices, housing, maintenance, and troop support facilities. The Cantonment Area (west of Rte 26) and areas surrounding the WSAAF are in the southwestern part of the installation and the areas experiencing most of the current and future development. The Training Area is approximately 96,000 ac (38,850 ha) and where the majority of field training and firing of weapons occurs. The Training Area is divided into 18 numeric training areas (TAs) which is further subdivided into 70 alpha-numeric subtraining areas. The Main Impact Area covers 16,951 ac (6,860 ha). Due to the presence of dud and unexploded ammunition, the Main Impact Area is generally off-limits to all personnel. The 2,463 ac (997 ha) Training Area (TA) 20 was historically used as an impact area, but it has been surface-cleared of unexploded ordnance (UXO). Personnel are permitted in TA 20.

Figure 1.4 Current map of Fort Drum, including Cantonment Area, Wheeler Sack Airfield, Ammunition Supply Point (ASP), Main Impact Area, and Range and Maneuver Areas.



Fort Drum can be characterized into five distinct ecoregions as defined by Fort Drum's Natural Resources personnel. Ecoregion classifications were determined by soils, topography, geology, hydrology, and vegetation types. On Fort Drum, these ecoregions have been named: Eastern Ontario Plains, St. Lawrence Valley, Western Adirondack Transition, Indian River Transition, and Black River Valley (Figure 1.5).

Within the five ecoregions, there are 93 land cover/vegetation type classifications used to characterize habitats. These land covers are based on the Vegetation Classification Standard (VCS) of 1997 (Federal Geographic Data Committee (FGDC) 1997), the standard vegetation classification system used by U.S. Federal Agencies and their cooperators. The major land cover types and associated acreages on Fort Drum are listed in Table 1.1.

Figure 1.5 Ecoregions of Fort Drum

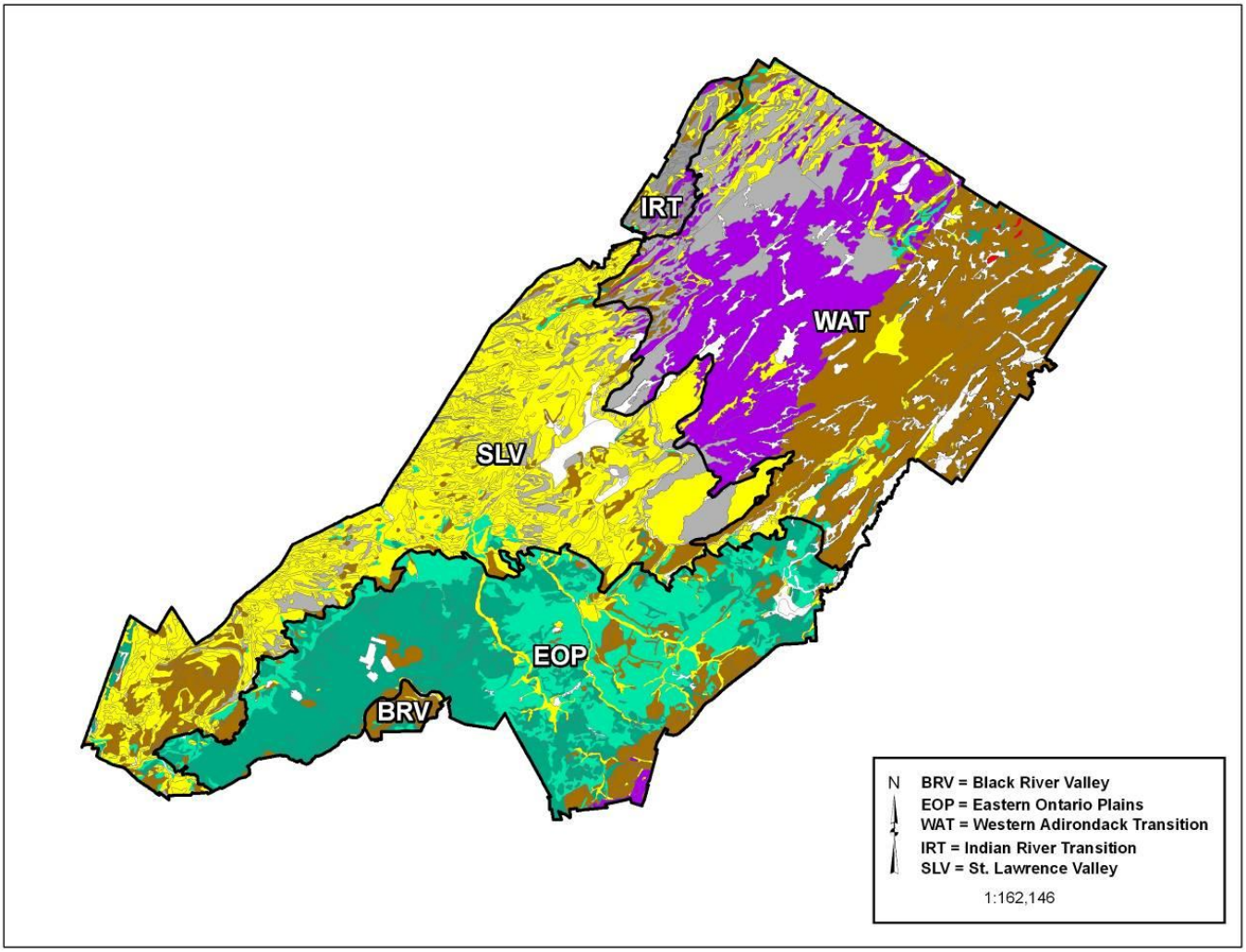


Table 1.1 Land use/land cover acreage on Fort Drum in 2008.

Types	Acreage
Forest Upland	66,236.87
Forest Wetland	8277.67
Shrub Upland	2548.75
Shrub Wetland	4737.66
Graminoid Community Upland	6560.96
Graminoid Community Wetland	2188.63
Forb Community Upland	5058.24
Forb Community Wetland	279.45
NonVascular Upland	13.23
NonVascular Wetland	15.03
Surface Water Lake	803.12
Surface Water Stream	2205.31
Surface Water Drainage	1668.80
Developed Hardscape	5259.09
Developed Landscaped	2644.66
Other Bedrock	184.14
Other Sand	327.46
Other	15.41
Fort Drum (Total)	109,024.48*

***Although Fort Drum is officially 107,265 ac (43,409 ha), the total amount of land is 109,024 ac (44,120 ha) according to the most recent GIS coverages. For purposes of assessing habitat, the 109,024 ac (44,120 ha) figure is used.**

1.3.4 General Habitat Information on Fort Drum

Because Indiana bats are primarily associated with forests, detailed information about forest land cover is included in this section. See the Integrated Natural Resources Management Plan (U.S. Army in progress) for information about other landcover information. Forests are defined as plant communities with at least 25% tree species cover. Forested sites are classified as having an open canopy if the percent of tree species cover is between 25 and 60%, or a closed canopy with greater than 60% tree species cover. Mixed deciduous/conifer forests have an at least 25-75% co-dominance.

Much of Fort Drum was agricultural lands at the time of its acquisition by the federal government in 1940. Since that time, the amount of forests have doubled and have become the dominant land cover across the installation comprising 74,514 ac (30,155 ha) or 68% of Fort Drum. Approximately 28,052 ac (11,352 ha) are deciduous or mixed-deciduous forest (>6 in DBH)—the remainder consists of conifers, early successional tree species, saplings, or is unknown. (Unknown habitat of 16,178 ac (6,547 ha) includes areas that are unsafe to survey (e.g. Main Impact Area)). Of the 74,514 ac (30,155 ha) of forests, 67,651 ac (27,377 ha) are classified as upland forests while 6,863 ac (2,777 ha) are wetland forests. See Table 1.2 for the different forest land cover types and Table 1.3 for forest types by size class on Fort Drum.

Table 1.2 Acreage of forested land cover.

Upland Forests	**Acreage**
Closed canopy conifer	7849.66
Closed canopy deciduous	27388.29
Closed canopy mixed	19135.57
Open canopy conifer	643.50
Open canopy deciduous	9270.67
Open canopy mixed	1949.18
Wetland Forests	**Acreage**
Closed canopy conifer	377.10
Closed canopy deciduous	2753.07
Closed canopy mixed	1353.76
Open canopy conifer	110.62
Open canopy deciduous	2857.42
Open canopy mixed	825.70

Table 1.3 Total acreage of forest types by size class on Fort Drum.

	Conifer (pines & hemlocks)		Northern Hardwood (beech, maple, birch, cherry & ash)		Mixed Forest (combination of confer & deciduous trees)	Oak	Early Successional (includes aspen, gray birch & elm)	**Total**
	Upland	Wetland	Upland	Wetland				
Seed/sapling (0.1-5" DBH)	226	36	2741	802	702	103	5476	10086
Pole (6-11" DBH)	1326	41	8270	1895	6671	621	6864	25688
Small Saw (12-17" DBH)	2151	23	3742	493	6133	1386	308	14236
Medium Saw (18-23" DBH)	1060	9	490	72	1034	19	2	2686
Large Saw (> 23" DBH)	22	0	2	0	4	14	1	43
Unknown*	2528	239	7728	1455	8108	0	0	20058
Total	7313	348	22973	4717	22652	2143	12651	72797

**** Unknown size class refer to forests that could not be surveyed on the ground (e.g. Main Impact Area).***

Within the overall deciduous forest community, vegetation types range from early successional northern hardwood species such as gray birch (*Betula populifolia*), red maple (*Acer rubrum*), and quaking/trembling aspen (*Populus tremuloides*) to more climax forests with sugar maple (*Acer saccaharum*) and American beech (*Fagus grandifolia*) dominants.

Forests comprised of red maple and poplar (*Populus* spp.) species are typical of the St. Lawrence Valley ecoregion with poorly drained soils comprised of loamy clays (e.g., Training Areas 3 and 12). Early successional forests primarily composed of gray birch and poplars are prevalent on ranges and other landscapes that are periodically disturbed due to active land management or military training.

Conifer forests are found across the installation but are particularly prevalent in the Western Adirondack Transition ecoregion. Eastern hemlock (*Tsuga canadensis*) and white pine (*Pinus stobus*) are the dominant species growing in these upland and wetland cover types.

Deciduous wetland forests occur most commonly in riparian zones, drainages and seasonal floodplains. These riparian wetland forests are generally colonized by American elm (*Ulmus americana*) willows (*Salix* spp.) and red maple. These riparian forests are typically open canopy with a speckled alder shrub (*Alnus incana* ssp. *rugosa*) understory. Forested drainages are generally dominated by willows (*Salix* spp.). The floodplains on Fort Drum are typically populated with green ash (*Fraxinus pennslyvanica*), black ash (*Fraxinus nigra*), red maple, silver maple (*Acer saccahrinum*), and American elm.

Mixed conifer and hardwood stands are common throughout the Training Areas. Typically the spruce-northern hardwood forests are prevalent in the rockier Western Adirondack Transition ecoregion while pine-northern hardwood stands are more common in the sandier Eastern Lake Ontario ecoregion.

To remediate erosion problems in the sandy areas of the Eastern Lake Ontario ecoregion, mostly Scotch pine (*Pinus sylvestris*) and red pine (*Pinus resinosa*) have been established in various areas in Training Areas 4, 5, 6, 7, and 8.

Water Bodies

Almost all of Fort Drum (98%) is in the Oswegatchie River basin. There are eight primary lakes and ponds totaling more than 400 ac (162 ha) of surface area on Fort Drum. Most of the natural lakes and ponds are found in the Western Adirondack Transition ecoregion. Two ponds, Remington Pond and Conservation Pond, are impounded creeks created by dams. There are two rivers and approximately eight primary streams running through Fort Drum totaling approximately 91.9 mi (147.9 km). Minor streams and tributaries are widespread throughout the installation. Wetlands are prevalent throughout the installation and comprise approximately 20% of the land area on Fort Drum. Approximately 91% of all wetlands on Fort Drum are palustrine.

1.4 Action Area

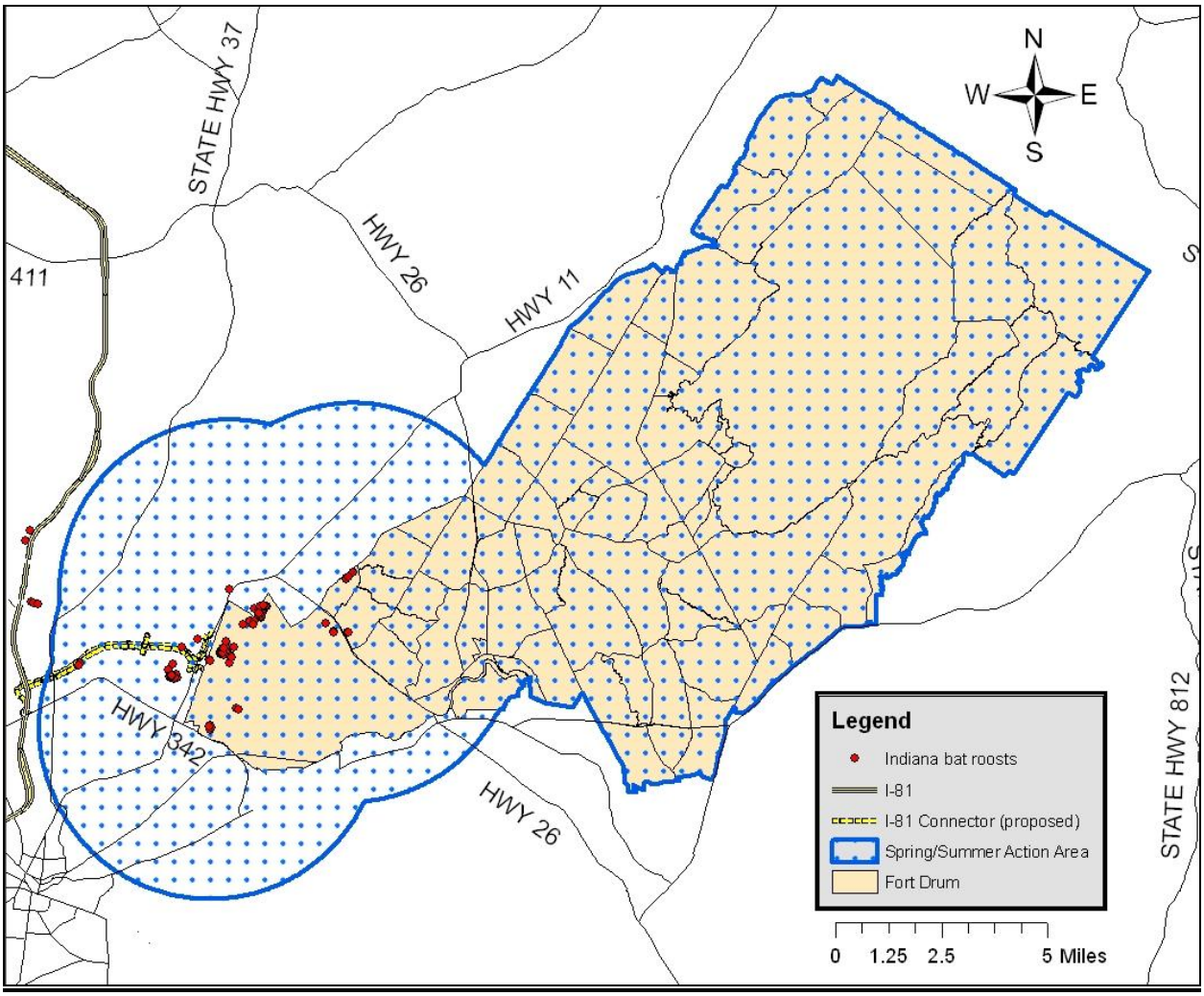
The action area is defined by regulation as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR §402.02). This analysis is not limited to the "footprint" of the action nor is it limited by the Federal agency's authority.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

The term action area is used to define the area that will include all direct and indirect effects of implementing and sustaining the mission of Fort Drum. Direct and indirect effects of activities associated with Fort Drum would occur on military lands, and they could extend off military property and onto other ownerships.

For purposes of this BA, two action areas were defined that encompassed roosting and foraging needs of Indiana bats throughout the year: Spring/Summer and Fall/Winter. The Spring/Summer action area included the whole of Fort Drum and a 4 mi radius around known maternity roosts (Figure 1.6). The 4 mi radius was determined by reviewing published literature on the foraging range of Indiana bats (e.g. Murray & Kurta 2004) and from foraging studies

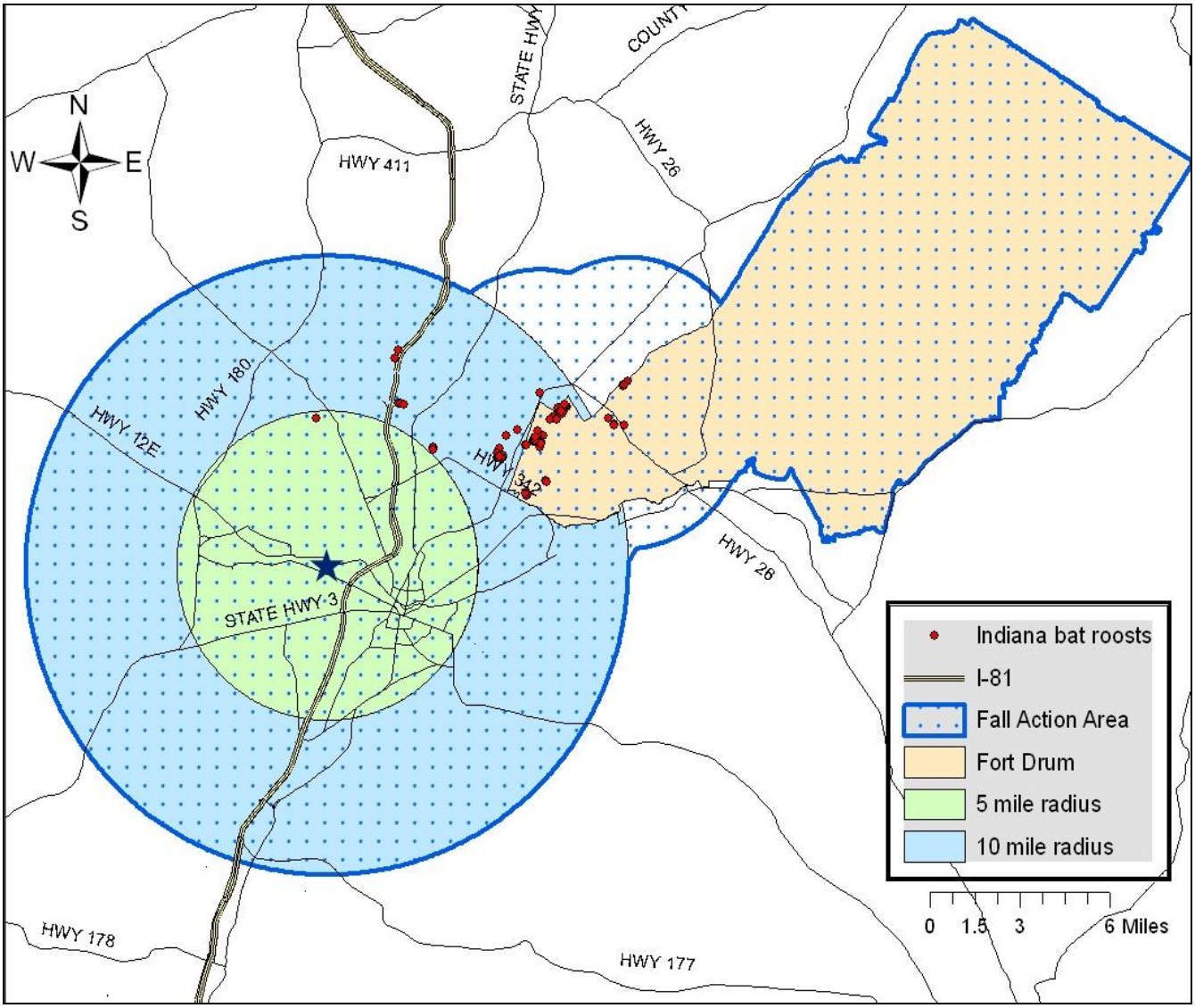
conducted on Fort Drum (ESI 2008b, unpublished data 2008). This action area will most likely be used by Indiana bats after emergence from the hibernaculum and during the reproductive season.

Figure 1.6 Spring/summer action area..



The Fall/Winter action area consists of all of Fort Drum and extends to a known Indiana bat hibernaculum (Figure 1.7). This action area includes Fort Drum, a 4 mi radius around known maternity roosts, and a 10 mi radius around the Glen Park hibernaculum. This area will most likely be used by Indiana bats during swarming and during movement between Fort Drum and the hibernaculum (ESI 2008b). There are no known hibernacula on Fort Drum.

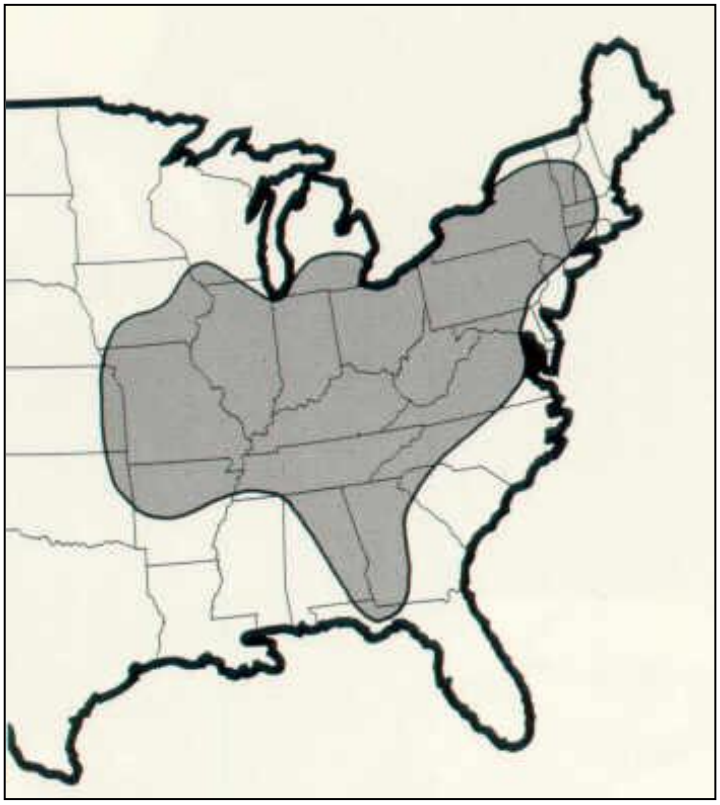
Figure 1.7 Fall/Winter action area with a 5 mile and a 10 mile buffer around the Glen Park hibernaculum.



1.5 Indiana Bat

The Indiana bat is a temperate, insectivorous, migratory bat that ranges from Oklahoma, Iowa, and Wisconsin, east to Vermont and south to northwestern Florida (Figure 1.8). Indiana bats hibernate in mines and caves in the winter and primarily roosts in trees during warmer seasons (USFWS 2007).

Figure 1.8 Range of the Indiana bat



1.5.1 General Description

The Indiana bat is a medium-sized species belonging to the genus *Myotis* (Barbour & Davis 1969; USFWS 2007). On average, it weighs approximately 5-7g and has a total body length between 41-49 mm. Its forearm length ranges from 35-41 mm, and its pelage is brown. The Indiana bat is very similar to the northern myotis (*Myotis septentrionalis*) and the little brown bat (*Myotis lucifugus*). It is distinguished from northern Myotis by the tragus length and shape, which is shorter and rounder than the northern Myotis. The Indiana bat differs from the little brown bat by the presence of a keeled calcar and by possessing fewer, shorter toe hairs. Additionally, Indiana bats' pelage does not contrast as starkly with the ears and wing membranes, which has a dull appearance.

1.5.2 Background Ecology

A thorough description of Indiana bat behavior and life history requirements are discussed in the Indiana Bat Draft Recovery Plan (USFWS 2007). This section briefly describes life history traits that may be affected by Fort Drum military activities.

1.5.2.1 Hibernation

Indiana bats spend the winter months hibernating in caves or mines with appropriate temperatures and levels of air flow (Tuttle & Kennedy 2002). In northern New York, Indiana bats typically hibernate from October to mid-April (Kurta et al. 1997; Hicks 2004; USFWS 2007). Within their 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, unfortunate events, such as vandalism, disease, flooding or extremely cold conditions, may negatively impact hibernating Indiana bats. Vandalism or natural disasters (i.e. flooding) can have devastating effects on hibernating Indiana bats, and can substantially reduce the overall population after a single occurrence.

1.5.2.2 Spring Emergence

Spring emergence occurs when outside temperatures have increased and insects are more abundant (Richter et al. 1993). In New York, spring emergence studies have consistently

shown that Indiana bats emerge once evening temperatures remain higher than 50ºF after April 15 (Alan Hicks, NYSDEC, personal communication). Some bats may remain in close proximity of the cave 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).

Spring is a critical time of year for Indiana bats due to low fat reserves and potentially limited food availability. They must re-nourish themselves after hibernation and migrate to summer roosting areas. At this stage, females initiate fertilization and become pregnant, which also require a large amount of energy, so additional stress placed on Indiana bats during spring migration may lead to increased mortality and/or lower reproductive success.

1.5.2.3 Summer Roosting and Reproduction Behavior

In late spring or early summer, female Indiana bats form maternity colonies (usually less than 100 individuals) in order to raise young. Pups are typically born in May and July and will stay with the mother until they are volant (i.e. capable of flight) in July-August. The number of individuals in a primary roost can vary across the range. Primary maternity colonies are typically defined as roosts with 30+ bats on multiple days (Callahan et al. 1997) and are considered important to the social structure of Indiana bats for raising/rearing young. In New York, primary maternity colonies may consist of 20+ individuals (ESI 2008a). Maternity colonies usually consist of reproductive and/or non-reproductive females and pups that roost together, while males generally roost separately. Male bats disperse throughout the range and roost individually or in small groups.

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 in 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 and selection of maternity roost sites may be critical to reproductive success. While Indiana bats primarily roost in trees, four maternity colonies have been found in buildings (USFWS 2007).

Although primary roosts are central to Indiana bat reproduction and social organization during the summer months (USFWS 2007), Indiana bats are known to utilize multiple roost trees during the non-hibernation period. Usually, alternate roost trees are located in close proximity to primary roosts—distances between roosts can be a few meters to a few kilometers. 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 (USFWS 2007). Because of roost tree characteristics, Indiana bats tend to select forested areas that have high snag densities (e.g. Callahan et al. 1997). 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 usually surrounded by open canopy and are warmed by solar radiation. Alternate roosts may be used when temperatures are above normal or during precipitation. Shagbark hickories are good alternate roosts because they are cooler during periods of high heat and tight bark shields the

bats from rain (USFWS 1999). Weather has been found to influence bat behavior and habitat use (Humphrey et al. 1977).

Indiana bats exhibit strong site fidelity to their traditional summer colony areas and foraging habitat, that is, they return to the same summer range annually to bear their young (Kurta et al. 2002, USFWS 1999). Traditional summer sites that maintain a variety of suitable roosts are essential to the reproductive success of local populations. 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 this effort places additional stress 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.

1.5.2.4 Foraging/Travelling

Indiana bats are selective opportunistic insectivores that feed on a number of insect species, predominantly Lepidopterans, Dipterans, Coleopterans and Hymenopterans (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). Female Indiana bats have been recorded to forage 0.3 - 5.2 mi (0.5 - 8.4 km) from roost sites (Murray and Kurta 2004; Sparks et al. 2005; USFWS 2007). The USFWS routinely considers Indiana bats using roost trees within 2.5 mi from each other as part of the same colony, unless there is sufficient information to demonstrate otherwise. In general, 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). Some studies have shown that summer foraging areas 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 have also been found foraging along habitat edges that incorporate early successional forest, mature forests, and fields (Menzel et al. 2001).

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.

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 I-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.

1.5.2.5 Fall Swarming

Swarming typically occurs between August and October (Cope & Humphrey 1977). 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 & 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.

Forested habitat surrounding winter hibernacula provide important foraging and roosting sites during the autumn swarming period (USFWS 2007). During swarming, Indiana bats have been recorded using areas between 0.2 – 20.0 mi (0.32 – 32.0 km) from winter hibernacula (USFWS 2007).

1.5.3 Population Status & Threats: Range-wide 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. The Recovery Priority of the Indiana Bat is 8, which means that the species has a moderate degree of threat and high recovery potential.

The overall population (estimated at 513,398 individuals) has seen a general decline since 1965 with about a 50% reduction in Indiana bat numbers since that time (Figure 1.9; USFWS 2007).

Populations appear to be decreasing in the southern portion of the range. However, winter surveys indicate that Indiana bat populations were increasing in the northern portion of their range (i.e. New York) prior to the discovery of the white nose syndrome (Figure 1.10; USFWS 2007). According to hibernacula surveys conducted by the NYSDEC, there are approximately 52,000 Indiana bats that overwinter in New York using 12 hibernacula (Figure 1.10; Hicks 2006). In Jefferson County, NY, there is a single Indiana bat hibernaculum in Glen Park with a Priority II classification (Priority II hibernacula 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 from Fort Drum and it provides wintering habitat for approximately 2,000 Indiana bats (Figure 1.11). However, in 2008, approximately 1,300 Indiana bats were recorded in the hibernaculum (Alan Hicks, NYSDEC, personal communication).

There are a number of documented and suspected reasons for the decline of Indiana bat populations that include disturbance during hibernation, habitat loss, pesticide contamination, persecution, and disease. As previously mentioned, Indiana bats are most susceptible to injury or death during hibernation. This can be from humans entering hibernacula and disturbing bats 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 been documented to have 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 has been in the forefront of Indiana bat recovery plans (USFWS 2007).

Figure 1.9 Indiana Bat Rangewide Population Estimates 1981-2007

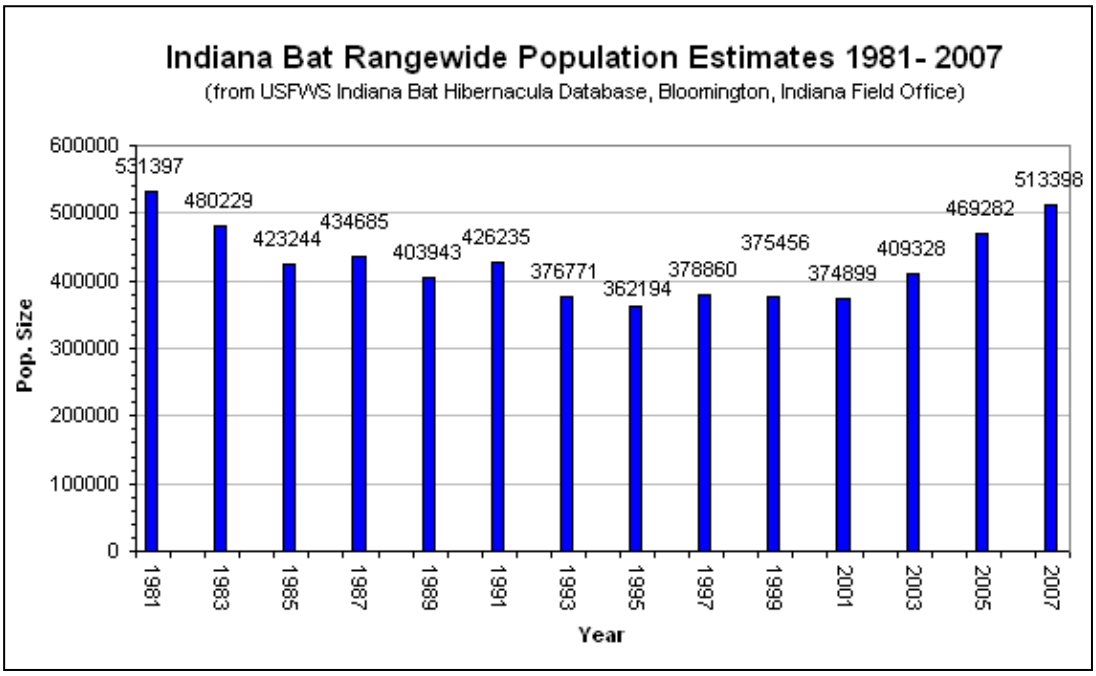


Figure 1.10 Population estimates from winter surveys of Indiana bats in New York.

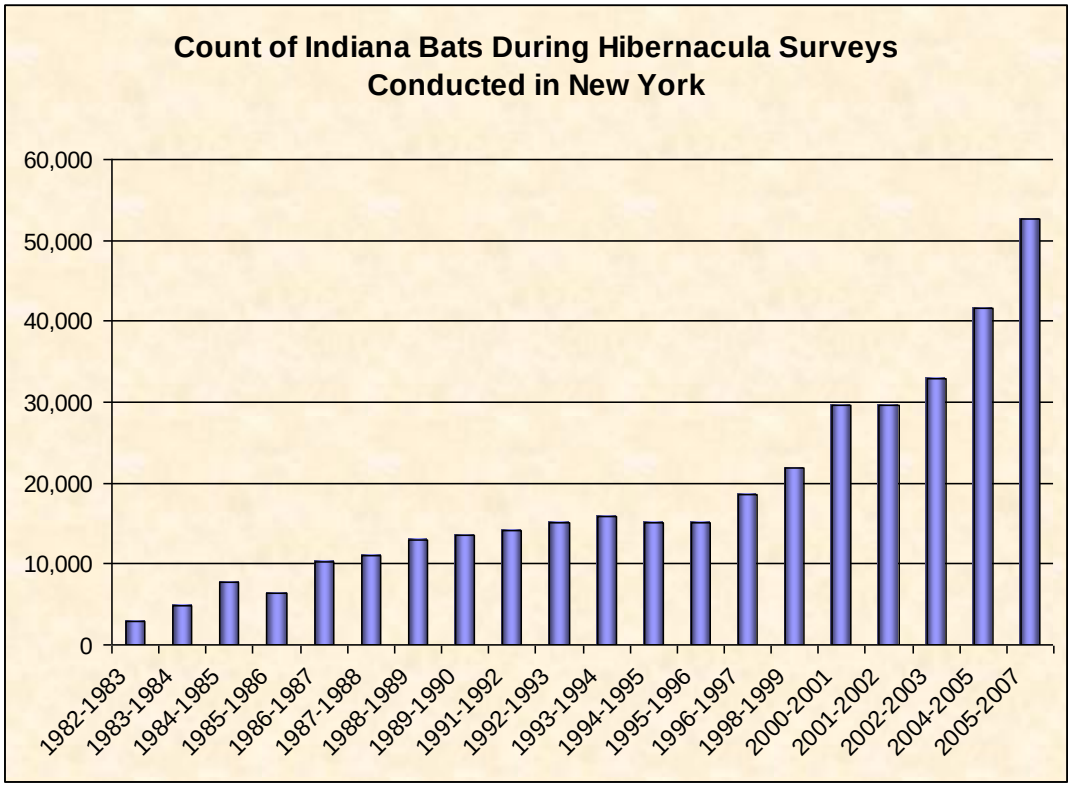
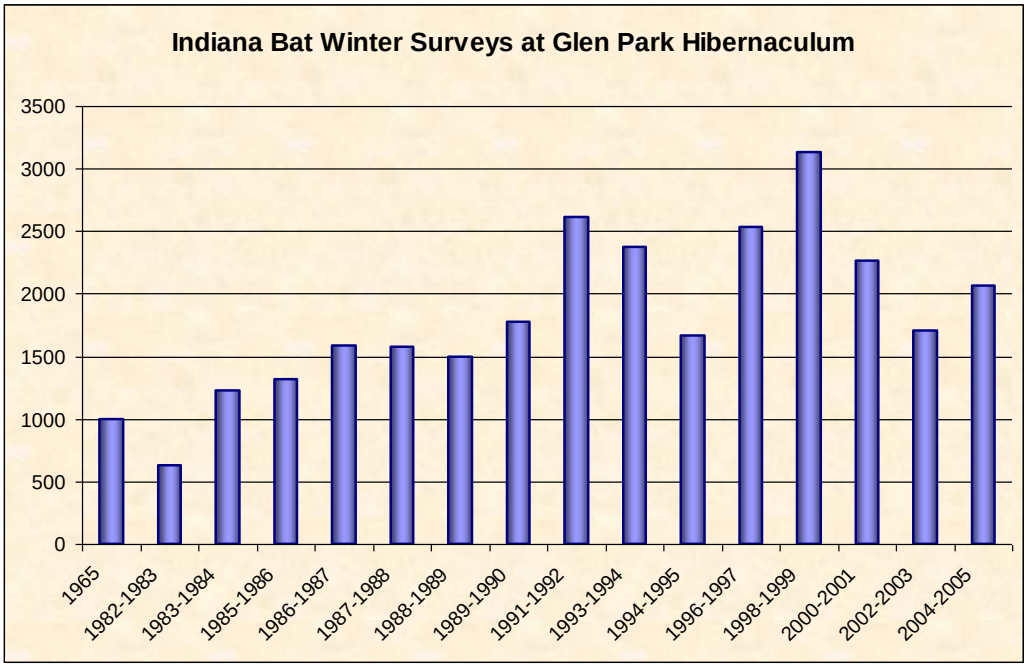


Figure 1.11 Population estimates of Indiana bats from the Glen Park Hibernaculum.



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.

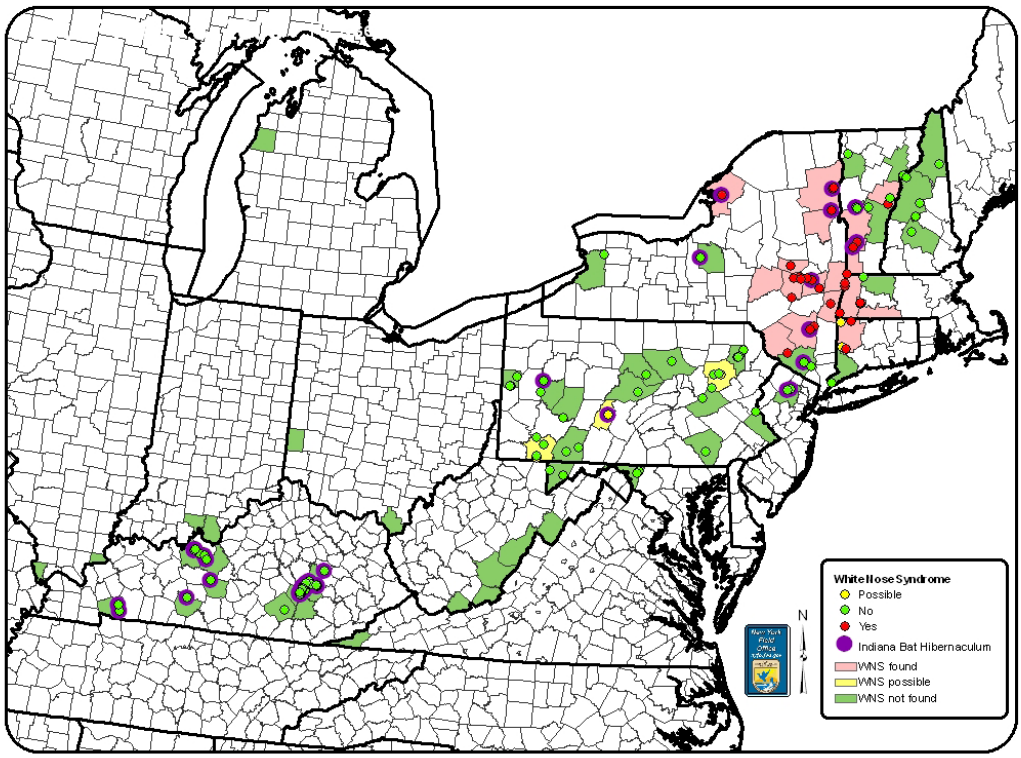
Bioaccumulation of environmental contaminants is another suspected cause for the decline of Indiana bats (USFWS 2007). Organochlorine insecticides which became widely used after World War II are neurotoxic, synthetic chemicals of which many are resistant to metabolism in mammals (O'Shea & Clark 2002). Organochlorine insecticides may have resulted in chronic mortality of Indiana bats (O'Shea & 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 & 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.

An emerging threat to bats in the last decade has been wind power facilities located on wooded ridges. In one study, an estimated 48 bats were killed per wind turbine at the Mountaineer wind farm in West Virginia (Kerns & Kerlinger 2003). Numerous wind power facilities have been recently constructed in northern New York with more planned. 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.

The latest threat to Indiana bats in the northeastern United States is an unknown agent(s) referred to as “white nose syndrome (WNS).” WNS is typically associated with a white fungus that grows on the nose of Indiana bats although it may not always be visible. The disease has contributed to the deaths of more than 8,000 bats in 2007, including Indiana bats. In 2007, four hibernacula in New York were discovered to be affected—2 of those sites suffered a 90% and 97% reduction in bats (Alan Hicks, NYSDEC, personal communication). Affected bats appear to use up their essential fat reserves well before spring emergence and subsequently starve to death.

WNS has been confirmed at over 30 sites in New York, Vermont, Connecticut, and Massachusetts, including the Glen Park hibernaculum (Figure 1.12). At the Glen Park hibernaculum, the K-cluster (or the largest known cluster) of Indiana bats appeared normal at the end of March 2008, however the population was estimated between 1200-1400 (USFWS 2008a), which was down from the 2007 estimate of approximately1,900 Indiana bats. Research about the possible causes and the effects of WNS is on-going.

Figure 1.12 Summary of winter 2007-2008 surveys for signs of White Nose Syndrome (USFWS, unpub. data).



1.5.4 Population Status on Fort Drum

Indiana bats were first confirmed on Fort Drum in 2006 when four radio-tagged Indiana bats from a survey off-post were found roosting and foraging in and around Fort Drum’s Cantonment Area (ESI 2006). Previously, Fort Drum had surveyed for Indiana bats at eight sites during a two-week period in July 1999 (BHE Environmental, Inc. (BHE) 1999). The 1999 survey did not result in the capture of Indiana bats, however the survey was limited in scope and was only

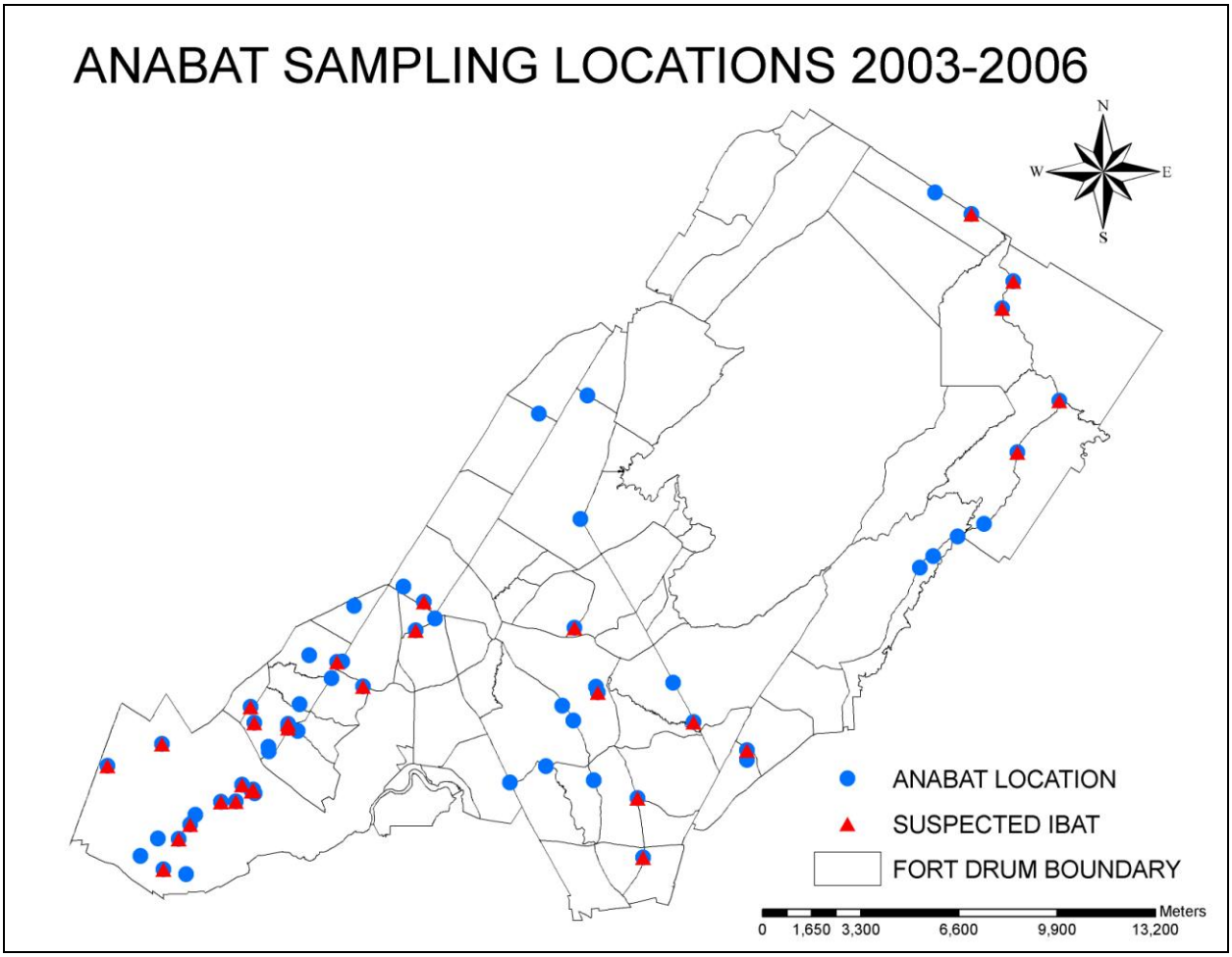
conducted in the Training Area. In 2005, a spring emergence survey was conducted by New York State Department of Environmental Conservation (NYSDEC) and the USFWS at the Glen Park hibernaculum (Hicks 2006). Thirty-two out of approximately 2,000 Indiana bats (<1% of the hibernaculum's population) were radio-tagged and tracked as they emerged. Twenty-six bats were successfully tracked for approximately 3-4 weeks and roosted in areas northwest and southwest of the hibernaculum— none of the radio-tagged bats were tracked to Fort Drum.

Acoustical surveys using Anabat echolocation detectors have been conducted annually since 2003, but the data were not analyzed until 2006. Anabat detectors provided support for the possible presence of Indiana bats throughout the installation (Figure 1.13) and identified areas of general bat activity throughout the installation. USFWS standards for positively confirming the presence of Indiana bats is currently restricted to mist net protocols, however acoustic surveys have an accuracy rate of 93-100% for identifying Indiana bats (Britzke et al. 2002). Echolocation call sequences collected on Fort Drum were analyzed by the U.S. Forest Service Northern Research Station using very conservative filters, which are more likely to reject call sequences as Indiana bats if certain parameters are not met. In order to be even more conservative in identifying an area that may have Indiana bats, only sites with more than 10 Indiana bat echolocation passes were considered in Figure 1.13. Further acoustical surveys will be conducted to collect information about foraging bats on Fort Drum and to target other areas for future mist net survey efforts.

In 2007 and 2008, summer mist net surveys began on Fort Drum to record bat species presence, to assess the summer status of Indiana bats, and to locate maternity colonies on the installation (ESI 2008a). One hundred twenty-two net sites were surveyed between June 2 - August 15, 2007 (81 sites) and June 19 - July 25, 2008 (41 sites) following USFWS mist netting guidelines (Figures 1.14). Given Fort Drum's size and amount of forests accessible for surveys, it is estimated that 384 net sites (i.e. 262 additional net sites) need to be surveyed in order to sufficiently confirm the presence or probable absence of Indiana bats throughout the installation. The total number of net sites was determined by calculating the area of forested land available for commercial and non-commercial forestry (47,259 ac (19,125 ha)) and dividing it by 123 ac (49 ha) in accordance with USFWS mist netting guidelines (1 net site/123 ac). The number of stream miles was not considered in this calculation due to the overlap of forested and riparian habitat on Fort Drum. Although capture of Indiana bats confirms their presence, failure to catch Indiana bats does not absolutely confirm their absence. After adequate survey efforts are completed, probable absence of Indiana bats may be assumed if none are captured. Indiana bat mist net surveys are valid for at least two years. Future mist net surveys are planned on Fort Drum for 2009 and 2010.

In the summer of 2007, 1,380 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. Emergence counts of roost trees ranged from 1-44 bats. 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 (unpublished data). Both were radio-tagged and tracked to roosts. Emergence counts ranged from 1 to 6. Additional mist net surveys will be conducted in the Training Area until at least 2010 to gain further information.

Figure 1.13 Locations of Anabat surveys (blue circles) and locations where >10 call sequences were determined (red triangle) from 2003-2006.



In addition to the above summer mist net surveys, a fall mist net survey conducted in 2007 opportunistically monitored the Cantonment Area (Figure 1.15). 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 during foraging. Emergence counts did not exceed two bats per night.

In 2008, 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. Mist netting was opportunistically selected. Between May 13 to the beginning of October in 2008, 10 Indiana bats (5 adult females, 2 adult males, 1 juvenile male, and 1 juvenile female) were captured and 9 were radio-tagged and tracked. Emergence counts ranged from 1 to 64. The project is planned to continue in 2009. No further study is planned in the Cantonment Area beyond this time.

Figure 1.14 Locations of mist net surveys conducted in accordance with USFWS guidelines for monitoring efforts in 2007 and 2008.

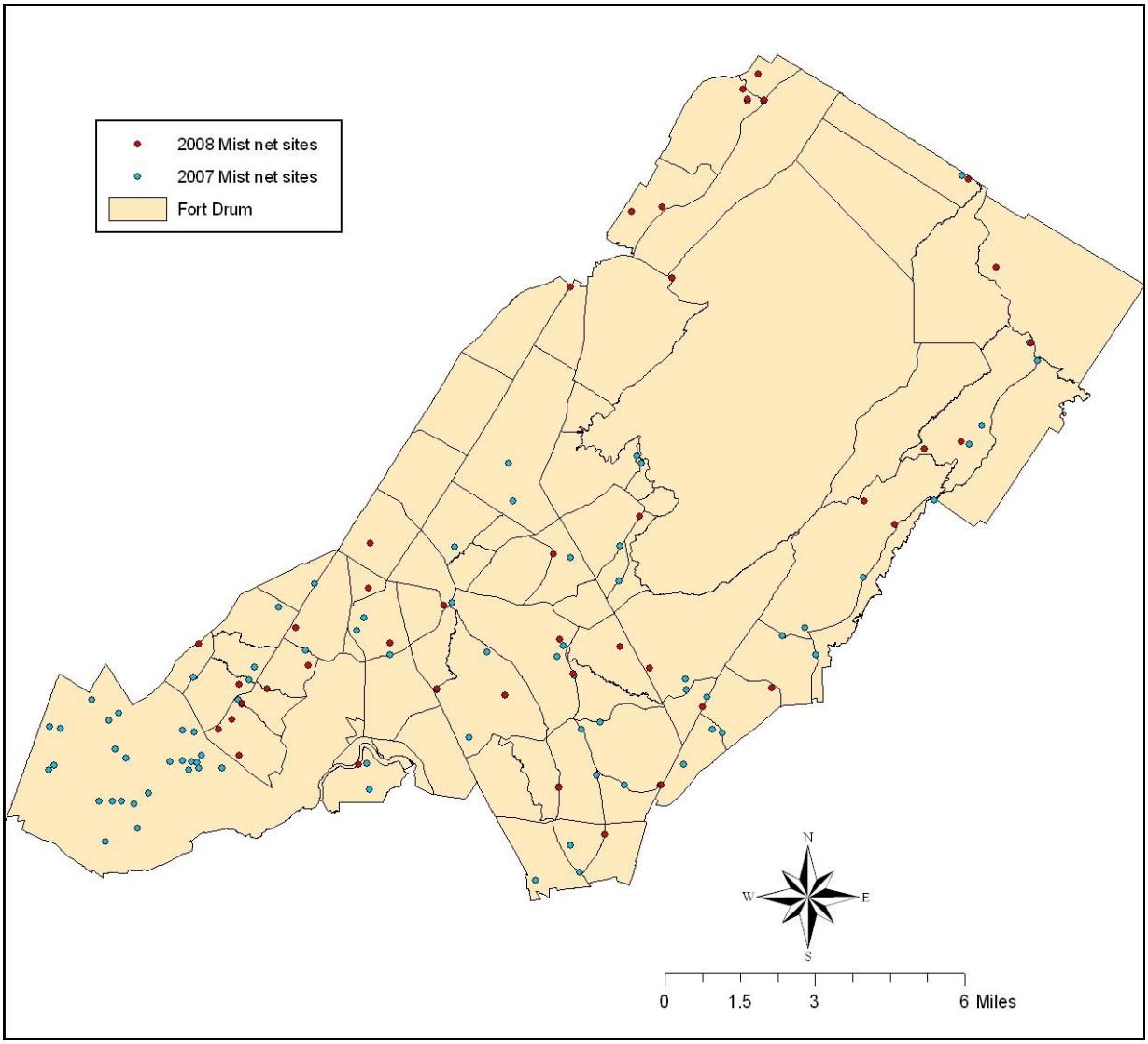
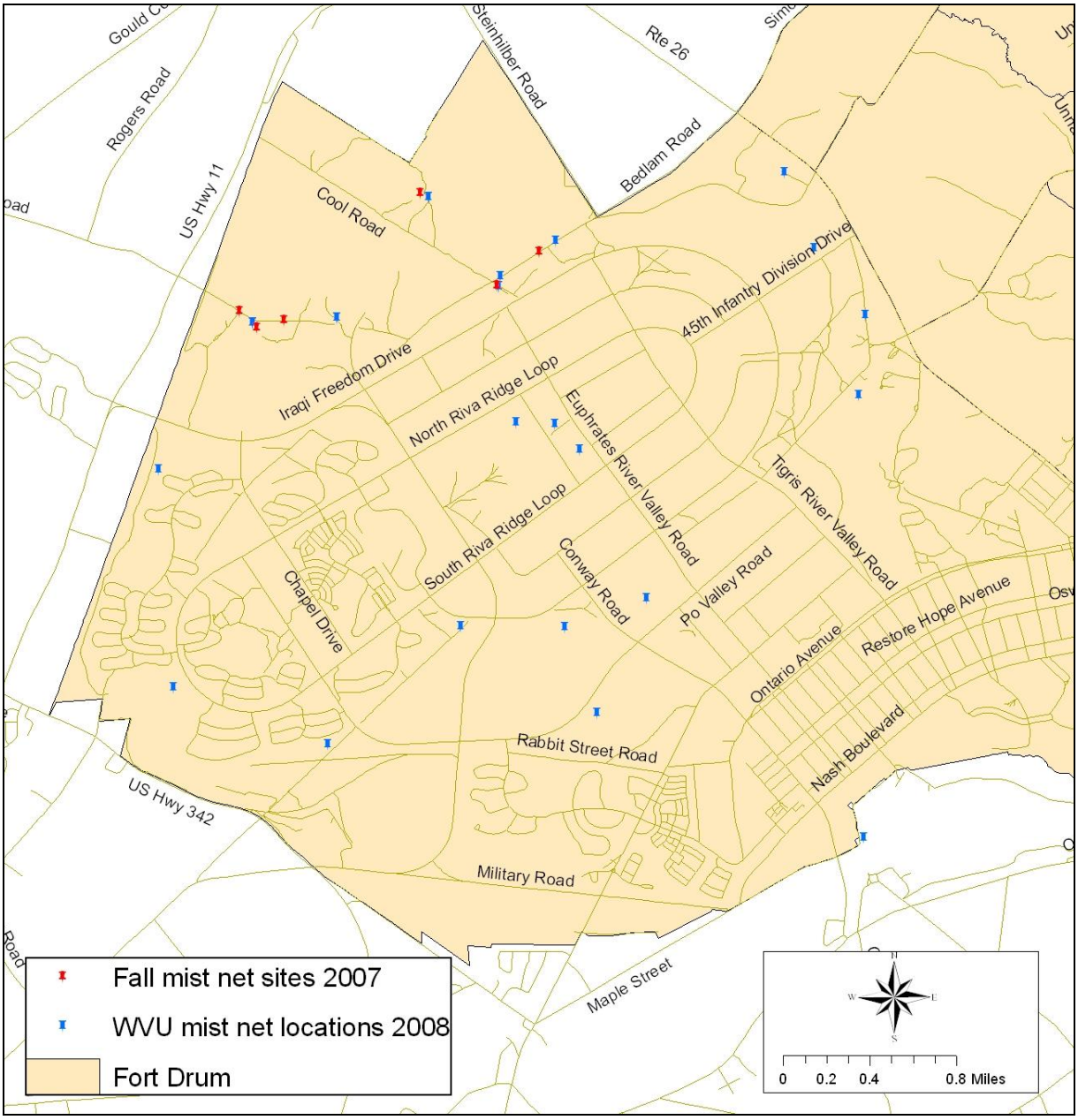


Figure 1.15 Mist net locations opportunistically placed in fall 2007 and summer 2008 for foraging and movement studies.



1.5.4.1 Hibernation

Presently, there are no known hibernacula on Fort Drum, however the Glen Park hibernaculum (Priority II) is located within the action area approximately 6.5 mi west of Fort Drum. One Indiana bat that was captured during the fall study was tracked from Fort Drum to the

hibernaculum on October 11, 2007 (ESI 2008b), thus providing evidence that at least some Indiana bats on Fort Drum are associated with the Glen Park hibernaculum.

The WNS has been found at the Glen Park hibernaculum and recent data has suggested a decline in the K-cluster of the Indiana bat population (USFWS 2008b). Little information is available concerning the impacts of WNS and how it may affect the population, both long- and short-term. It has been suggested that Indiana bats may be more susceptible to WNS if already stressed from other activities, such as needing to increase time spent foraging due to habitat loss. It has also been mentioned that Indiana bats may not be accumulating enough fat reserves in the fall in order to sustain them through the winter and possibly, to protect against WNS. Research is on-going about WNS and bats.

1.5.4.2 Spring Emergence

In northern New York, Indiana bats arouse from hibernation in mid-April—approximately April 13-17 at Glen Park (Alan Hicks, NYSDEC, personal communication)—and migrate to summer roosts. Spring is a critical time of year for Indiana bats as they have low fat reserves after hibernating through the winter and potentially limited availability of insects for food. During this time, female bats initiate fertilization and become pregnant which also requires a large amount of energy.

Currently, there are no capture data confirming the presence of Indiana bats on Fort Drum during the spring. The earliest capture of an Indiana bat was on May 13 (unpublished data 2008). However, mist netting was not conducted prior to this time. It is assumed that Indiana bats are present on Fort Drum in mid-April given that they have been identified on post during autumn and summer seasons and considering the close proximity to a Priority II hibernaculum. It is also assumed that males, non-reproductive females, and pregnant females will roost on Fort Drum after spring emergence.

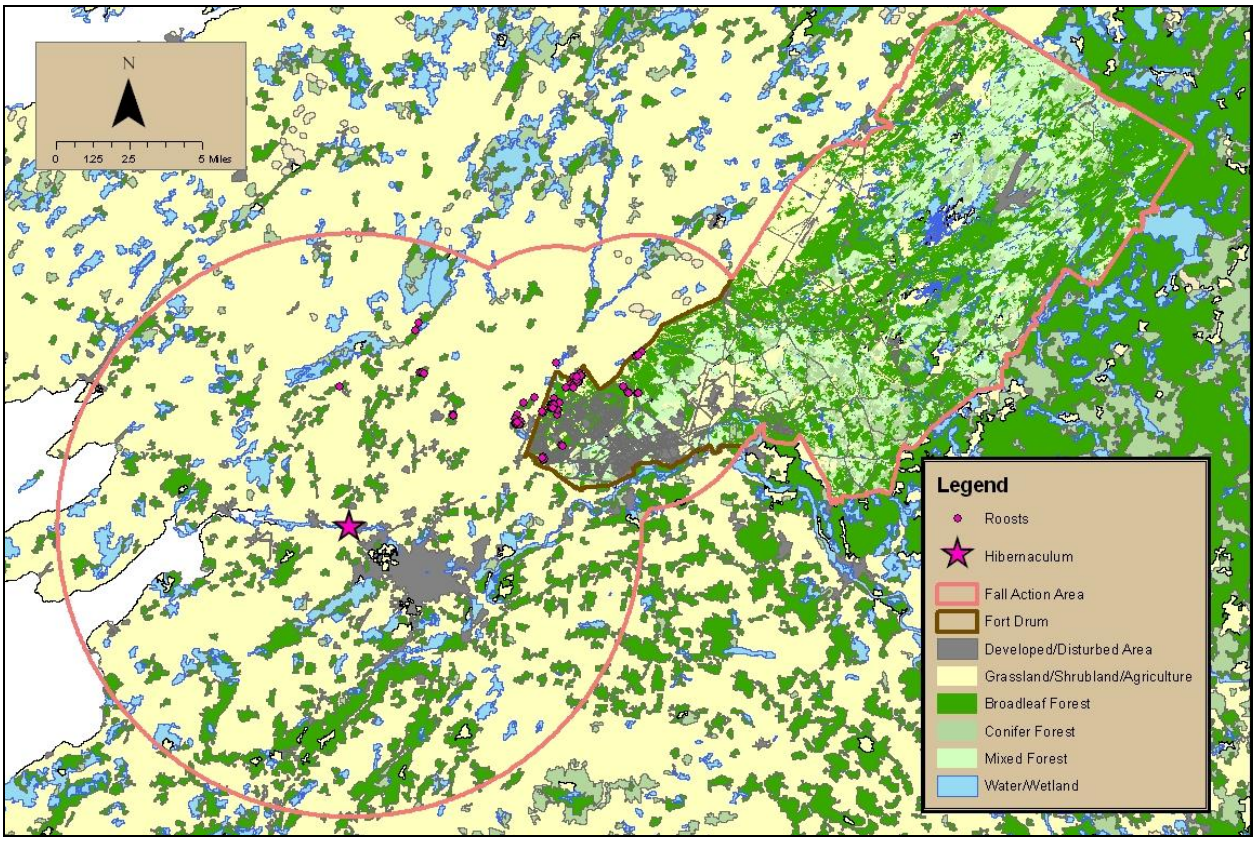
1.5.4.3 Summer Roosting and Raising Young

Fort Drum has abundant potential roosting habitat for bats with approximately 74,515 ac (30,155 ha) of forested land and snags common throughout the installation. See Section 1.3.4 for more information on forested areas on Fort Drum. In the action areas excluding the installation, the land cover is predominantly agriculture/pasturelands with fragmented forested habitats dispersed throughout (Figure 1.16).

In previous consultations with USFWS, Fort Drum conservatively estimated and assumed that four maternity colonies could be located on the installation assuming that 15 maternity colonies form from the Glen Park hibernaculum. This conservative estimate was calculated previous to mist netting and tracking efforts. Current data indicates that 9 (out of possibly 15) maternity colonies have been identified off the installation and within Jefferson County (USFWS 2008b). From mist net surveys and radio-telemetry efforts conducted on and adjacent to Fort Drum, one known maternity colony has been identified on Fort Drum. The known maternity colony has known roosts primarily in the Cantonment Area, TA 3, and on lands in the Town of LeRay. The largest exit count from one roost tree (primary) was 64 Indiana bats. In addition to this roost tree, several other alternate roost trees were identified during survey efforts. Thus, it is assumed that between 75-100 Indiana bats are present within this known maternity colony. An undiscovered maternity colony is also assumed to be present on Fort Drum based on 1) the ample amount of suitable roosting habitat available, 2) proximity to the Glen Park hibernaculum, 3) the size of Fort Drum, 4) the size of and distance to the known maternity colony, 5)

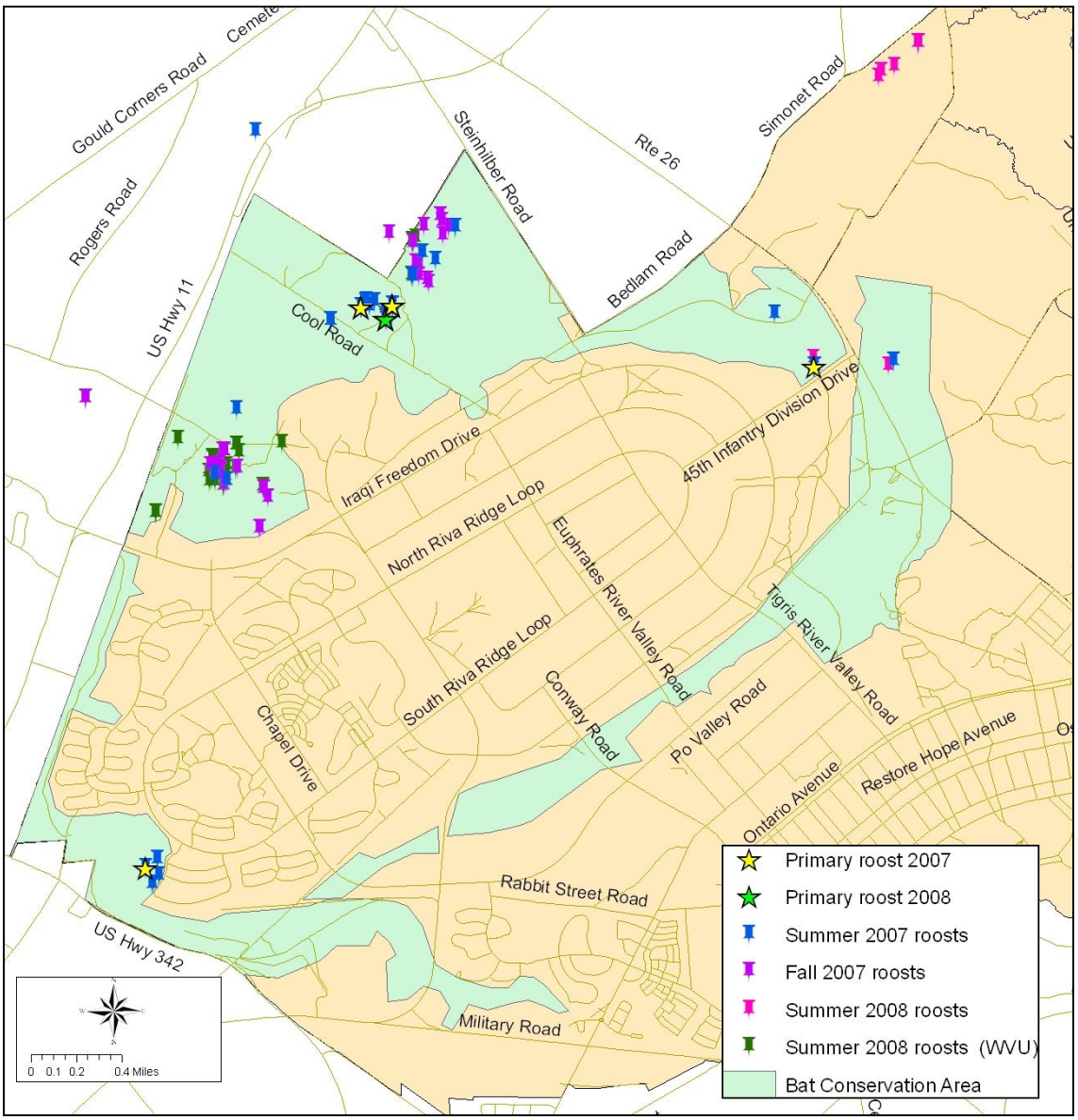
echolocation passes identified as potential Indiana bat call sequences found throughout the installation, and 6) insufficient mist net survey efforts to rule out probable absence. Based on the known maternity colony on Fort Drum, the undiscovered maternity is estimated to be of similar size with up to 100 Indiana bats. For the purposes of this BA, it is assumed that two maternity colonies with up to 100 Indiana bats in each are present on Fort Drum.

Figure 1.16 Land cover types and known Indiana bat roost location off of Fort Drum.



From all summer mist net surveys, 52 roosts were located on Fort Drum (ESI 2008a, unpublished data). Indiana bats were primarily captured and identified roosting in the Cantonment Area and in Training Areas 3 and 4 (Figure 1.17). Roost sites appeared to be in five seemingly distinct locations with some roost switching between sites and overlap in foraging (ESI 2008a,b, unpublished data). In 2008, Indiana bats demonstrated site fidelity by returning to several of the same areas previously identified in 2007. Specifically, two Indiana bats were tracked in 2008 to the same roost trees that were utilized in 2007 (unpublished data). Portions of the 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 2008b, ESI 2008a).

Figure 1.17 Known Indiana bat roost locations from 2007 and 2008 monitoring efforts on Fort Drum.



Both juvenile and adult Indiana bats roost on Fort Drum (ESI 2006, ESI 2008a, unpublished data). To date, five roosts were considered "primary" roosts (Figure 1.17). All of the roosts considered as "primary" had a minimum of 12 bats on multiple nights while two of the roosts had more than 20 bats each (ESI 2008a). It is assumed that all bats observed emerging from a roost are Indiana bats (USFWS 2007). In Cincinnati, OH, a snag was felled that had an Indiana bat maternity colony with non-volant pups and only Indiana bats were noted within the roost (Belwood 1996).

Roosts were primarily located in standing dead trees or within dead tree limbs. The average diameter for roost trees on Fort Drum was 13.1 in (range 4 in -27 in), and mean tree height was

27.8 ft (8.4 m)(range 23-33 ft (7-10 m); ESI 2008a). Canopy cover varied around each roost tree, ranging from 0-100% cover.

1.5.4.4 Foraging

Approximately, 92% of Fort Drum is covered by a variety of natural habitats which may be utilized by Indiana bats. Echolocation detector surveys identified probable Indiana bat call sequences throughout the installation (Figure 1.13).

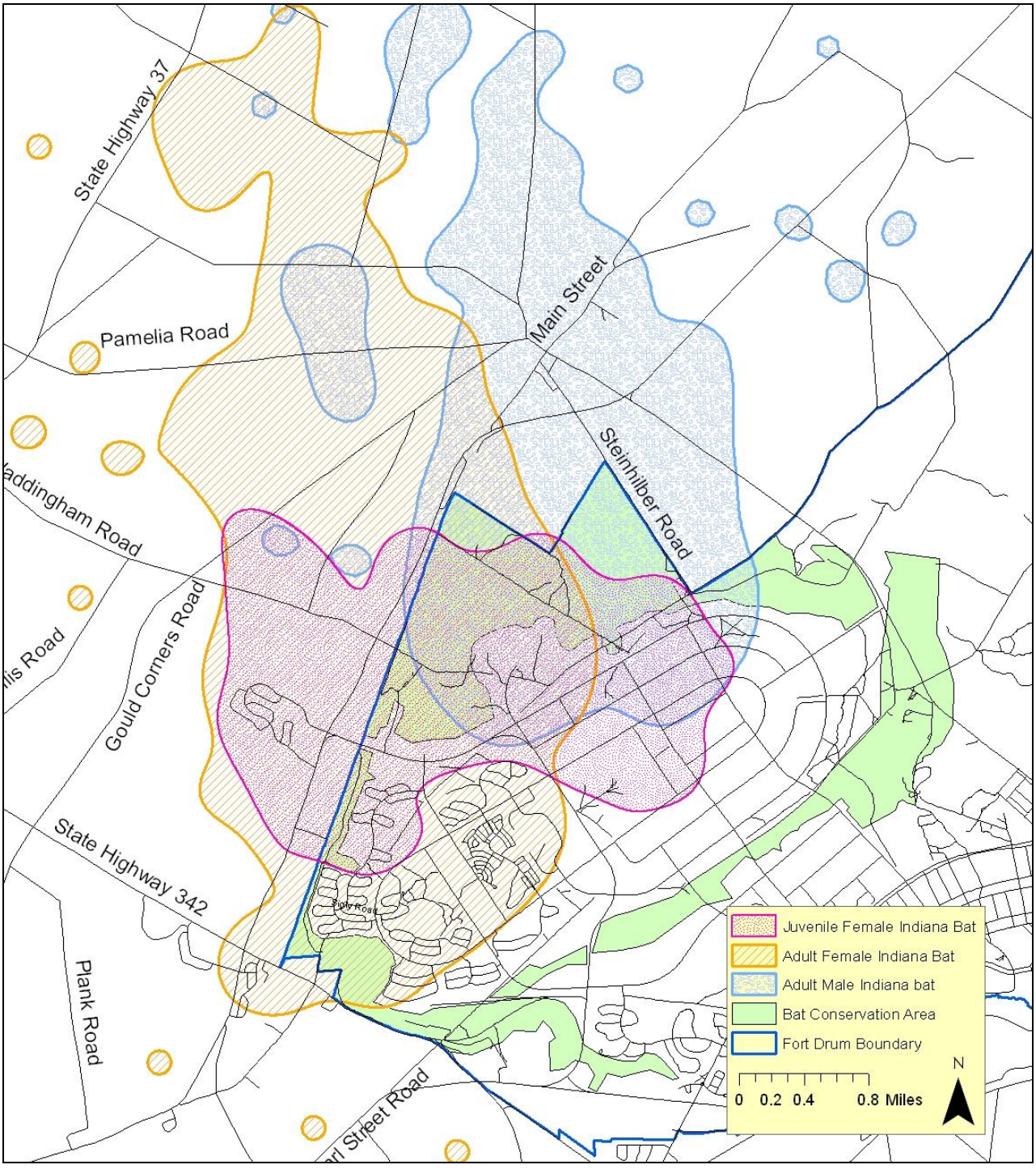
Indiana bat foraging has been confirmed in the Cantonment Area and off-post from radio-telemetry studies (ESI 2008b, unpublished data), and it is assumed that Indiana bats forage within Training Areas 3 and 4 since they have been captured and found to roost in these locations. During the fall 2007 study, three Indiana bats foraged over the northern portion of the Cantonment Area as well as in off-post areas to the north and east of the installation (Figure 1.18). Pasture/hay, deciduous forests, and palustrine forested wetlands were the most commonly used habitat types accounting for 68% of habitat used by the tagged Indiana bats. The home range size (fixed kernel) of the Indiana bats varied from 1,267 - 5,295 ac (513 – 2,143 ha) with a mean range of 4,720 ac (1,910 ha) (ESI 2008b).

Research studying Indiana bats' temporal and spatial use of Fort Drum is currently being conducted by the U.S. Forest Service and West Virginia University. Data from this study is still being analyzed, but preliminary data suggests foraging areas similar to ones identified in the fall 2007 study.

1.5.4.5 Swarming/Fall Roosting

Because of Fort Drum's proximity to a Priority II 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). A fall study in 2007 observed the presence of roosting and foraging Indiana bats (*n*=3) in the Cantonment Area as late as October 12 (ESI 2008b). Roosts that were located in the fall were approximately 7.7-9.5 mi (12.4-15 km) from the Glen Park hibernaculum. One tagged Indiana bat (juvenile female) was present on Fort Drum until October 10 when it flew to the Glen Park hibernaculum. The other two bats were also present on Fort Drum after October 1, but the transmitter either fell off or its battery died before it could be determined when the bats left Fort Drum for the hibernaculum. In total, 29 roosts (2 partially dead, 2 live, and 25 dead trees) were located within the Cantonment Area of Fort Drum during the autumn survey. Fourteen new roosts were located after October 1. In 2008, 11 new roost trees were identified in the Cantonment Area after August 15 (unpublished data). In addition, two juvenile Indiana bats (1 male, 1 female) were tracked in 2008 and were observed foraging and roosting on Fort Drum after October 1.

Figure 1.18 Fall home range for three foraging Indiana bats captured on Fort Drum (ESI 2008b).



2.0 Proposed Activities

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

2.1 Construction

Currently Fort Drum is in the midst of its third major construction period in its history. (See *Section 1.3.2* for a brief history of the major construction periods at Fort Drum.) Between Jan. 2009 -December 2011, approximately 60 projects including 125 buildings and range facilities, and 900 residential homes are proposed for construction. Although construction will occur throughout Fort Drum, most of the projects are concentrated in the Cantonment Area and the area surrounding Wheeler-Sack Army Airfield (WSAAF).

2.1.1 Construction Activities

Because of constantly shifting funding and construction priorities, impacts to Indiana bats were determined by analyzing all projects that are proposed to occur between January 2009 - December 2011. Footprints for construction projects were estimated to represent the potential maximum area that may be impacted which includes stormwater retention ponds, parking lots, landscaped yards, utilities, new borrow pits, etc. Location and size of footprints may shift during the next three years, however land clearing will not exceed the total acreage discussed in this chapter. Additionally, land clearing will not go over the acreage for each vegetation cover type (i.e. mixed forest, grassland, etc.) discussed in this chapter. If construction activities are likely to exceed the specified total acreage or the acreage for each vegetation cover type, then it will be necessary to consult with the USFWS. If additional projects occur but do not remove undeveloped habitat, then further consultation is not needed.

Construction projects are developed using the design-build process. In design-build, Fort Drum provides general conceptual and/or performance requirements to a contractual builder, who expands on Fort Drum's general requirements, incorporates these ideas into a design, and subsequently constructs the project (Hanvey 2004). The overlapping of the engineering and construction phases means a final design is not established when construction begins, so oftentimes footprints may need to shift as the project proceeds in order to address unknown issues. Although the design-build process was developed to streamline the construction process and to be more cost-effective, it creates challenges for environmental planning and compliance.

To determine the maximum amount of vegetation cover types that are likely to be cleared, construction footprints were overlain with vegetation information, and acreages of impacted habitat were determined for each project. These acreages were summed by each habitat type and buffered by an additional 50 ac (20 ha) per habitat type to adjust for potential project shifts to other areas with different vegetation types. Acreages for wetlands and water bodies were not buffered. Vegetation types are based on land covers described in the Vegetation Classification Standard of 1997 (FGDC 1997) and calculated in acres.

All construction projects are subject to environmental review via the NEPA process. 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. 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.

All construction activities with ground disturbance greater than one acre including disturbances of less than one acre that are part of a larger common plan of development or sale that will ultimately disturb one or more acres of land 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. In addition, construction projects follow the criteria set forth in the Clean Water Act Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material.

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.

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.

All construction projects are subject to environmental review via the National Environmental Protection Act (NEPA) process and are subject to various federal and state laws and regulations (Appendix C).

Cantonment Area/WSAAF Construction

The Cantonment Area and the surrounding area around WSAAF contain the majority of installation development. Construction proposed in the Cantonment Area as part of the Army

Transformation process includes barracks, headquarters and administrative buildings, vehicle maintenance facilities, residential housing, indoor firing ranges, child development centers, etc.

To determine the maximum amount of vegetation cover types that are likely to be cleared, construction footprints were overlain with vegetation information and calculated in nine general categories (Table 2.1). Vegetation types are based on land covers described in the Vegetation Classification Standard of 1997 (FGDC 1997) and calculated in acres. Each category (except wetlands/water bodies) was then buffered with an additional 50 ac (20 ha) to adjust for potential project shifts to other areas with different vegetation types.

Fort Drum anticipates constructing on up to 2,483 ac (1,004 ha) of land in the Cantonment Area and in the surrounding areas around WSAAF between January 2009 – December 2011 (Figures 2.1 and 2.2). Refer to Table 2.1 for acreages of impacted vegetative cover types.

Figure 2.1 Proposed construction projects between January 2009 – Dec 2011 within the Cantonment Area on Fort Drum.

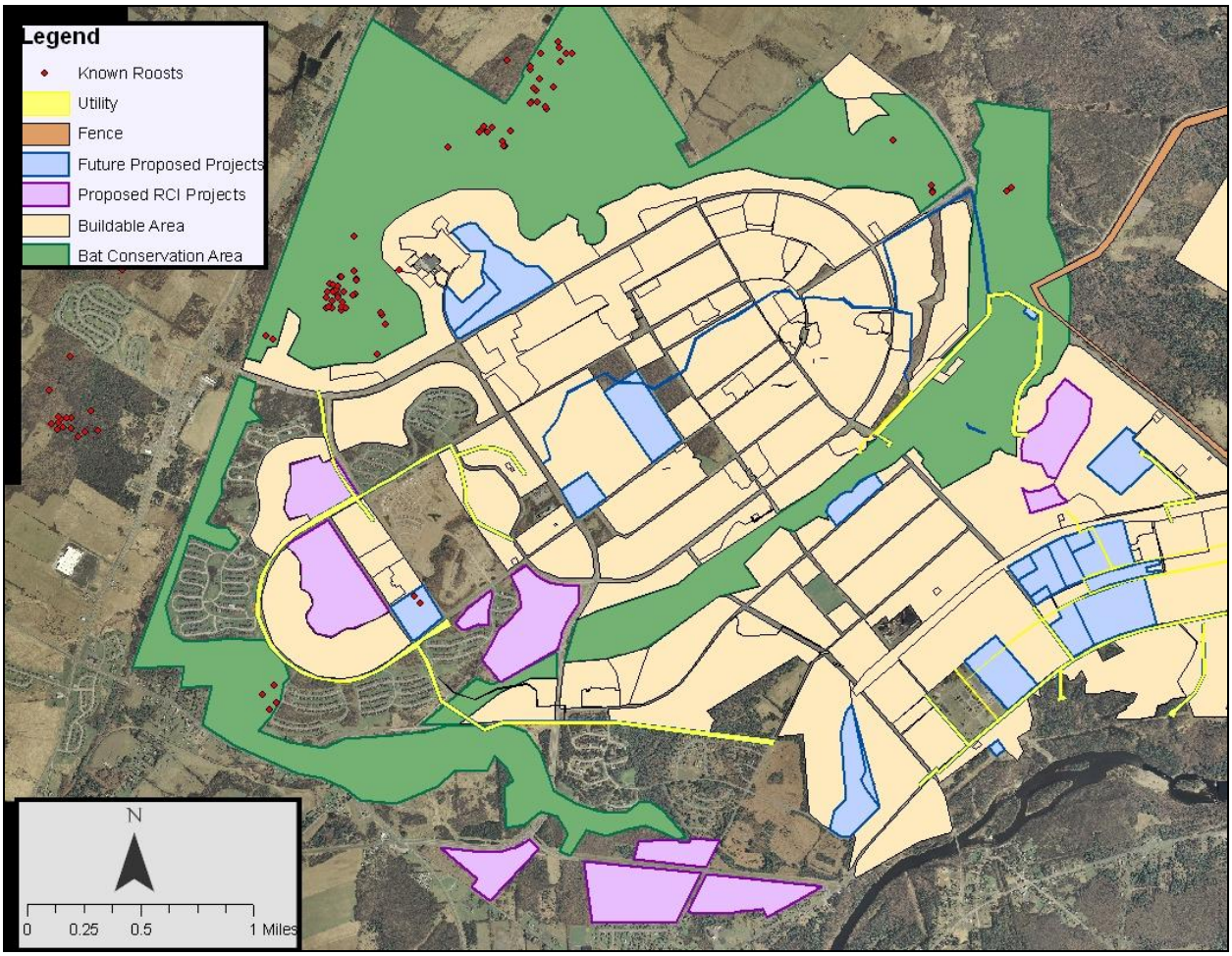


Figure 2.2 Proposed construction projects between January 2009 – Dec 2011 around WSAAF on Fort Drum.

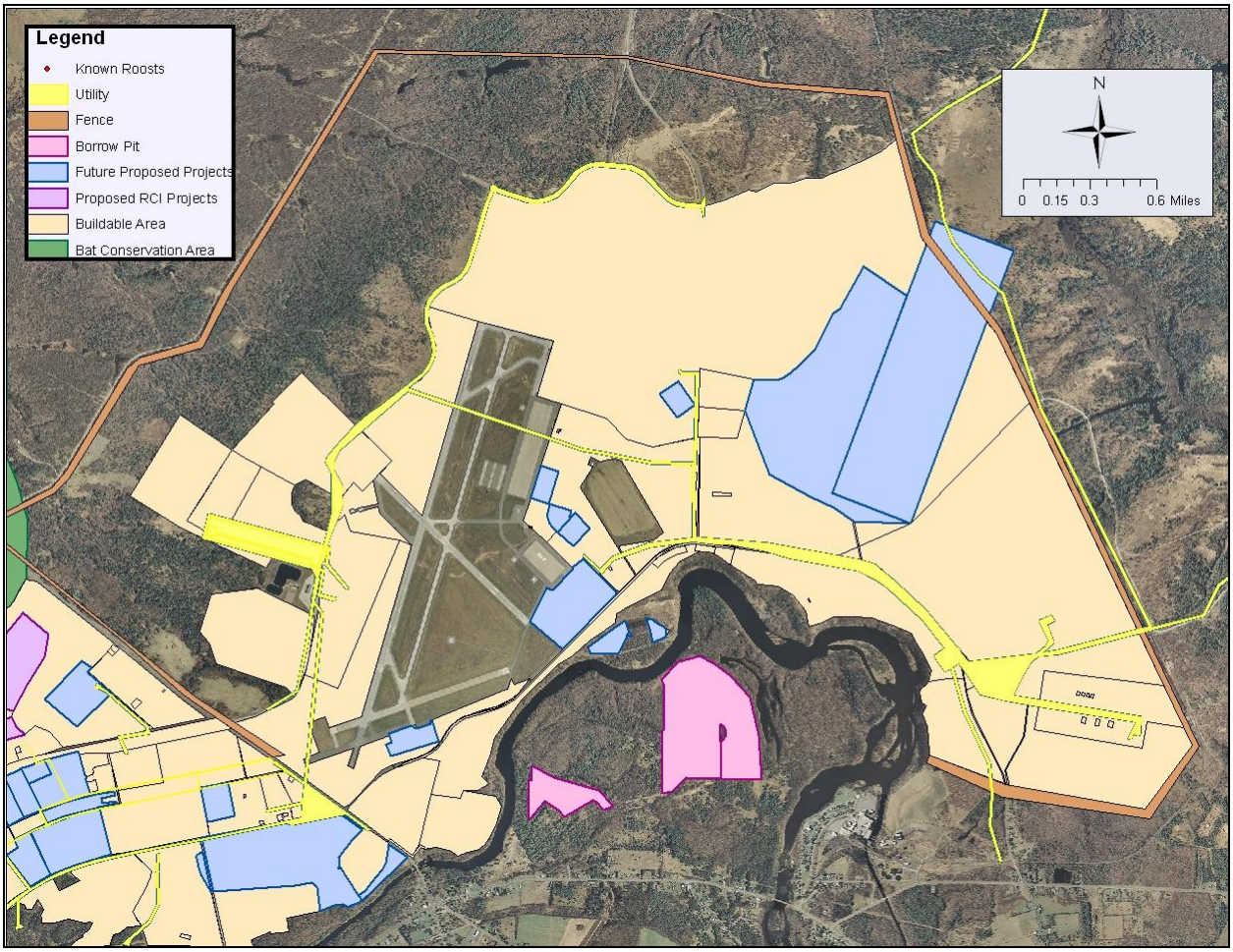


Table 2.1 Maximum amount of vegetation by type (buffered by 50 ac/vegetation type) that may be impacted from construction activities, excluding Training Area projects.

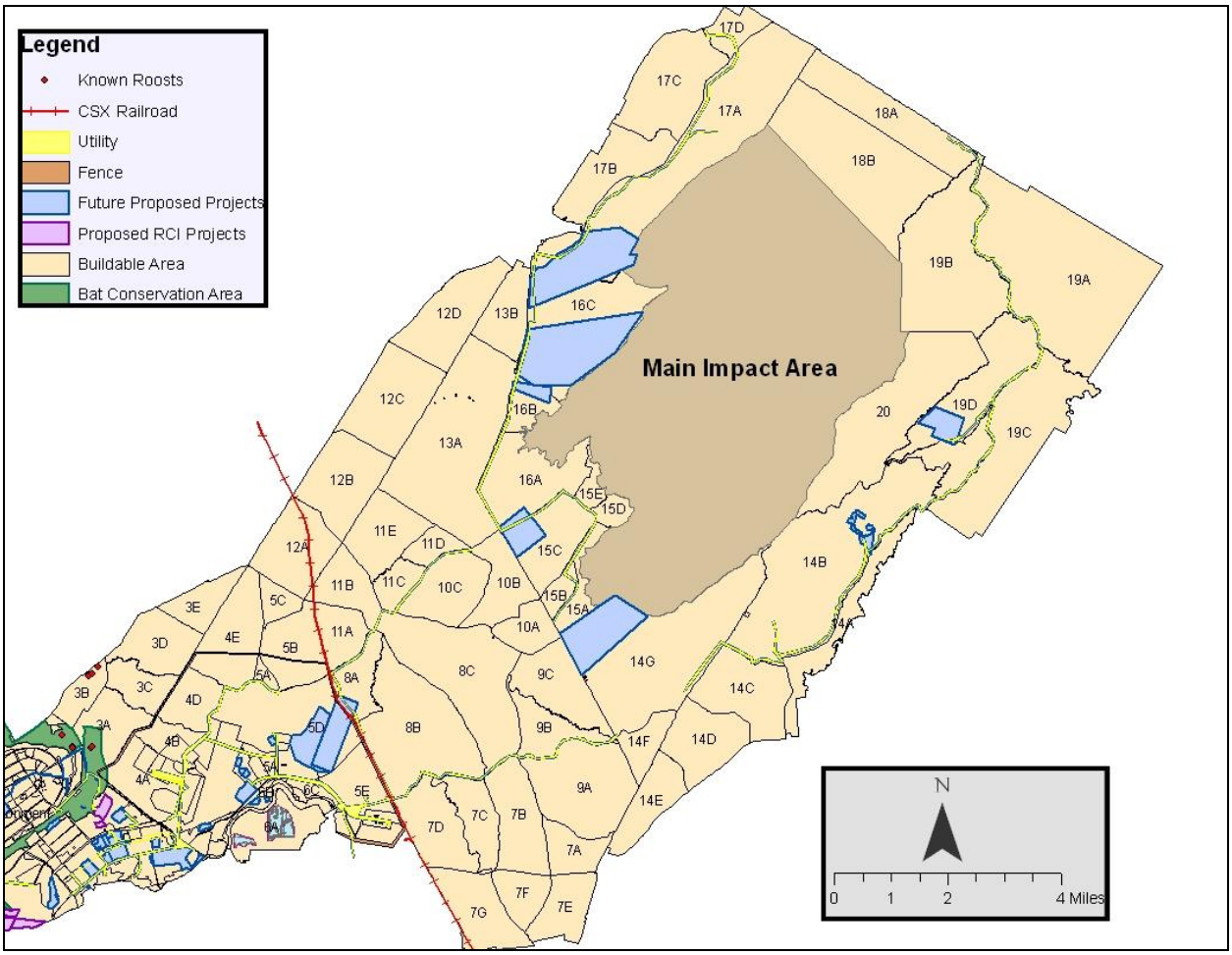
Vegetation Type	Acres
Conifer Forest	283
Deciduous Forest	619
Disturbed	300
Grasslands	518
Landscaped Yard	358
Mixed Forest	509
Sand Dunes/Flats	116
Shrublands	169
Water/Wetlands	8

Training Area Construction

Construction of range facilities includes support and maintenance buildings, ranges for firing weapons including clearing for line of sight and target areas, airfields, and/or trail networks and bivouac sites. Unlike construction in the Cantonment Area, it is not always necessary to remove all vegetation to construct range facilities, however, these areas still have relatively high levels of disturbance (see *Section 2.2 Military Training*). Although wetlands and surface waters may be encompassed within a range project footprint, extensive measures are undertaken to avoid, minimize, or mitigate wetland impacts.

Types of vegetative cover loss were calculated (in acres) from estimates on the proposed locations and were buffered to account for potential shifts in location. Projects in the Training Areas are also subject to relocation and may be relocated anywhere in the Training Areas. Loss of vegetation types were calculated from the proposed location in the Training Area and buffered by 50 ac (20 ha) for each vegetation type.

Figure 2.3 Proposed construction projects between January 2009 – December 2011 in the Training Area on Fort Drum.



Assuming a complete removal of vegetation in proposed construction areas, construction in and around the ranges may clear up to 3,478 ac (1,407 ha) of vegetative cover (Figure 2.3). Refer to Table 2.2 for acreages of vegetative cover types that are within the proposed range project footprints. Construction for training is also subject to NEPA review and state and federal regulations.

Table 2.2 Acres of vegetation by type (including 50 ac buffer/vegetation type) that is within the footprints of proposed Training Area construction projects.

Vegetation Type	Acres
Conifer Forest	172
Deciduous Forest	1449
Disturbed Area	75
Grasslands	791
Landscaped Yards	107
Mixed Forest	595
Shrublands	432
Water/Wetlands	259

In order to facilitate small unforeseen training-related projects, Fort Drum may need to clear trees in the Training Area between August 15-September 30. Based on previous years and projects, it is assumed that 5 projects will occur each year 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. Clearing trees between August 15 – September 30 would only occur east of the CSX railroad line running north and south through the southwestern part of the Training Area which is outside the area of the known maternity colony. Before construction begins, each project will be monitored via mist netting and Anabat echolocation detection. Mist netting will occur in locations most likely to capture Indiana bats in or near the project site between June-September. Mist netting will follow USFWS mist netting protocols for Indiana bats. There are no USFWS standards for monitoring Indiana bats using Anabat echolocation detectors, so Fort Drum proposes the following guidelines:

1) A minimum of two Anabat detectors per acre will be deployed for at least two nights.
2) Recording will occur 30 min. before sunrise until dawn.
3) 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.
4) Detectors will not be deployed if the following weather conditions exist: precipitation; temperatures below 10ºC; and/or strong winds.
5) Echolocation passes will be identified using a filter for Indiana bats, and the number of identified passes will be recorded. Results will be sent at the end of the year to the USFWS.

If construction projects need to occur between April 16 - September 30 or west of the CSX railroad line or within the range of the known maternity colony, then 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.

Demolition

Many buildings on the installation were built in the 1940s and are scheduled to be demolished. Up to 80 buildings, including some outdated RCI housing, may need to be demolished between January 2009 - 2011. 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 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 Fort Drum's Fish and Wildlife Management Program will contact USFWS to discuss the most appropriate measures that need to be taken to protect the Indiana bats.

Borrow Pits

Eleven quarries/borrow pits in the Training Area and one in the Cantonment Area encompass approximately 188 ac (76 ha) and are used to provide sand and gravel for installation use, primarily for construction. Current borrow pit sites are disturbed sites with minimal vegetation. Up to 161 ac (65 ha) may be cleared to establish new borrow pits (Figure 2.2). Land clearing for borrow pits is considered another "construction" project for this BA. Refer to Table 2.3 for impacted vegetation types. No buffers were included in estimating vegetation cover types for borrow pits. The operation of borrow pits is considered to have no effect on Indiana bats, because no additional vegetative cover will be lost.

Table 2.3 Amount of vegetation types that is within the footprints of proposed borrow pits.

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

Wetland Mitigation

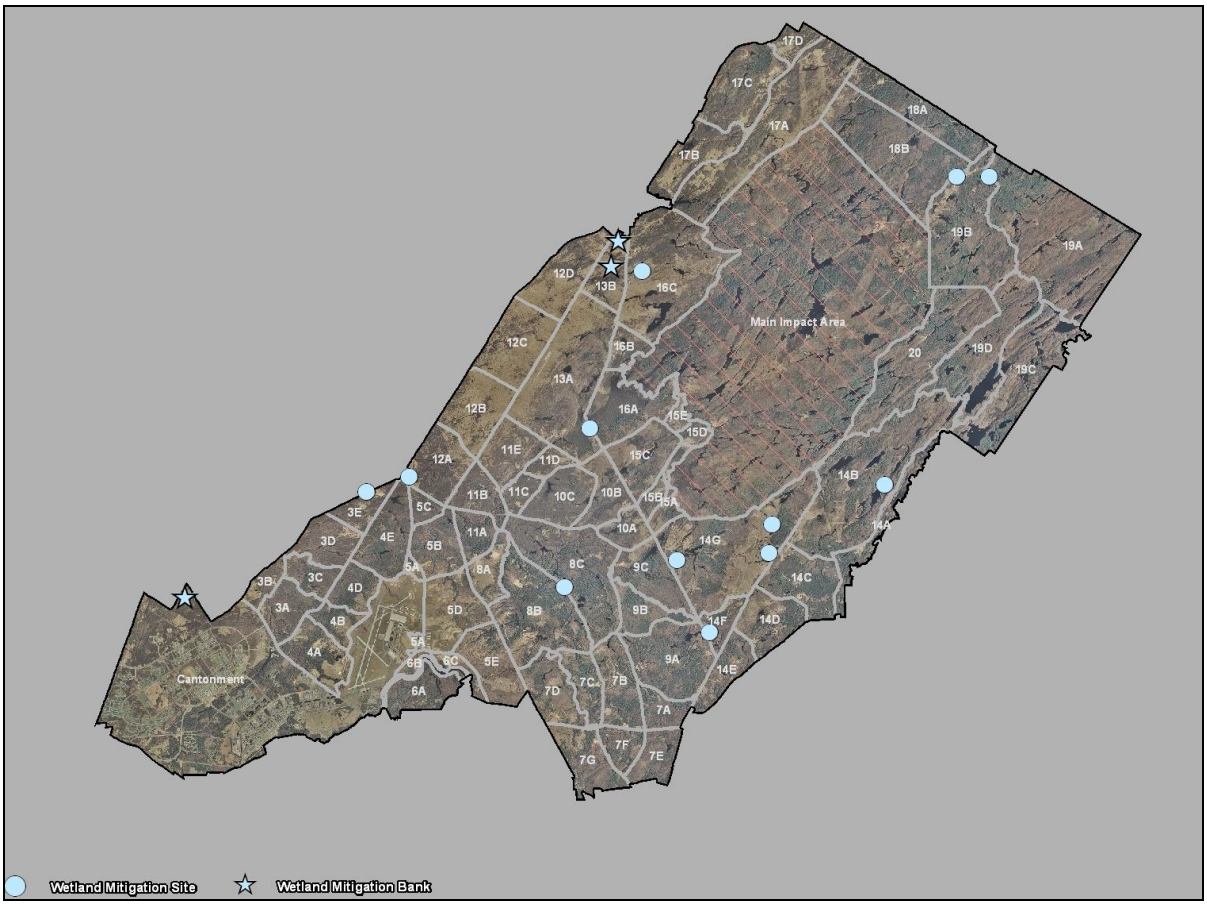
Where impacts to wetlands are unavoidable and determined to be more than minimal, a plan to construct other wetlands or waters are incorporated into the wetlands permit application. The mitigation plan is developed in accordance with USACE Mitigation Guidelines (33 CFR Parts 325 and 332; 40 CFR Part 230).

When mitigation is required, acreage as well as loss of wetland functions may be assessed to include ground water recharge and discharge, flood flow alteration, sediment stabilization, sediment or toxicant retention, nutrient removal or transformation, production export, wildlife diversity/abundance, aquatic diversity/abundance, uniqueness/heritage, and recreation. The Fort Drum Wetland Management Program coordinates with USACE-New York District, USFWS,

EPA, and NYSDEC to assess mitigation requirements for each construction project that may have the potential to impact wetlands. See the Fort Drum Integrated Natural Resources Management Plan (U.S. Army in progress) for more information on the mitigation process.

Historically, Fort Drum has either provided on-site or near-site (to the project area) compensatory wetland mitigation. In general, mitigation sites are located near the installation boundaries or other areas where the impact to available training areas is minimized (Figure 2.4). For example, many wetlands sites have been established in former sand and gravel borrow sites to minimize training area lost, reduce construction costs, and provide the greatest improvement value. Low impact military training can still occur on these sites, but ground disturbing activities are not allowed.

Figure 2.4 Constructed Wetland Mitigation Sites & Bank Sites on Fort Drum



The development of compensatory wetland sites into fully functional wetlands must be monitored per their permit requirements for generally up to five years (although on the forested portion of one mitigation bank site monitoring is required for 10 years) until the special conditions of the permit have been met. Monitoring is conducted by Fort Drum's Wetlands Management Program.

Only areas (both on and off-post) that have no or minimal (e.g., a few isolated trees within a landscape of open grass or shrubland) tree removal will be recommended for mitigation areas. The exception to this would be restoring or creating forested wetlands. However, recreating

forested wetland functionality is difficult, costly and time consuming, so typically forested wetland areas are avoided completely when possible.

Beginning in 2007, compensatory mitigation efforts were initiated off-post. Monitoring of these off-post mitigation sites and other post-construction activities will be the primary responsibility of the Contractor providing the mitigation or through the Army Compatible Use Buffer process. This effort will further decrease the amount of training lands used for mitigation.

Although the loss of wetlands due to development or construction may lead to losses of suitable foraging or roosting (in the case of forested wetlands) habitat, the mitigation process should offset some of the impacts. Constructing mitigation sites should have discountable or wholly beneficial impacts to Indiana bats. Restoring areas that historically had wetland functionality should provide additional foraging areas for bats. Further, creating wetland areas in appropriate upland sites will provide a diversity and juxtaposition of habitat that should also provide foraging opportunities. Appropriate upland plantings of trees adjacent to wetland sites could also develop into suitable roosting areas in the future.

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 1 and 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 – September 30) and east of the CSX railroad line will be monitored for Indiana bats, which will help Fort Drum identify potential Indiana bat areas for future consultations..

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, 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 minimze light pollution by angling lights downward or via other light minimization measures. In addition, structures surrounding the BCA will be retrofitted to reduce lighting impacts in this known area of Indiana bat use. 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. During demolition of buildings, if bats of any species are discovered, all work must cease and Fort Drum's Fish and Wildlife Management Program must be immediately contacted. 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. Refer to Section 2.7 for description of bat management. 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 Fort Drum's Fish and Wildlife Management Program will contact USFWS to discuss the most appropriate measures that need to be taken to protect the Indiana bats.

8. 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.

2.1.3 Effects to Indiana bats

This section details the impacts that all construction activities may have on Indiana bats on Fort Drum.

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 currently are anticipated to have no known direct effects to hibernating Indiana bats.

Roosting

Because most tree clearing occurs from October 1 – April 15 when most Indiana bats are absent from the installation (ESI 2008b), the potential to remove a maternity roost with large numbers of Indiana bats present is unlikely. Thus the potential for the majority of construction

projects to directly affect maternity colonies with non-volant young is unlikely and effects are discountable.

Although a fall foraging study conducted on Fort Drum in 2007 provided support that the majority of Indiana bats leave the installation in the fall as evidenced by low capture rates and tree exit counts (ESI 2008b), there were three radio-tagged Indiana bats that remained on Fort Drum as late as October 12 (ESI 2008b). In addition, two juvenile Indiana bats roosted and foraged on Fort Drum after October 1, 2008. Although these Indiana bats were present on the installation after October 1, most of their known roosting locations were located 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.

Changing construction priorities, transient behavior of Indiana bats, and lack of information regarding Indiana bat roosting and foraging areas may result in land clearing activities occurring in undiscovered Indiana bat roosting areas after October 1. Undiscovered roost locations that may be present outside the BCA and within construction zones could potentially be adversely affected by construction activities as roosts are removed before all Indiana bats have returned to the hibernaculum. All Indiana bats still present on the installation in October are all volant and should be capable of flying from the roost tree during disturbances. However, not all Indiana bats may be able to quickly respond (i.e. awake and fly away) to construction activities, so they may be injured or killed by tree felling in October. Thus, construction activities are anticipated to disturb, injure, or kill Indiana bats in undiscovered roosts in October within the known maternity colony and the undiscovered maternity colony. Indiana bats that use the BCA for fall swarming will not be adversely affected by construction activities after October 1, because no trees will be felled within the BCA. To date, all known Indiana bats present on the installation after October 1 have been located within the BCA or off-post.

In order to facilitate small, unanticipated training-related projects, Fort Drum may need to clear trees in the Training Area between August 15-September 30. 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 only occur east of the CSX railroad line running north and south through the southwestern part of the Training Area. This area is outside the range of the known maternity colony, so no known direct impacts to this maternity colony are anticipated. However, the undiscovered maternity colony may be adversely affected by tree felling in August and September. During this time, Indiana bats are more likely to be dispersed throughout the forested habitat although multiple Indiana bats have known to continue to roost together during this time. Felling trees during August and September reduces the risk of felling a maternity roost tree with non-volant pups or a tree with a large cluster of individuals. Juvenile bats should be newly volant at this time. However, novice Indiana bats and some adult individuals may not be capable of quickly abandoning the roost which could result in injury or death to individuals. More experienced fliers are better able to abandon a roost quickly, however this forced abandonment means Indiana bats will need to immediately find alternate roosts. 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, so these construction activities are likely to adversely affect Indiana bats.

Although tree removal will primarily occur when Indiana bats are not on the installation, other construction activities (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. Dust may cause Indiana bats to shift roosts from the affected area. 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 2008b). 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, however 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, unpublished data). We anticipate Indiana bats to acclimate to noise associated with operation and maintenance activities. Dust and noise may affect, but are unlikely to adversely affect (direct) roosting Indiana bats.

Foraging

Forested habitat (excluding the aforementioned 25 ac (10 ha) per year in the Training Area in August and September) will not be removed between April 16 - September 30 when the majority of Indiana bats are present on Fort Drum; thus Indiana bats would not immediately lose preferential foraging habitat during the reproductive season (Sparks et al. 2005). Foraging Indiana bats within the known maternity colony are unlikely to be directly affected by tree removal, because trees will be removed during the hibernation season when Indiana bats are not present on the installation. 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-September 30 as unforeseen shifts may occur within projects. This removal would immediately reduce available foraging habitat for Indiana bats in the undiscovered maternity colony. Approximately 73,000 ac (29,542 ha) of forested habitat is present of Fort Drum with the majority of it in the Training Area. Abundant amounts of suitable vegetative cover will still be present within the Main Impact Area and in surrounding Training Areas, so foraging habitat will be available to Indiana bats at all times during and after construction. Indiana bats associated with the undiscovered maternity colony are likely to shift their foraging behavior to natural habitats adjacent to construction projects in the Training Area.

Beginning October 1, forested habitat may be permanently removed for construction. Since Indiana bats have been noted on Fort Drum until October 12 (ESI 2008b), removing forested habitat after October 1 is likely to reduce overall foraging areas for any Indiana bats still remaining at that time. Clearing land (e.g. small trees, shrubs, and grassland) for construction after August 15 will also affect Indiana bats, including newly volant young. Foraging behavior of Indiana bats on Fort Drum in August is currently unknown, however it is assumed that Indiana bats forage within 2.5 mi of their roost (e.g. Murray & Kurta 2004) which would encompass the majority of natural habitats in the Cantonment Area. Permanent removal of some of this natural habitat will immediately reduce the amount of foraging opportunities for Indiana bats, including young of year, but it is suspected that foraging Indiana bats would shift their foraging behavior accordingly due to the amount of natural vegetative cover still remaining. During radio-tracking surveys, it was noted that Indiana bats mostly used the Cantonment Area (primarily within the BCA) and off-post areas for foraging (ESI 2008b, unpublished data). The BCA will remain as a foraging area and will be relatively undisturbed by construction and other activities.

Subsequently, foraging habitat in the BCA would not be affected (direct) by construction activities, however construction activities outside the BCA will reduce available habitat for foraging in the Cantonment Area by approximately 30%. Thus, Indiana bats may further concentrate foraging activities within the BCA or in natural habitat fragments on-post and off-post. The BCA provides suitable foraging habitat for Indiana bats year-round, so the known foraging areas in the BCA are unlikely to be adversely affected by construction activities. Due to the amount of natural habitat available in the Training Area, Indiana bats may be affected, but are not likely to be adversely affected by vegetation removal. Ample amounts of vegetative types are available in the Training Area for foraging 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 currently have no known 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 3,627 ac (1,467 ha) of woodlands, including two known roosts (used by a male Indiana bat in 2006;(ESI 2006)), are expected to be cleared between October 1 and April 15 during the next three years. Unknown roosts from the known maternity colony and from the undiscovered maternity colony may also be unwittingly cleared for construction. Indiana bats are known to display site fidelity to roost locations (Gumbert et al. 2002), 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 will also suffer a decline in reproductive success since more energy will be expended locating new suitable roosts. Because less woodland habitat is available in the Cantonment Area than the Training Area, loss of roosting habitat in the Cantonment Area is more likely to result in harm to Indiana bats than in the Training 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 known Indiana bat roosts identified on Fort Drum were found within the Cantonment Area and are mostly protected within the BCA from construction. Indiana bats within the known maternity colony have used the same general areas on Fort Drum for the past two summers (i.e. 2007 and 2008; ESI 2008a, unpublished data) and it is expected that Indiana bats will continue to utilize the protected area as long as suitable roosts remain available. Construction activities in the Cantonment Area and around WSAAF are expected to remove two known male roosts and potentially other undiscovered roosts. If an undiscovered primary or maternity roost is removed, then Indiana bats may search nearby woodlands for roost sites and may congregate less during the spring/summer months. Given the number of Indiana bats counted during exit counts, it is

likely that Indiana bats are using trees outside the BCA for roosting. Additional roost trees were found outside the BCA in 2008 within Training Area 3. Construction activities in the Cantonment Area are likely to remove undiscovered roost trees concentrating Indiana bats into the BCA or into other forested areas, such as those in the Training Area or off-post. The overall loss of natural habitat to construction is likely to adversely affect Indiana bats as fewer roosting opportunities will be available.

Construction projects in the Training Area are primarily located around the Main Impact Area and are not anticipated to occur within 5 mi (8 km) of any known roosts, primarily found in Training Area 3. Construction projects in the Training Area are typically restricted to certain areas in order for fire to be directed towards the Main Impact Area and for safety concerns. In the next three years, construction projects are not likely to remove known roost trees in the Training Area. Thus, it is unlikely that the known maternity colony is likely to be affected by the proposed construction projects. However, project shifts may result in impacts near known roost sites. Unknown roosts of the known maternity colony and of the undiscovered maternity colony may be removed during the non-hibernation season. This tree removal will have similar effects to Indiana bats as previously discussed for tree removal in the Cantonment Area, however more natural habitat is available in the Training Area, which could provide suitable roosting habitat for Indiana bats. Because more natural habitats are available, Indiana bats may need to spend less time and energy seeking new roosts than in the Cantonment Area. Therefore, the likelihood that Indiana bat roosting habitat (in the range of both the known and undiscovered maternity colonies) would be negatively (indirectly) impacted by tree removal for construction projects is unlikely. Construction in the Training Area may affect, but is not likely to adversely affect Indiana bats.

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 by roughly 34%. 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 2,483 ac (1,004 ha)(in Cantonment Area and WSAAF) and 3,478 ac (1,407 ha)(in Training Area) of potential foraging habitat. 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. To provide 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. Currently, there is insufficient data concerning Indiana bat foraging and movements on Fort Drum although a study is presently underway. Preliminary results show that Indiana bats forage in the northern portion of the Cantonment Area (ESI 2008b, unpublished data). During a fall foraging study, three Indiana bats were found to forage primarily in the BCA and off-post areas to the north and west (ESI 2008b). Because the BCA provides foraging opportunities throughout the Cantonment Area, 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 5 mi (8 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. Up to 4% of vegetative cover in the Training Area may be removed. Ample amounts of vegetative cover will remain available for the undiscovered maternity colony, thus habitat fragmentation may affect, but is unlikely to affect Indiana bats in the undiscovered maternity colony.

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 (unpublished data). Dust may affect, but is not likely to adversely affect known or undiscovered maternity colonies during the spring and summer or affect individuals in the fall.

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 up to 267 ac (108 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 by the creation or restoration of wetlands elsewhere. 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 to 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 is implementing light minimization measures on newly constructed buildings and on buildings surrounding the BCA to help reduce these impacts. With these measures, light pollution may affect, but is not likely to adversely affect Indiana bats.

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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 in press). 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, however, occurrences appear to be restricted to along roadsides and forest edges. Woodland interiors have isolated patches of 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.

Lastly, Fort Drum is currently implementing the Army Compatible Use Buffer (ACUB) Program. One of the purposes of the ACUB Program is to mitigate loss of habitat by providing funding for conservation easements. Conservation easements will be used on land located off-post to protect natural habitats which may be suitable for Indiana bat foraging and roosting (See *Section 3.4*). Indiana bats are known to forage in off-post areas in the town of LeRay (ESI 2006, 2008b) and this is one of the primary focuses of the ACUB Program at this time. This

action is expected to be beneficial to Indiana bats by retaining foraging and roosting opportunities for Indiana bats.

2.1.4 Conclusion

Land clearing for construction in the Cantonment Area on Fort Drum will remove approximately 34% of natural vegetative cover for Indiana bats in the Cantonment Area and around WSAAF. Construction in the Cantonment Area will in total reduce 0.01% of total vegetative cover within the portion of the fall action area that includes the Cantonment Area, WSAAF, and land off-post. Due to the nature of the land cover data, this estimate was calculated from acreage that included agriculture fields as a part of vegetative cover (Dr. Lee Herrington, SUNY ESF, 2002). The data did not differentiate between natural grasslands and farmlands. Approximately, 0.04% of forested habitat will be removed from this same portion of the fall action area. Two known male roosts will be removed for construction, however no known primary or maternity roosts will be felled. The majority of tree clearing will be conducted between October 1 – April 15. Although conservation measures are in place including the 2,200 ac (890 ha) BCA which encompasses the known maternity colony, construction activities are likely to lead to a cumulative, permanent loss of foraging and roosting habitat within the Cantonment Area, which are likely to adversely affect Indiana bats on the installation.

In the Training Area, up to 4% 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 indirect effects on the undiscovered maternity colony. Removal of roosting habitat in the winter may temporarily impact their reproductive success since Indiana bats will need to locate new roosts in the spring time. However, ample habitat of equal quality will remain available throughout the Training Area that will provide roosting and foraging sites.

Tree felling during the spring, summer, and fall seasons may affect, and are likely to adversely affect Indiana bats in the undiscovered 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, Indiana bats in the known maternity colony are not likely to be adversely affected by tree felling during the non-hibernation season.

2.2 Military Training

The primary purpose of Fort Drum is military training. 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 (Figure 2.5).

Maneuver areas consist of approximately 72,608 ac (29,383 ha) and are divided into 18 training areas (TA) which are further divided into 70 sub-training areas. Of the 18 maneuver training areas, four are classified for Heavy Maneuvers (TA 10, 12, 13, and 17) available for both wheeled and tracked vehicles driving on- and off-road. The remaining 14 maneuver training areas are classified for Light Maneuvers, meaning they are accessible to wheeled vehicles on- and off-road, but tracked vehicles are restricted to designated roads. Throughout maneuver

areas, there are approximately 94 bivouac areas, 69 landing zones, and 197 surveyed indirect firing points (including one hardened artillery firing point in TA 8A) primarily used for firing field artillery, mortars, and other forms of indirect live-fire training.

There are two designated drop zones in TA 12C and 13A; a 4,000 ft (1,219 m) long assault landing strip in TA 13A; a Forward Air Refueling/Re-arming Point (FARRP) site in TA 18A; a Forward Operating Base (FOB) in TA 5A; and eight Observation Points around the Main Impact Area. There are also a number of other training facilities throughout the Training Area including a Bayonet Assault Course, a Confidence Course, a Land Navigation Course, an Expert Field Medical Badge Training and Qualification site, a Rappel Tower, a Nuclear/Biological/Chemical (NBC) facility, and a Floating Bridge site over the Black River.

Within the maneuver areas, there are 39 ranges supporting a wide variety of weapon systems. These ranges include 15 Weapons Marksmanship Ranges (e.g., rifle, pistol, grenade launcher, anti-tank, sniper, shotgun, light machine gun, and other small arms weapons); six Collective Live-Fire Ranges (e.g., infantry squad and platoon battle courses, defensive and offensive live-fire ranges, a Multi-Purpose Training Range (MPTR) and Multi-Purpose Range Complex (MPRC), Combined Arms Live Fire Exercise (CALFEX) ranges, and specified aerial gunnery ranges); six Direct-Fire Gunnery Ranges (e.g., tank, mechanized infantry, and engineer gunnery ranges); and seven Special or Other Live-Fire Ranges (e.g., demolitions, hand grenade and claymore ranges, infiltration courses, and the 9.5 ac (3.8 ha) Military Operations Urban Terrain (MOUT) assault course in TA 13A).

Each of the 39 ranges has surface danger zones, or range fans, associated with their operation. Range fans are areas that need to be cleared of activity before any firing may occur at the designated range. The size of each surface danger zone varies by the type of weapon and ammunition used and the number of firing lanes and target layout. In general, the range surface danger zones at Fort Drum overlap and are oriented toward the Main Impact Area. Due to safety concerns, personnel and activities are generally restricted from range safety fans.

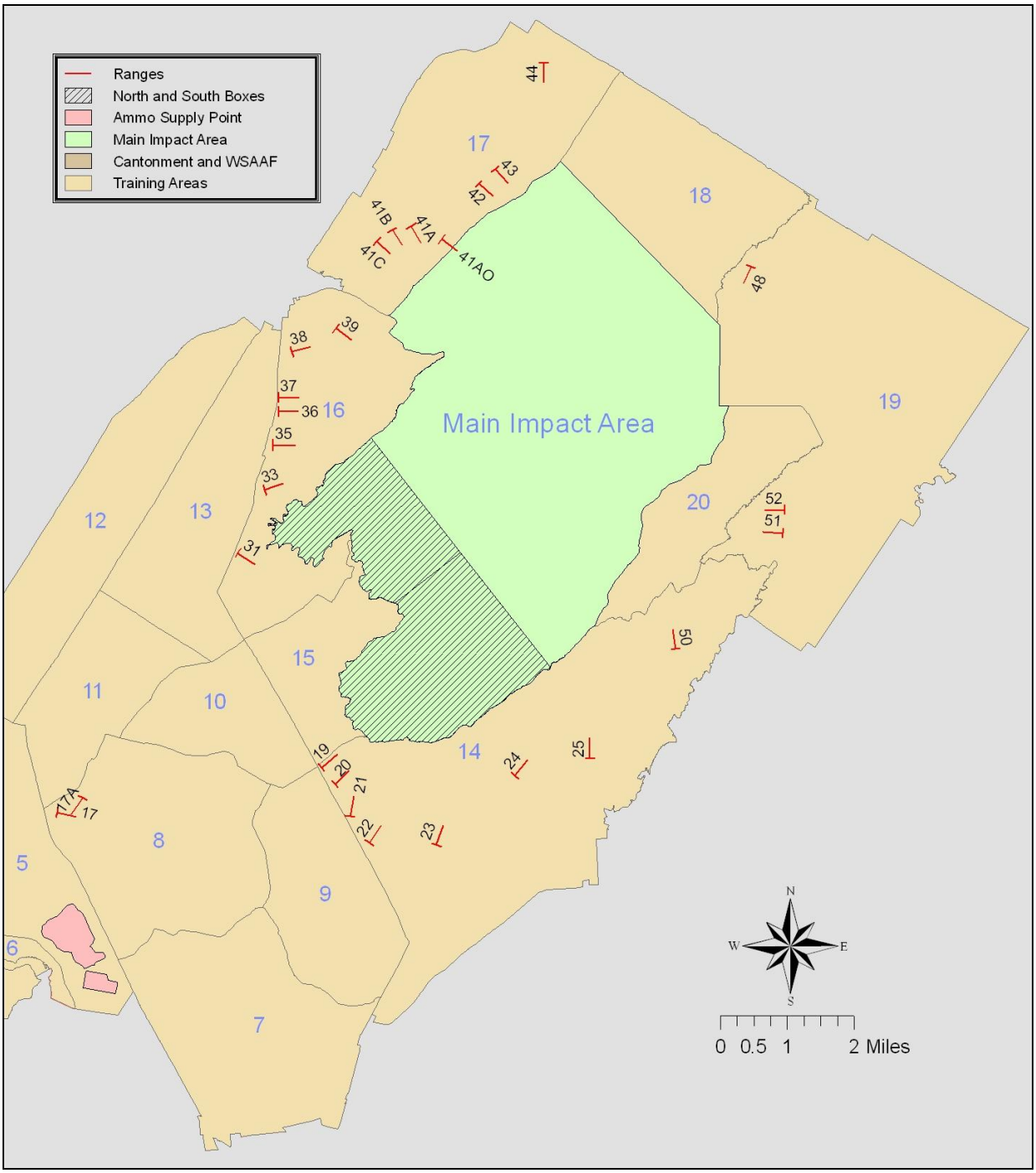
The Main Impact Area is the designated area in which weapons are generally fired into and dud-producing ordnance impacts or detonates. The Main Impact Area covers 16,951 ac (6860 ha) and receives indirect firing from a variety of ordnance. Typically, ordnance is concentrated into select areas within the Main Impact Area: the north box, south box, or along the northeast side of the Main Impact Area south of Range 48 (Figure 2.5). For the most part, the remainder of the Main Impact Area is relatively undisturbed from ordnance impacts. However, due to the presence of dud and unexploded ammunition, the Main Impact Area is generally off-limits to all personnel. The 2,463 ac (997 ha) Training Area 20 was historically used as an impact area, but it has been surface-cleared of unexploded ordnance (UXO).

2.2.1 Military Training Activities

For the purposes of this BA, military training activities can be generally divided into eight categories: sustainment operations, engineering operations, air operations, water operations, field training operations, live munitions training, demolition, and smokes/obscurants. All of these activities occur in the Training Area; some of these activities occur in the Local Training Area within the Cantonment Area (see below for more information).

All military training events in the Training Area are subject to environmental review via the National Environmental Protection Act (NEPA) process (Appendix C).

Figure 2.5 Ranges and Main Impact Area on Fort Drum.



Sustainment Operations

Sustainment operations are functions that are used to facilitate or support training in the field. Typically, sustainment operations occur at a bivouac site or forward operating base (FOB) which can be thought of as field camps. FOBs are typically situated in open areas or in woodlands with little to no understory. At each site, a secure perimeter is established, which may include excavation activities (e.g digging “fox holes” or trenches) and putting up concertina wire.

Support functions, such as field kitchens, water purification operations, shower and laundry facilities, and resupply points, are also established. Water operations may utilize nearby water resources or use water transported to the site. At bivouacs and FOBs, portable Nuclear/Biological/Chemical (NBC) units are used for training in decontamination of personnel, vehicles, and equipment using simulated chemicals. Soldiers are re-supplied with appropriate equipment and vehicles undergo maintenance and petroleum, oil, and lubricant (POL) operations. All POL operations are required to follow protocol in the Spill Prevention, Control, and Countermeasure Plan (Parsons 2005b), including placement of a secondary containment unit under refuel areas to contain any spills. Radio communication is regularly used to support training throughout the installation.

Engineering Operations

Engineering operations include the movement of earth, construction of barriers, and establishment of fighting positions. These activities may require land clearing in order to offer soldiers more diverse training opportunities (e.g. create area for a landing zone or establish new fighting positions). Usually land clearing for training purposes is done as a part of construction activities (*Section 2.1*), forest management (*Section 2.3*), and/or vegetation management (*Section 2.4*).

Air Operations

Air operations include the use of rotary-wing aircraft (i.e. helicopters), fixed-wing aircraft (i.e. planes), and unmanned aerial vehicles. UH-60, OH-58D, and CH-47 helicopters are the most commonly used aircraft on Fort Drum. Helicopters are used for a variety of purposes, including reconnaissance, transporting soldiers and supplies, aerial gunnery (i.e. the firing of bullets, rockets, and missiles from aircraft) and medical evacuation. On rare occasions, helicopters are utilized to transport water in bambi buckets for wildfire suppression. Helicopters are operational day and night, year-round, at a variety of speeds and altitudes throughout the Training Area. Most helicopters at Fort Drum use WSAAF, but may land and re-fuel at the FAARP in TA 18 or at Belvedere Landing Strip in TA 13. They may also use landing zones (LZ) and pickup zones (PZ) (i.e. any open fields) throughout the installation. However, aerial gunnery is primarily operational during April and May. Fire from helicopters is targeted into Ranges 23, 37, 44, 48, OP6A, the Main Impact Area, and along FUSA Blvd in TA 19.

Fixed-wing aircraft are used for attack and transport training. Attack aircraft (e.g. F-16, A-10) may carry almost any type of weapon from practice munitions to high explosive bombs. All fire is targeted into Range 48 or the Main Impact Area. Transport aircraft (e.g., C-130, C-17, C-5) carry personnel and/or equipment to and from WSAAF, but occasional training missions may entail dropping personnel and equipment into designated drop zones in TA 12 and 13. Fixed-wing aircraft have the potential to use the Belvedere Landing Strip, but most aircraft land and take-off at WSAAF. Fixed-wing aircraft are operational year-round, both day and night.

Unmanned aerial vehicles (UAV) are remotely piloted or self-piloted aircraft that can carry cameras, sensors, communications equipment or other payloads. UAV's range in size from hand-held model airplane to a Cessna airplane. On Fort Drum, UAVs are primarily used for reconnaissance training throughout the Training Areas, but may be used to deliver munitions into the ranges or into the Main Impact Area.

Water Operations

Fort Drum has limited water operations which include a floating bridge site, water crossings, assault water craft operations, and special operations underwater activity (e.g. scuba diving). These activities may occur, albeit infrequently, on Fort Drum. A floating bridge site was established where engineers practice setting up a floating bridge along the Black River in TA 6. On each side of the river, two abutments are in place for soldiers to attach the bridge components. The shore bank is hardened to minimize erosion. This training occurs infrequently on Fort Drum (not more than once a year).

Water crossing operations train soldiers to be familiar with the capabilities of vehicles in a variety of conditions. In TA 8 and TA 14, small portions of Black Creek have been designated for driving in water. These areas of Black Creek typically have approximately 12 in (30 cm) of water and a rock bottom. Additionally, there are two hardened crossings in Hunter Creek in TA 12 where fording occurs. Otherwise, fording is not authorized in other stream locations without NEPA review (AR 200-2: 32 CFR Part 651).

In the Indian River and Indian and Narrow Lakes, assault water craft (e.g. armed boats) may shoot small arms (e.g. machine guns) at assigned targets on shore. Special operations may practice underwater activities at Indian River, Quarry Pond, and Indian and Narrow Lakes. This training also occurs very infrequently (less than once a year).

Field Training Operations

Field training operations may include: physical training, road marching, the use of confidence courses (i.e. obstacle course) or rappel towers, field training exercises (FTX), the deployment of non-lethal weapons, land navigation, and vehicle/convoy maneuvers. These activities may occur year-round throughout the Training Area.

Field training exercises are typically tactical operations that occur under simulated combat conditions involving the entire battalion and its supporting combat support and combat service support units. Soldiers fire non-lethal weapons, utilizing blanks, man-marker rounds, and/or pyrotechnics. Noise simulators are used to simulate a variety of battlefield sounds, such as weapons firing and people yelling. Land navigation is basic orientation from one location to another either mounted (i.e. in a vehicle) or dismounted (i.e. on foot). Vehicles in field training operations range from high mobility multi-purpose wheeled vehicle (HMMWV) to heavy expanded mobility tactical trucks (HEMTT).

Live Munitions Training

Live munitions training occurs year-round, day and night, and encompasses two main types: indirect and direct firing. All weapon fire is targeted towards ranges and the Main Impact Area.

Indirect firing is usually artillery or heavy mortars fired from any open area north of WSAAF and 1 km (0.62 mi) from the installation boundary. Mortars are typically fired only from areas directly adjacent to the Main Impact Area.

Direct fire includes tanks and small arms (e.g. machine gun, pistol, grenade) firing on a range at an observable target. Tanks only fire on Ranges 25, 44, and 48. Tanks only fire practice munitions which do not travel as far as regular munitions and only produce noise upon firing (not

from any impact explosion). Small arms are fired on all ranges and along the convoy live fire route on FUSA Blvd. in TA 19.

Guided systems are a direct fire weapon system, which include optical-guided and air defense missiles. On Fort Drum, optical-guided missiles may be deployed from movable platforms, aerially, or via ground-mounts such as HMMWVs. These missiles are targeted towards ranges and the Main Impact Area. Air defense missiles are used to shoot down aerial drones flying over ranges and the Main Impact Area, so falling debris will land in those areas.

See Appendix D for an example of the location, types of weapons used, and the approximate/actual amount of ammunition expended on Fort Drum during a training year. These tables were originally created to provide noise contours for National Environmental Policy Act (NEPA) documentation as a result of Army Transformation (U.S. Army 2007a). This information is based on existing records on range utilization and some additional reasonable assumptions. The amount of ammunition expended is divided between the day (0700-2200) and night (2200-0700) to assess impacts to humans.

Demolition

Demolition weapons (e.g. high explosives such as dynamite and C4 plastic explosives) are used to destroy bridges, mines, or other explosive charges generally on designated ranges.

Smoke/Obscurants

Smoke/obscurants are used to conceal military movements and are used throughout the Training Area primarily during the day. Although uncommon, smoke/obscurants may be deployed at night. Smoke/obscurants are generated via smoke grenades, smoke pots, and smoke generators (M56 and M58), and are deployed through munitions. Smoke/obscurant material may consist of white phosphorous (WP), terephthalic acid (TPA), fog oil, and/or graphite flakes.

WP is used for signaling, screening, and incendiary purposes, and is usually dispersed by explosive munitions. WP is used only 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. White phosphorous ignites when it is exposed to air and may cause burns. Smoke typically lasts up to 15 min.

TPA is used in 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 E for past usage of smoke/obscurants and to Appendix F for concentrations of TPA at varying distances (Pasquil Category B).

Smoke training would occur on approximately 30,000 ac (12,140 ha) on Fort Drum. However, 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 G 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 would be generated about 25% of the training time (ENSR International 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 would be used on Fort Drum, to generate graphite smoke. Smoke training would occur on approximately 30,000 ac (12,140 ha) on Fort Drum. This potentially would be an increase in the use of fog oil, however, graphite has not been utilized at Fort Drum, but it is expected to be used in the next three years. 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, due to limits on funds available to purchase graphite.

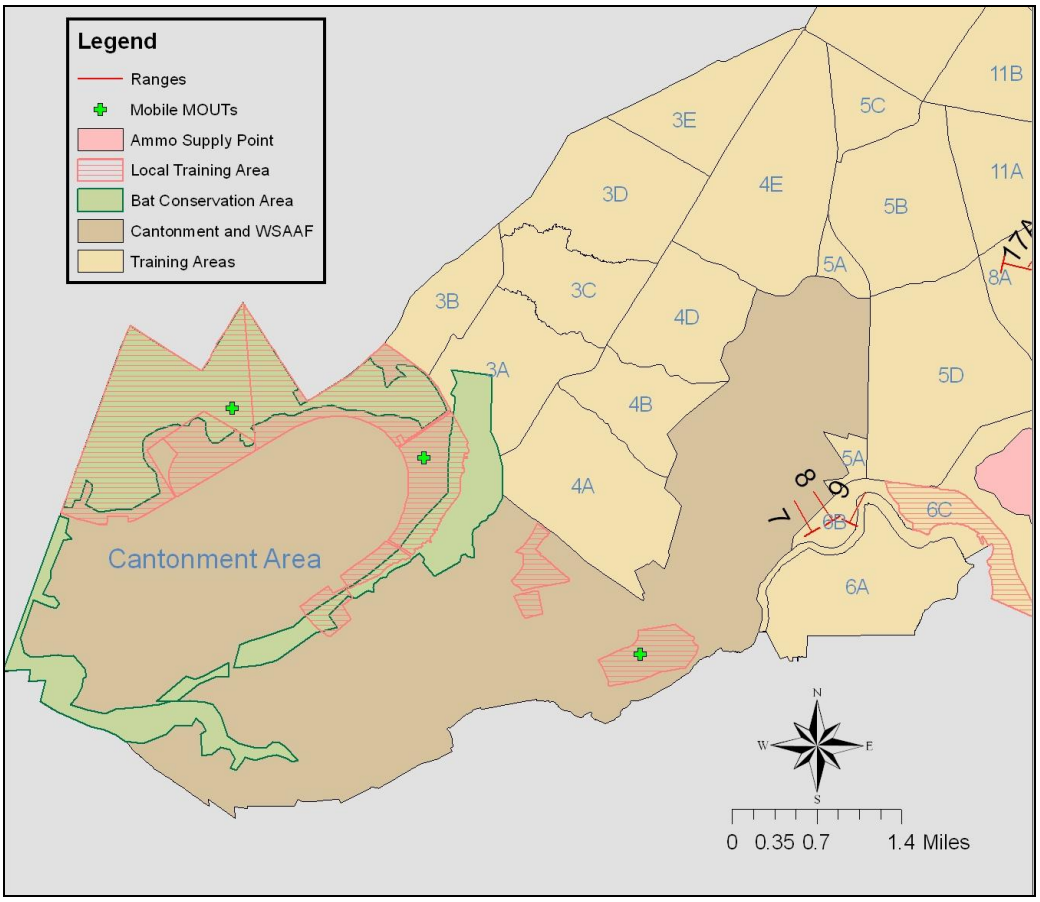
Local Training Areas Activities

Local Training Areas (LTA) are located primarily within the Cantonment Area (Figure 2.6). The two largest LTAs are within the boundaries of the Bat Conservation Area. LTAs provide units an area near their barracks and administrative buildings where low intensity training can be conducted. Unlike the Training Area where all activities are coordinated through Range Control, utilization of the LTAs is not centrally managed, but activities are regulated by *Fort Drum Regulation 350-6 Assignment and Operational Use of Local Training Areas*. Due to the decentralized nature of the LTAs, records of training frequency and specific activities are not available.

Examples of military training typically conducted in LTAs include field exercises, air operations in approved landing and pickup zones (i.e. open fields), and/or foot and wheeled maneuvers. Only blank ammunition with the use of the Multiple Integrated Laser Engagement System (MILES; i.e. similar to laser tag) is authorized for use in the LTAs. MILES may be used between 0600 and 2400 but is prohibited within 200 m of the installation boundary because of noise concerns to neighboring properties in accordance with FD Reg 350-6. Petroleum, oil, and lubricant (POL) operations and the use of CS gas (i.e. tear gas), live ammunition and explosives are prohibited in LTAs in accordance with FD Reg 350-6. Colored smoke may be used at three mobile MOUTs (smaller and semi-portable Military Operations Urban Terrain structures for urban warfare training) in the LTAs, however no other smoke or obscurants are permitted within LTAs that are within the boundaries of the BCA. The three mobile MOUTs are located in open fields. Two MOUTs are approximately 400 m from known maternity roosts. Concertina wire is permitted within the LTAs, but booby traps and barbed wire are prohibited. Training may include the construction of temporary structures only.

Physical training (PT), road marching, and use of rappel towers may also occur throughout the Cantonment Area and the LTAs.

Figure 2.6 Local Training Areas on Fort Drum.



2.2.2 Conservation Measures for Military Training Activities

Most of the conservation measures for military training occurs in the Local Training Area (in the Cantonment Area) within the boundaries of the Bat Conservation Area.

1. In the Training Area, smoke and obscurants must be used >100 m from known Indiana bat maternity roost areas (including roosts identified in the future) between April 16 – September 30; and the use of smoke and obscurants must be rotated among training areas to minimize impacts to any one area. The 100 m buffer serves to minimize the effects of smoke and obscurants by providing distance between the roost and the densest amount of smoke/obscurants. Training missions will be aware of maternity roost trees via the REC process and will be directed to avoid these areas (Appendix C). By minimizing the concentration of smoke around maternity roosts, it will reduce the risk of Indiana bats (including pups) from abandoning roosts. The rotation of smoke/obscurants between areas reduces impacts to any one area, thus minimizes the Indiana bats' risk to chronic exposure.

   No 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*. The one exception is the use of colored

smoke at three mobile MOUTs within the LTAs (1 mobile MOUT is in an open area of the BCA and 1 is in an open area near the BCA). Only infrequent use of colored smoke is expected to be used in around the mobile MOUTs. With the exception of the 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 in accordance with *Fort Drum Regulation 350-6 Assignment and Operational Use of Local Training Areas*, vehicular traffic is restricted to open grassy areas within easy access of the road. 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 in accordance with *Fort Drum Regulation 350-6 Assignment and Operational Use of Local Training Areas*, POL operations are prohibited which minimizes the risk of accidental water/ground contamination.

5. Fort Drum will abide by the Fort Drum Integrated Wildland Fire Management Plan (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

Fort Drum has been used as a military training site since 1908. Military training in the next three years is expected to be similar to training activities in the past 10+ years with some modifications in type or intensity.

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 military training activities currently have no known direct effects to hibernating Indiana bats.

Roosting

Direct effects could possibly occur if a helicopter was hovering low over roosts and caused the roost tree to fall or to cause exfoliating bark to be stripped from the roost tree exposing Indiana

bats. Sleeping Indiana bats may not be able to adequately respond if the roost fell, and may be crushed or injured. Grounded bats would be more susceptible to predators, trampling, and/or vehicle maneuvers. During spring/summer, helicopters may disturb and potentially kill or injure individuals within a maternity roost including non-volant young. In the fall, impacts are anticipated to be less because Indiana bats are dispersing and forming smaller groups within tree roosts. Currently, roosts are known only in the Cantonment Area, in TA 3, and off-post. Although helicopters have the potential to hover immediately over forested areas, it is more common for helicopters to hover over fields or other open areas within the boundaries of Fort Drum, specifically within the Training Areas. Equipment and other goods are more likely to be dropped in these locations, and it reduces the risk of unknown objects flying into the propellers. Undiscovered maternity roosts in the Training Area could potentially be impacted, however, the chances seem minimal based on the vast area in the Training Area where roosts may exist and that helicopters typically hover over open areas rather than forested areas. Helicopter operations may affect known and undiscovered Indiana bats during the spring, summer and fall, but are unlikely to have adverse effects.

Vehicle use within forested areas may accidentally fell a snag which may have roosting Indiana bats (volant and non-volant). However, most vehicle maneuver training occurs in the Training Area on established trails or roads and would not occur in the forested areas in the BCA where the majority of known Indiana bat roosts are located. The falling of a snag during training would not be intentional. Dead trees along trails are sometimes identified as hazard trees and appropriate measures would be taken for their removal if deemed a risk—refer to *Section 2.4 Vegetation Management* for more information on hazard trees. Since vehicle maneuvers will not occur in known roosting areas and the falling of a snag would be a rare event, the impacts to roosting Indiana bats (in spring/summer/fall) from vehicle maneuvers is unlikely to adversely affect Indiana bats and effects are discountable.

Roost trees and roosting Indiana bats may be directly affected during the course of firing weapons on ranges and the Main Impact Area. To date, no Indiana bats have been found roosting in these areas of the Training Area. However, much of this area is off-limits to personnel due to safety concerns and will not be surveyed. Training with weapons is an essential part of the mission on Fort Drum and has been on-going in the general area for 100 years. It is assumed that Indiana bats have adapted to Fort Drum military training and may opt to avoid areas that are frequently disturbed. Areas that are frequently utilized for ranges and impact areas are generally clear of roost trees; although it is acknowledged that some areas are vegetated and will be further addressed in *Section 2.6 Pesticides* to be further cleared. Although the potential exists, it seems extremely unlikely that roosting Indiana bats would be directly injured or killed by weapons firing. Weapons firing may affect, but are unlikely to adversely affect the Indiana bat.

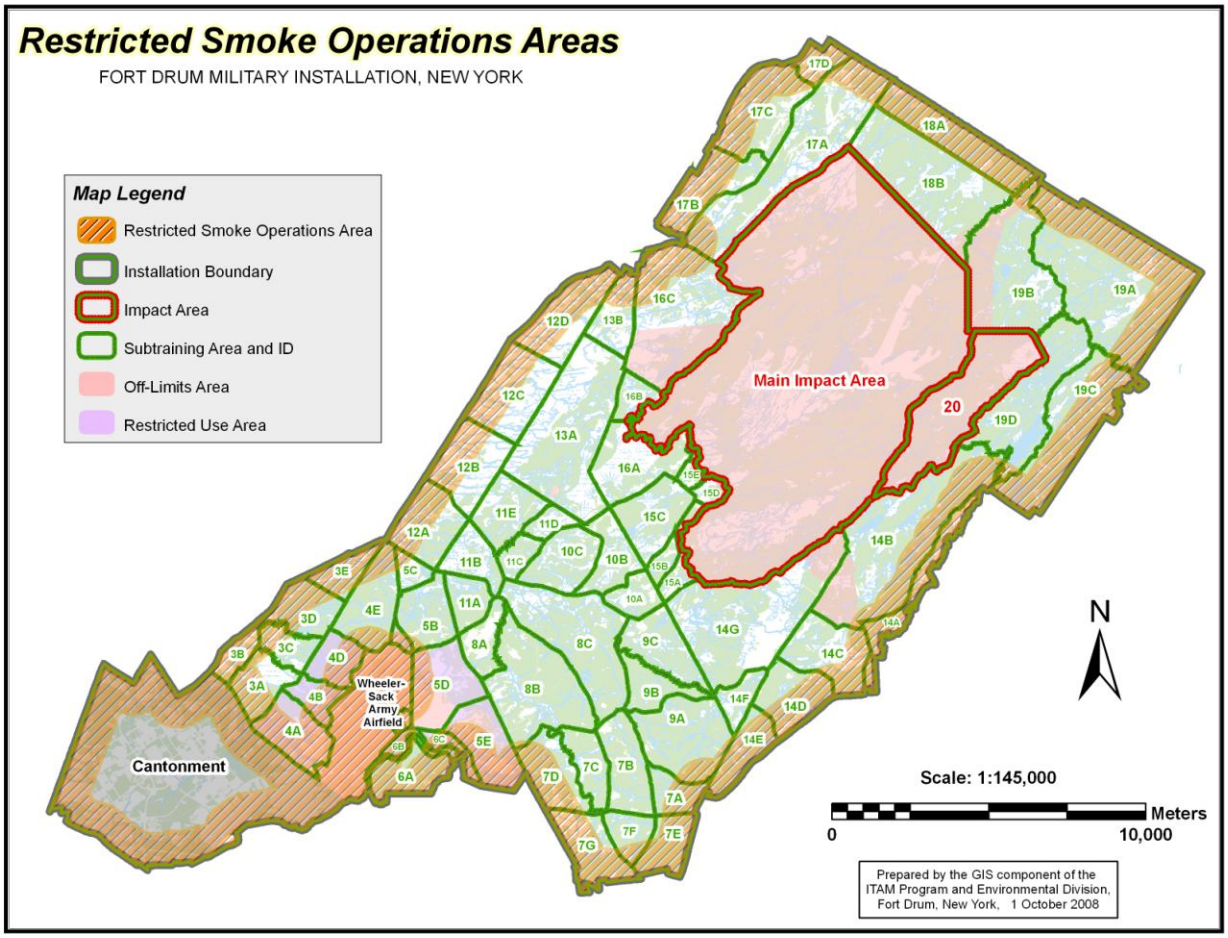
Smoke and obscurants have the potential to infiltrate Indiana bat roost trees (Guelta & Balbach 2006), which may expose Indiana bats (volant and non-volant) to potentially harmful chemicals via inhalation, ingestion, or through the skin. The smoke itself may force Indiana bats to abandon the roost, and smoke exposure can have harmful effects. The primary smoke and obscurants used on Fort Drum include white phosphorous (WP), colored smoke, fog oil, and graphite smoke.

WP can result in severe burns if it comes into contact with the skin; and it is highly toxic if ingested (National Research Council1999a). 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/m^3 (H_3PO_4) resulted in the death of

32% of the rats within 6 weeks. LC_{50} for rats exposed to WP for 1 hour ranged from 1,300 to 4,800 mg/m^3. Reproduction and development of rats showed that higher WP exposure (1,742 mg/m^3 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. Conservation measures will restrict the use of smokes and obscurants within 100 m of known Indiana bat maternity roosts. A buffer of 100 m is anticipated to reduce exposure to Indiana bats since the concentration of WP is greatest at the point of deployment (Michael Earl, Range Control, personal communication). This buffer attempts to reduce the risk of Indiana bats abandoning a roost site by buffering the roost from high concentrations of WP. Wind is likely to disperse WP, which may contact Indiana bats but at low enough levels that roosts are unlikely to be abandoned. At this time, no known maternity colonies are located within 6,500 m (~4 mi) of the ranges or the Main Impact Area. Because of the distance between known roosts and WP training sites, it is unlikely WP smoke training will drift and result in adverse effects to known Indiana bats during the spring, summer, or fall. Thus impacts are discountable. However, an undiscovered maternity colony may be adversely affected by WP smoke via inhalation, ingestion, or dermal absorption during the non-hibernation seasons. Assuming 75-100 Indiana bats are present in a given maternity colony (based on Fort Drum's known maternity colony), up to 100 Indiana bats from the undiscovered maternity colony may potentially be exposed to WP which may result in both acute (i.e. skin burns, abandonment of roost) and chronic (i.e. lower fecundity, natal weights) effects.

Overall data on the toxicity of colored smoke 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/marking tool, it will not be broadly dispersed, which also minimizes the risk of smoke exposure to Indiana bats. Based on recent past use, colored smoke has not been utilized around known Indiana bat areas on Fort Drum, however the potential exists that colored smoke may be deployed near known roosts at the three mobile MOUTs. In the BCA (where the majority of known roosts are located), smoke will not be used within 100 m of forested areas during the non-hibernation season or within 1000 m of the installation boundary except for colored smoke use at the three MOUTs (Figure 2.7). Subsequently, few locations remain within the BCA that would permit smoke use. The mobile MOUTs in the BCA are approximately 400m from known maternity roosts. 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). Colored smoke is not expected to be used in large quantities within the BCA and the area of deployment is greater than 350 m from known maternity roosts. Because of the infrequency of use, the distance to known maternity colonies, and the smoke buffer around Fort Drum's perimeter, colored smoke may affect, but is not likely to adversely affect Indiana bats.

Figure 2.7. Buffer (1000 m) around Fort Drum where smoke operations are prohibited per Fort Drum Regulation 350-4 Range Regulation.



An undiscovered maternity colony if present in the Training Area may be exposed to colored smoke deployed during training exercises. Colored smoke has the potential to adversely affect Indiana bats, including pups, roosting in undiscovered locations during the spring, summer, and fall seasons. Assuming 75-100 Indiana bats are present in a given maternity colony, up to 100 Indiana bats from the undiscovered maternity colony (spring/summer action area) may be exposed to WP which may result in both acute (i.e. respiratory distress) and chronic (i.e. lower juvenile weights) effects. In the fall, Indiana bats are expected to occur in lower numbers on the installation as they move toward the hibernaculum, so only a portion of the undiscovered maternity colony will be affected by colored smoke.

Table 2.4 Estimates of fog oil concentrations resulting from typical smoke screening operations at given distances from the source (Getz et al. 1996).[A]

Air Concentration[B]	**Distance (meters)**	**Average (mg/m3)**	**Range (mg/m3)**
	100	64	25 - 102
	200	56	8 - 105
	500	46	1.3 - 90
	1000	13	0.8 - 25
Aquatic Concentrations[C]	**Distance (meters)**	**Average (mg/m3)**	**Range (mg/m3)**
	100	3080	160 - 6000
	200	1030	960 - 2000
	500	243	6 - 480
	1000	101	2.4 - 200
Surface Deposition[D]	**Distance (meters)**	**Average (mg/m2)**	**Range(mg/m2)**
At the end of the smoking period	100	3080	160 - 6000
	200	1030	960 - 2000
	500	243	6 - 480
	1000	101	2.4 - 200
1 hour after stopping the smoking	100	2000	104 - 3900
	200	670	40 - 1300
	500	158	3.9 - 312
	1000	66	1.6 - 130
1 week after stopping the smoking	100	462	24 - 900
	200	154	9 - 300
	500	36.5	0.9 - 72
	1000	15	0.4 - 30

[A] The values represent midpoints (average) of the lowest and highest (range) estimated concentrations predicted from models based on the six sets of environmental conditions in Driver et al. 1993. The models are based on a 2-hour release at a rate of 80 gal (302L) per hour.
[B] Estimates of concentrations present during the release.
[C] Based on the assumption that all the fog oil released deposits on the surface deposits of the water and becomes incorporated in the water column; pools are assumed to be 1 m deep. Thus surface deposition in mg/m2 translates to total concentration in mg/m3 . However, in reality, oils do not mix with water. The contrary assumption is made to facilitate calculation of theoretical total concentration.
[D] Total accumulation based on the untested assumption that all the fog oil released deposits from the air into an area 1000 m by 1000 m.

Fog oil is produced by hydrogenation of a naphthalenic petroleum stock (the multiple bonds between carbon atoms are saturated by addition of hydrogen), followed by extraction of the aromatic and polycyclic aromatic hydrocarbons (PAHs). 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). Single oral exposure to oil indicated little potential for acute lethality and no tumors were noted in rats chronically exposed to fog oil (Toxicology 1997). LC_{50} of rats for inhalation of fog oil after 3.5 hours was 5,200 mg/m^3. Less than 15% of the rats died at 4,000 mg/m^3. 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). Driver et al. (1993) utilized models that incorporated the complex atmospheric conditions that affect fog oil smoke dispersion and deposition. Using these models, Getz et al. (1996) estimated the maximum airborne and deposition concentrations of fog oil expected during training exercises (Table 2.4). At 100 m, fog oil is unlikely to reach high enough concentrations to result in the death of 50% of the roost population, however fog oil may reach sufficient levels to result in sublethal effects for some individuals. 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). In a smoke study conducted on Fort Leonard Wood, it was estimated that Indiana bats within 4,000 m of static smoke training and 7,000 m of mobile smoke training had the potential to inhale unsafe quantities of fog oil (3D/International 1997). Indiana bats repeatedly foraging or roosting within 4000 m of static fog oil smoke training and within 7,000 m of mobile smoke training will be exposed to unsafe concentrations of fog oil, and are likely to exhibit chronic inhalation effects. Fog oil is anticipated to be used frequently throughout the Training Areas of Fort Drum and it could potentially be used within the BCA, although it is expected to occur infrequently, if at all. A conservation measure limiting smoke use within 100 m of known maternity roost trees will minimize Indiana bat exposure to high concentrations of fog oil. At this distance, Indiana bats (including pups) are unlikely to suffer acute effects, however repeated exposure are likely to result in chronic effects to Indiana bats. Fog oil use within TA 3 and 4 is likely to affect portions of the known maternity colony (6 known roosts of which 2 are maternity roosts and up to 7 Indiana bats have been counted during exit counts) on Fort Drum. Six roosts of which two are maternity roosts were identified within TA 3. Up to seven bats were observed exiting one roost. There is potential that fog oil use in other Training Areas will adversely affect the undiscovered maternity colony. Smoke/obscurant use within a 100 m may cause Indiana bats to abandon a roost and to inhale unsafe quantities of chemicals. Potentially, up to100 Indiana bats from the undiscovered maternity colony (spring/summer action area) are likely to exhibit respiratory distress from fog oil dispersed via static and mobile means which can lead to lower birth weights in pups and reduced fecundity. In the fall, Indiana bats are dispersing and are concentrated in fewer numbers. Thus, a portion of the undiscovered maternity colony may be negatively affected by the use of fog oil during the fall season.

Graphite smoke inhalation studies have shown to cause only mild respiratory tract inflammations in rats even at high graphite concentrations (100 mg/m^3)(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 toxicity to experimental animals, it is unlikely that known and undiscovered maternity colonies will be negatively affected by exposure to graphite smoke and its toxicity impacts are discountable.

Other military activities will not result in the loss of roosts or will not emit potentially harmful chemicals, so they are expected to have no direct effects to roosting Indiana bats.

Foraging

Direct effects to foraging Indiana bats could potentially occur during the course of firing weapons. At this time, Indiana bats are not known to forage in ranges or impact areas where live fire occurs. Because of the length of time that Fort Drum has been an active military installation, it is assumed that Indiana bats that are present on Fort Drum have adapted to military training including weapons firing. Directly striking a foraging Indiana bat may occur, but is unlikely. Thus effects are discountable.

Aircraft operations at night could potentially strike a foraging Indiana bat, although it would be incidental and extremely unlikely. Foraging Indiana bats tend to fly lower than most aircraft (Humphrey et al. 1977), but that may not always be the case. However, foraging Indiana bats tend to avoid large open areas (USFWS 2007) which is the current condition of WSAAF where aircraft fly the lowest to the ground. There has been no record of a bat strike for any aircraft utilizing WSAAF; aircraft strikes with birds which would presumably be more common occur only infrequently (typically < 10 per year). A study at Meridian Naval Air Station showed that although the southeastern myotis (*Myotis austroriparius*) roosted in culverts on the airfield, this species was not typically involved in airstrikes—the most common species for bat strikes were red bats (*Lasiurus borealis*) which are stronger fliers and are most often hit during migration (Chester Martin, U.S. Army Corps of Engineers, personal communication). Indiana bats are not strong, fast fliers like red bats (Norberg & Rayner 1987) and are known to increase their flight time in order to follow vegetation corridors to avoid flying over open areas. Although bat strikes may occur, it is unlikely that Indiana bats will be adversely affected due to the improbability of strikes and the flying behavior of Indiana bats. Thus, effects are discountable.

There is limited information on the effects of noise on foraging Indiana bats. Preliminary results from a 2004 study from Fort Knox analyzing the impacts of military noise (high caliber weapons) on bats found no significant impact on navigation or feeding sequences of bats (Chester Martin, U.S. Army Corps of Engineers, personal communication). The study used Anabat detectors and thermal infrared cameras to monitor all bats with no differentiation of species, so although bats overall appeared to be not affected by military noise, it can not be confirmed specifically for Indiana bats. Southeastern Myotis did not appear to be affected by the sounds of aircraft taking off and landing (Chester Martin, U.S. Army Corps of Engineers, personal communication), suggesting that certain bat species are capable of adapting to military noise conditions. Camp Atterbury investigated the auditory sensitivity of little brown bats and related it to Indiana bats (Watson & 3/D International 1998). They determined peak sound energy of vehicles is likely to be below frequencies audible to bats, and higher frequency sounds attenuate more rapidly thus reducing the potential to damage Indiana bat hearing. Indiana bats are known to use urban areas (including Fort Drum) that have obvious noise-producing activities. It is assumed Indiana bats have adapted to military training activities on Fort Drum, so noise may affect, but is not likely to adversely affect Indiana bats.

Smoke/obscurants will typically not be utilized during hours that Indiana bats will be active for foraging, so the likelihood that foraging Indiana bats will be negatively impacted (direct) by smoke/obscurants is unlikely. However, if smoke/obscurants are used when Indiana bats are foraging, then Indiana bats can be exposed to potentially harmful chemicals. Exposure effects will be the same as those for roosting and the presence of smoke may cause Indiana bats to forage in adjacent areas.

Other military activities are not expected to have direct effects on foraging Indiana bats because they are primarily operational during the day, will not emit toxic chemicals, and/or are not deploying projectiles into potential foraging areas.

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 known indirect effects to hibernating Indiana bats.

Roosting

Military training activities are not expected to have indirect effects to roosting Indiana bats, because removal of roost trees/habitat is typically done in conjunction with construction, forest, or vegetation management activities (See Sections 2.1, 2.3, and 2.4 for impacts).

Foraging

Smoke/obscurant use is anticipated to have no 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). 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.

Other military activities are not expected to have indirect effects on foraging Indiana bats because they should not affect water quality, insect prey, and/or amount of natural habitat present.

2.2.4 Conclusion

It is assumed that Indiana bats have adapted to military noise and activities including weapon use considering their presence on Fort Drum and the length of time Fort Drum has been an active military installation. However, the use of smoke and obscurants is likely to adversely affect the undiscovered maternity colony during the spring and summer and individuals associated with the undiscovered maternity colony in the fall. Conservation measures are established to help minimize potential military training impacts in the Local Training Areas which are part of the Bat Conservation Area, as well as, for the use of smoke/obscurants to future roost sites.

2.3 Forest Management

2.3.1 Forest Management Activities

Fort Drum's Forest Management Program (Directorate of Public Works-Environmental Division) has primary responsibility for managing forestland on Fort Drum. Current and future forestry actions are geared for sustainable ecosystem management while enhancing military training opportunities, maintaining forest health, benefiting wildlife habitat, and protecting water quality.

There are approximately 74,515 ac (30,155 ha) of forestland on Fort Drum (see Section 1.3.4 for information about Fort Drum forests). Approximately 47,259 ac (19,125 ha) are available for commercial and non-commercial forest management activities, while 27,256 ac (11,030 ha) are located in the Main Impact Area or in active range safety fans. Trees are not typically commercially harvested in these areas due to metal contamination and safety concerns.

In the next three years, up to 4,900 (1,982 ha) of forests may be harvested. This acreage is based on an annual maximum allowable cut of 1,627 ac (658 ha) calculated by Fort Drum's Forest Management Program to maintain sustainable forest. The current forest management plan is to manage approximately 3,500 ac (1,416 ha) in the next three years (Table 2.5; Figures 2.8 and 2.9). However, due to shifting priorities associated with supporting the military mission, these acreages may change in size, location, and species composition. The total amount actually harvested in a given year is also variable because commercial timber harvest contracts allow contractors two years to complete the harvest. Therefore, although rare, there may be instances where no harvesting occurs in one year, while up to 3,300 ac (1,335 ha) could occur in another. For the purposes of this BA, analysis was based on the maximum allowable cut (i.e. 4,900 ac (1,982 ha) total for the three years). If circumstances occur that require more than 4,900 ac (1,982 ha) to be cut over the next three years, consultation will be re-initiated with the USFWS.

In addition to timber harvesting, up to 300 ac (121 ha) will be site prepared to support tree regeneration and to control unwanted vegetation between August 1 - April 15. 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 (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. Historically, even-aged methods have been utilized 70% of the time.

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.

The majority of forestry actions will occur between October 1 - April 15 when most Indiana bats are not present on Fort Drum. This time of year restriction will protect maternity colonies during the reproductive season. However, the Forest Management Program may need to harvest up to 500 ac (202 ha) total (between 2009-2011) of early successional and/or conifer forests (Figure 2.10) between August 15 and September 30 in order to minimize soil disturbance, erosion, and water quality Potential harvest areas would be east of the CSX railroad tracks on the following soil types: clay, clay loam, loamy sand, silt loam, and silty clay. Forest stands would be predominantly aspen, birch, or conifers—none of which are considered typical bat roosting trees or habitat. The average patch size that may be harvested is estimated at 50 acres per site and the maximum patch size should not exceed 200 acres per site. Refer to Figure 2.10 for proposed locations of sites that may be harvested in-season, however any area east of the CSX railroad tracks that meet the aforementioned criteria may be harvested in-season not to exceed 500 ac 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. The potential use of these areas by Indiana bats will be monitored using mist nets and Anabat echolocation detectors.

Table 2.5 Approximate acreage of forests that are anticipated to be harvested between Jan 2009 - December 2011.

Forest Type	Acreage
Conifer	715
Deciduous	1655
Mixed	1060
Unknown	1470
Total	4900

Figure 2.8 Proposed timber harvests (2009-2011) within the range of the known Indiana bat maternity colony. Exact size and location of harvests are subject to change due to shifts in military priorities.

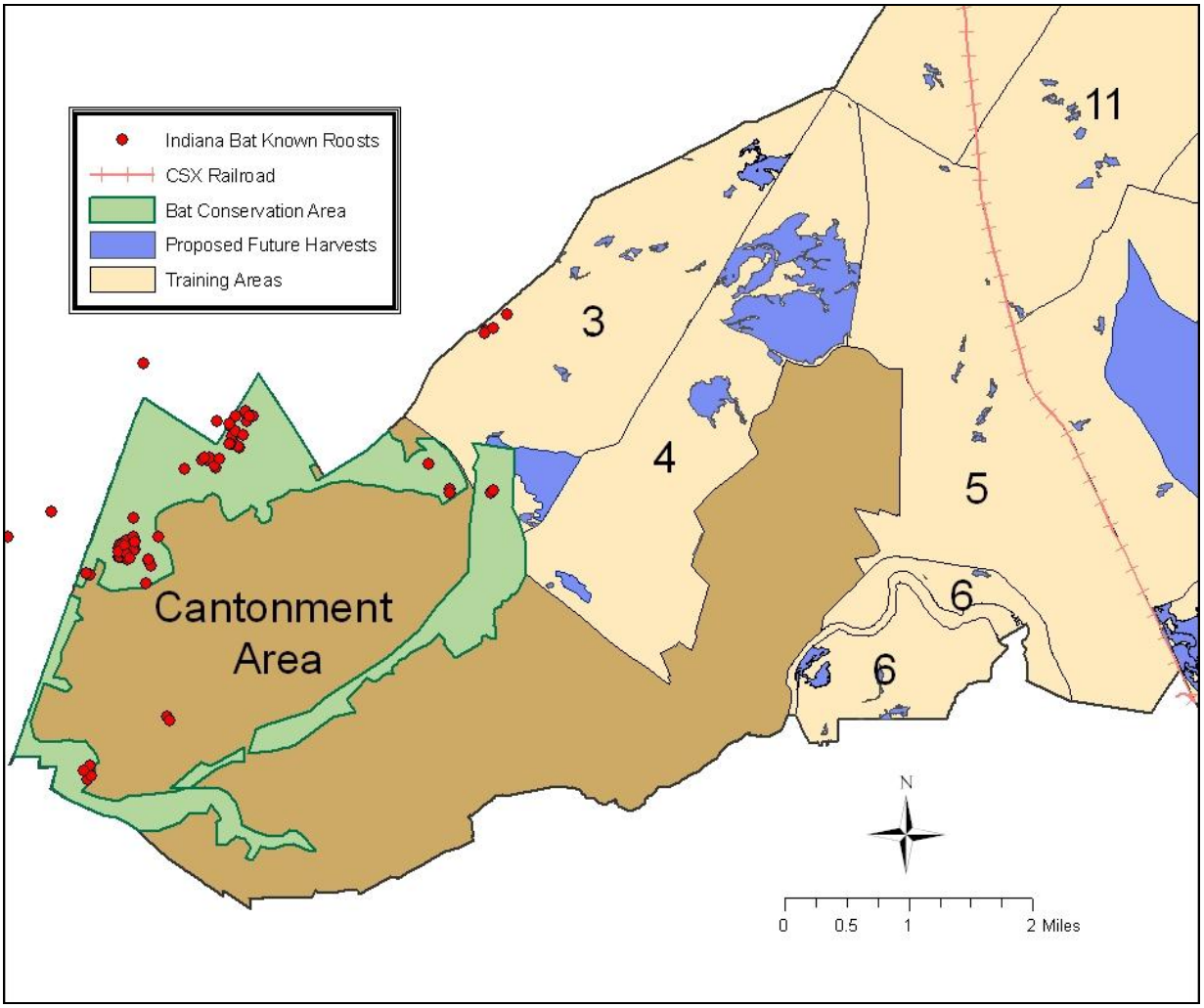


Figure 2.9. Proposed timber harvests (2009-2011) located east of the CSX railroad tracks. Exact size and location of harvests are subject to change due to shifts in military priorities.

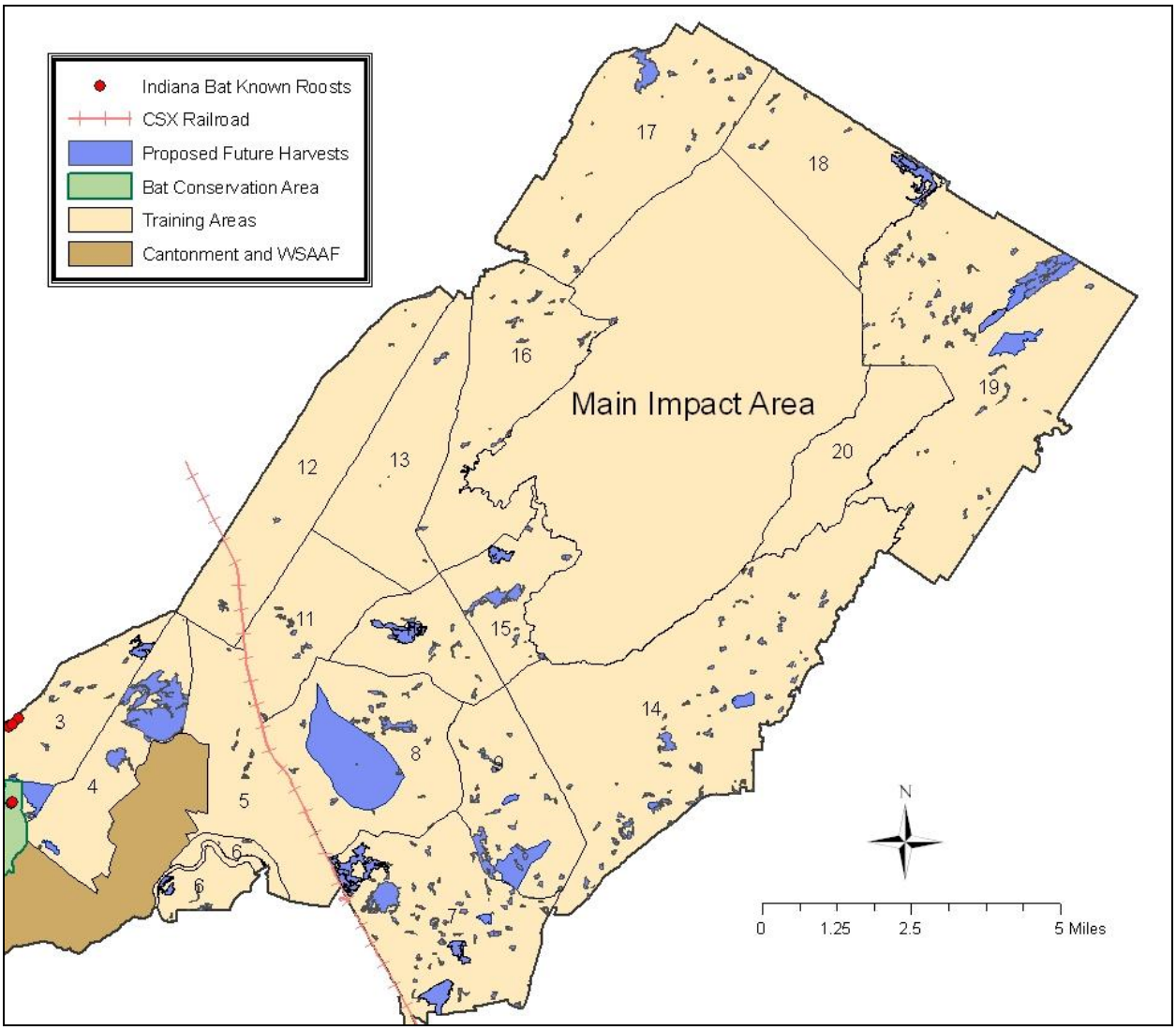
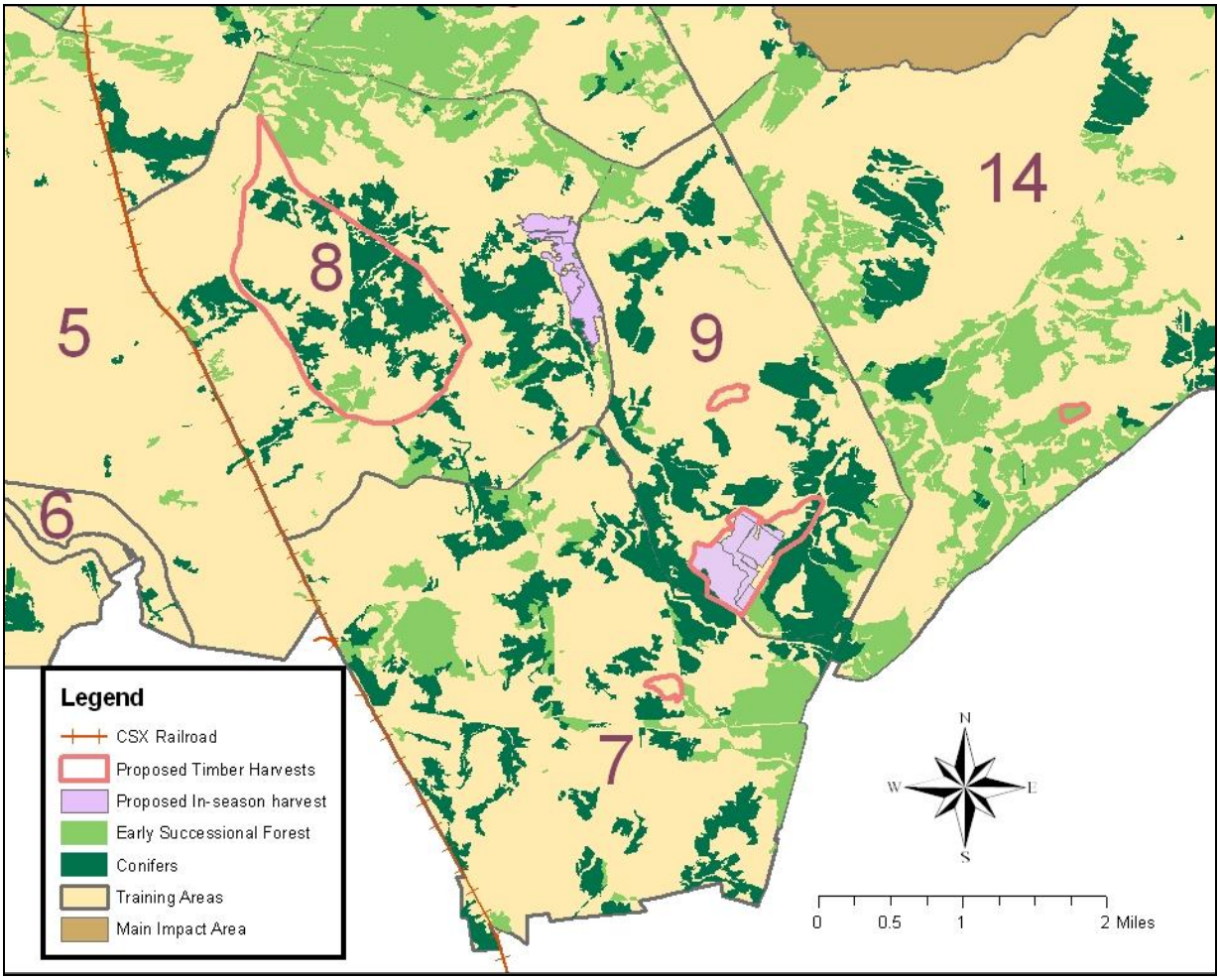


Figure 2.10. Proposed locations for harvesting between August 15-September 30 that is comprised of early successional forest and/or conifer forests east of the CSX railroad tracks. Additional projects similar to these may occur elsewhere east of the CSX railroad tracks.



Military Training Support

Forest management on Fort Drum is primarily done to support military training. Typically, 65-75% of treatments are performed to meet military training requirements. To create a variety of forested environments, obtain the maximum benefits for military training, and provide for various training scenarios, the Forest Management Program ensures there is variability among forest types, species mix, canopy coverage, and forest stand age structures across the installation.

Forestland in upland areas with little or no understory is desired primarily for maneuver space, overhead cover and concealment, and bivouac opportunities. To provide for this type of scenario, the goal for deciduous stands is to have 40-60, 18+-in DBH (diameter at breast height) trees per acre; 40-80, 18+-in DBH trees per acre in mixed stands; and 60-80, 18+-in DBH trees per acre in coniferous stands. These goals allow for maximum space between trees without allowing too much sunlight to reach the forest floor for understories to develop. These same parameters are also potentially beneficial for forest-dwelling bats, assuming the large

trees provide potential roosting locations (i.e. exfoliating bark, cavities) and are tall enough to have direct sun exposure (e.g. Callahan et al. 1997; Britzke et al. 2006).

These goals can best be obtained with even-aged management methods, which typically include shelterwood, seed-tree, overstory removal, two staged overstory removal, clearcuts and clearcuts with reserves. The exact harvest method is difficult to predict since harvest methods are prescribed based on the characteristics of each stand. To maintain stands in a desired state (e.g. maintain a bivouac site), forested stands are tended by intermediate thinning. Thinning at regular intervals (15-25 years) reduces tree mortality by reducing the number of trees per acre, and the remaining trees are often able to grow faster and healthier by being able to draw more of the remaining site resources. Thinning also helps the remaining trees to develop stronger root systems, be less prone to wind throw, and reduce or avoid stress due to overcrowding. The species composition of a stand can also be influenced by thinning, (i.e. specific tree species can be targeted to be cut and/or retained).

Uneven-aged forests contain three or more age classes, typically fewer big trees and more small trees, and more densely spaced trees. Uneven-aged management can be used in environmentally- or culturally-sensitive areas (e.g. wetlands and archeological sites) to discourage certain military training from these areas due to the density of the stands. Uneven-aged management in other areas (e.g. drier upland bivouac sites) are maintained with a goal of having fewer and larger trees to be more conducive to training.

Timber Production/Forest Health

Forested areas in the Training Area that are inaccessible or unusable for light or heavy maneuver training due to location, hydrology or topography are managed for sustainable timber production and forest health. Approximately 15-25% of silvicultural treatments are performed for timber production and forest health. These areas will typically be managed using uneven-aged management methods, such as the selection system; even-aged methods may be used in some stands if necessary.

The selection system is a silvicultural process which creates and maintains an uneven-aged stand. In the selection system, regeneration, tending, and harvesting all take place concurrently. Mature trees are removed from a fixed proportion of the stand area (either individually or in groups); a new age class is regenerated in the space previously occupied by mature trees; and the area of the stand allocated to immature trees is thinned. Individual or single tree selection is a selection system in which openings are created to regenerate a new age class in the space previously occupied by individual mature trees. Individual tree selection will result in gaps with relatively low light levels and are best suited to regenerate shade-tolerant species. Group selection is a selection system in which openings are created to regenerate a new age class in the space previously occupied by groups of two or more mature trees (one age class is 20-25% of the oldest age desired in the stand—typically 25 years). The gaps created by a group selection cut will usually receive sufficient light levels to regenerate shade-intolerant species, given an adequate seed source. Presumably, this method would create the diverse habitat structure and edges that Indiana bats may utilize (LaVal et al. 1977; Menzel et al. 2001).

Wildlife Habitat Management

Wildlife habitat management is accomplished primarily through coordination between Fort Drum's Forest Management and Fish & Wildlife Management Programs. Approximately 5-10%

of silvicultural treatments are specifically designed and implemented for direct wildlife benefits, although in the next three years this percentage may increase to approximately 15%.

One of the primary goals of the Fish & Wildlife Management Program is to manage for early successional habitat through rotational clearcuts. In the northeastern U.S., early successional forests have declined resulting in decreases in associated wildlife including American woodcock, snowshoe hares, and ruffed grouse (Dessecker & McAuley 2001; Litvaitis 2001). These forests are often characterized by dense, young seedling and sapling-sized trees, typically composed of shade intolerant species such as aspen and gray birch. These habitats have been maintained historically through natural disturbances from fires, wind, beavers, drought, insect outbreaks, and ice storms creating a mosaic of forest structure and ages within the landscape. As increased urban development, fire suppression, and other human interventions have become common, these important disturbance regimes have been interrupted. In order to create and maintain habitat diversity, forest management practices such as clearcutting, seed tree cuts or shelterwood cuts are needed to simulate natural disturbance events.

In the fall of 2005, the first early successional management area was established in Training Area 14E. The management area is approximately 120 ac (48 ha) in size and approximately 40 ac (16 ha) was clearcut in the spring of 2006 in blocks of 5 ac (2 ha) each (with one large 20 ac (8 ha) block for a military firing point). In 15-20 years, another 40 ac (16 ha) will be cut in 5 ac blocks and in 30-40 years, the remaining 40 ac will be cut. This 45-60 year cycle will then repeat. In 2006, a second area of 140 ac (56 ha) in Training Area 7A was established following a similar harvesting regime beginning in the spring of 2007. Over the next three years there are approximately another 600 ac (242 ha) in TA 3C, 6A, 7G, and 17B that are anticipated to be placed into early successional management. These areas will follow similar clearcut scenarios with approximately 50 ac (20 ha) being cut per year (total of 150 ac (60 ha) in 3 years). A maximum of two management areas (100 ac (40 ha)) will be harvested in any given year.

In the future, there may be additional harvest scenarios developed to benefit other wildlife. For example, certain species of trees could be thinned from approximately 50 ac (20 ha) of oak stands to benefit red-headed woodpeckers. Forest management activities to specifically benefit Indiana bats (and other bats) will also be explored to provide continued roosting and foraging habitat as more data becomes available from Indiana bat monitoring efforts and habitat assessments on Fort Drum in the next three years.

Even when wildlife habitat management is not the primary goal of a silvicultural treatment, considerations for wildlife are incorporated into all harvests whenever practicable. The following beneficiary actions are typically taken into consideration:

1. 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.

2. 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.

3. 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).

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.

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.

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. 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 1 and 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 east of the CSX railroad which may be harvested between August 15-September 30. 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 its associated non-volant young will be protected from this disturbance.

5. For timber harvests that may occur in August and September, 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.

6. 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).

7. No cutting of trees will occur within or along the bed or bank of streams protected under Article 15 of the NYS Environmental Conservation Law unless required to meet specific management goals and only after obtaining a permit from NYSDEC.

8. 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).

9. 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

The majority of tree clearing will occur from October 1 – April 15 when most Indiana bats are absent from the installation. Because of this time of year restriction, Indiana bat maternity colonies (undiscovered and known) are unlikely to be adversely affected by most timber

harvests. Trees, excluding areas identified in Figure 2.10, will not be removed when Indiana bats are pregnant, birthing, or nursing young; or when pups are non-volant or newly volant. Indiana bats still roosting on Fort Drum after October 1 may be adversely affected by timber harvests. A fall foraging study conducted on Fort Drum provided support that most Indiana bats leave the installation in the fall as evidenced by low capture rates and tree exit counts (ESI 2008b), however there were three radio-tagged Indiana bats that remained on Fort Drum as late as October 12 (ESI 2008b). In addition, two juvenile Indiana bats were on the installation after October 1 in 2008 (unpublished data). These Indiana bats were present primarily in the Cantonment Area where forestry activities are not expected to occur in the next three years. Several summer roosts were also identified within Training Area 3, so it is probable that portions of the known maternity colony will use the Training Areas for fall roosting and foraging. Forestry actions conducted after October 1 may fell trees that have roosting Indiana bats thus resulting in injury or death to bats that are unable to escape. Although low temperatures may influence an Indiana bat's ability to abandon the roost, Indiana bats present at this time are all volant and should be capable of flying from disturbance. Additionally, the likelihood of felling trees which have roosting Indiana bats after October 1 should be minimal due to snag retention during most types of harvesting. Given the conservation measures, forestry actions conducted after October 1 may affect but are unlikely to result in adverse direct effects to known or undiscovered maternity colonies.

Potentially up to 500 ac (101 ha) may be harvested during the time of year tree clearing restriction. These timber harvests are expected to occur in select areas on the eastern portion of the installation in August and September. These timber harvests are unlikely to adversely affect the known maternity colony of Fort Drum since the harvesting will occur more than 4 mi (6.4 km) from the nearest known Indiana bat roost. However, timber harvesting during the non-hibernation season is likely to adversely affect the undiscovered maternity colony. Trees with newly volant young and adult males and females may be cut, struck with another falling tree, or made more prone to windthrow as surrounding vegetation is removed. Individuals that are capable of quickly abandoning a falling roost will need to locate a new roost, but should not be harmed. However, newly volant young and some individuals may not be able to flee the roost before it is felled, and are likely to be injured or killed. Indiana bats still roost together in clusters during August and early September thus the potential exists that a tree with multiple bats could be felled, increasing the risk of injuring or killing an individual. As a conservation measure, all snags and live trees > 16 in DBH with noticeable cracks, crevices, or exfoliating bark will be retained. The majority of 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. Even with the measure, the potential exists that a roost tree will be cut or struck by another falling tree which could result in harm to Indiana bats. Thus, timber harvesting in August and September may affect and is likely to adversely affect the undiscovered maternity colony.

Noise is likely to be a by-product of all timber harvests; and harvests conducted in August and September may impact Indiana bats. 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 2008b). 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. Thus, timber harvesting in August or September may affect and is likely to adversely affect Indiana bats

within the undiscovered maternity colony. Timber harvests conducted within the known range of the maternity colony will occur between October 1 - April 15, so the likelihood that Indiana bats will be present and disturbed by noise is low. Noise from timber harvests may affect, but are 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 2008b). Because firewood cutting may potentially occur near known and undiscovered maternity colonies on Fort Drum, the noise or vibrations is likely to result in short-term disturbance to Indiana bats potentially resulting in the temporary abandonment of a roost. No snags are permitted to be felled during firewood cutting.

Foraging

Forest management activities are anticipated to have no known 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), thus firewood cutting are 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 (within 400 m of a known roost in TA 3) and in areas of the undiscovered maternity colony. Timber harvesting in these areas is likely to alter the forest structure and composition, which may impact Indiana bats. Depending on harvest methods, remaining snags are likely to be more exposed to incremental weather (i.e. winds, snow) and therefore more susceptible to falling. In addition, timber harvesting may inadvertently remove an undiscovered roost, potentially a primary roost, which can negatively impact Indiana bats that show site fidelity. 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 furthered stress after hibernation which may result in lower reproductive success. Forest management actions on Fort Drum may inadvertently remove an undiscovered maternity or primary roost tree, which would force Indiana bats on Fort Drum to find new roost locations. Removal of maternity or primary roost tree on Fort Drum could cause Indiana bats to congregate less and could lower the reproductive success of Indiana bats. Conservation measures are in place to protect known maternity roosts and areas surrounding known maternity roosts. In addition, 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. These conservation measures reduce the risk of felling an unknown roost tree, however timber harvests during the winter months may remove an unknown maternity roosts which can increase the time an individual spends looking for a new roost in the spring which diverts energy from reproductive needs. Because the risk is present that an undiscovered maternity or primary roost may be felled, timber harvesting may adversely affect Indiana bats.

Overall, forest management actions could potentially have serious 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 4,900 ac (1,982 ha) in the next three years and with over 74,000 ac (29,946 ha) of forested habitat

available and given the conservation measures, it is unlikely that there will be a significant loss of roosting habitat. Thus, the cumulative loss of roosting habitat is likely to be insignificant.

Foraging

On Fort Drum, up to 4,900 ac (1,982 ha) in three years out of approximately 47,000 ac (19,020 ha) of commercially available timber and 74,515 ac (30,155 ha) of total forestland may be harvested. 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 harvests units. Thus, sufficient habitat is available nearby for foraging bats. Timber harvest is likely to cause a shift in foraging behavior of Indiana bats and clearcuts are expected to temporarily reduce Indiana bat foraging habitat, however given the amount of natural habitat remaining, the effects are expected to be discountable.

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. As previously mentioned, Fort Drum has ample vegetative cover throughout the Training Areas where all timber harvests are currently scheduled. Because of the amount of available natural habitat, 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 are likely to temporarily shift Indiana bat foraging behavior to adjacent woodlands. The undiscovered maternity colony is also likely to shift their foraging behavior in response to timber harvests. 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.

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 silvilcultural 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 1. However, forestry actions that occur in August and September are likely to result in the death, injury, and/or harassment of some individual Indiana bats, including newly volant young, within the undiscovered maternity colony. Because forestry actions may occur during the non-hibernation season for Indiana bats, forestry actions are likely to adversely affect Indiana bats.

2.4 Mechanical Vegetation Management

This section includes only the mechanical management of vegetation which typically involves grasses, shrubs, trees < 4 in DBH, and hazard trees of any size. (Forest management is addressed in *Section 2.3*.) Vegetation is typically cleared or trimmed at or above ground level with the use of equipment such as the Brown Bear, Brontosaurus, Posi-Trac, lawn mowers, stump grinders, tractor-mounted brush cutters, and handheld power tools (i.e. chainsaw, brush saw, pruning saw). Woody debris is usually chipped in place using towed wood chippers. Selective broad-leaf herbicides may be used in conjunction with mechanical clearing in order to suppress woody plant re-growth; herbicides are also used for certain types of vegetation management. Refer to *Section 2.6 Pesticides* for herbicide use and potential impacts to Indiana bats. Prescribed burning is also a method used for vegetation management—refer to *Section 2.5 Prescribed Fire* for more information.

2.4.1 Vegetation Management Activities

Vegetation management is conducted for a variety of purposes including but not limited to:

- Grassland/shrubland management for military training including maneuver space, bivouac areas, drop zones, landing zones, firing points
- Line-of-sight clearance on ranges for firing weapons
- Minimizing/controlling vegetation growth along perimeter fences, utility corridors, roads and trails
- Urban/suburban lawn care
- Grassland/shrubland management for wildlife habitat management
- Invasive species or undesired vegetation control
- Hazard tree removal

Vegetation Management for Military Training

One of the primary reasons for managing grasslands and shrublands is to maintain or increase the amount of land available for military training to include maneuver space, bivouac areas, drop zones, landing zones, and firing points. These are maintained on a routine basis with various equipment mentioned above. Without management, these habitats would continue to undergo natural succession and become forests and not conducive to certain types of military training. Clearing for line-of-sight is usually complicated due to unexploded ordnance and other safety issues, however mechanical clearing of vegetation is routinely done. Vegetation management in these areas is also done with prescribed fire (*Section 2.5*) and/or pesticides (*Section 2.6*).

To maintain grasslands, the objective is to restrict woody vegetation to less than 10% of the area. Grassland maintenance is typically done via prescribed burning (Refer to *Section 2.5* for prescribed burning impacts), however mechanical methods may be used to recover land where woody vegetation has exceeded 10% of the area. On-site conditions are used to determine where and how shrubs will be cleared. Typically, shrubs are cut back along existing clusters until the target vegetation distribution is reached.

Shrublands are managed for unrestricted cross-country movement, while providing greater cover and concealment opportunities than those encountered in grasslands. The target vegetation distribution for shrublands is 70-80% herbaceous vegetation, with woody vegetation accounting for 20-30% of land cover. Woody vegetation clusters are not expected to exceed 35 ft (10.7 m) in radius, with a 30 ft (9.1 m) spacing between clusters. Prescribed burning is used to maintain shrublands if there is less than 30% woody vegetation (refer to *Section 2.5* for prescribed burning). However, mechanical means are used to recover land that has more than 30% woody vegetation.

Throughout the Training Area and occasionally in Local Training Areas, shrubs and small trees (< 4 in DBH) in the forest understory may need to be thinned or cleared to facilitate vehicle and foot maneuvers. Clearance may involve removing all shrubs from an area, establishing corridors through dense vegetation, or reducing shrub densities that will still allow for concealment opportunities. In the Training Areas, shrubs and small trees are usually managed at the same time as timber harvests (refer to *Section 2.3* for Forest Management acreages and impacts). However, the potential exists that an additional 500 ac (202 ha) may need to be cleared within the forest understory in the next three years. Because forest understory clearing is done as needed for the immediate training purpose, there are no long-term vegetation management

plans. However, cut units will be non-contiguous and dispersed throughout the Training Area. Existing trails are also regularly maintained—there are approximately 300 mi (480 km) of maintained trails in the Training Area. Infrequently, foot paths/trails in Local Training Areas may need to be cleared for training purposes approximately one every three years. At this time there are no plans for vegetation management in the Local Training Areas that are part of the Bat Conservation Area.

Vegetation management efforts for training are concentrated on the western portion of the Training Area, because the area has historically served as the primary corridor for maneuvers, and within the ranges, these areas have the highest density of shrublands and grasslands, and it provides the greatest cost-benefit potential for unrestricted maneuver training (Figure 2.11). On ranges, landing zones, and WSAAF, vegetation was previously cut and routine maintenance of vegetation is required. Between 2009-2011, approximately 3,000 ac (1,214 ha) are scheduled to for vegetation management east of Hwy 26. The exact location of anticipated areas for management may shift, however vegetation management activities for shrubland and grasslands should not occur on more than 3,000 ac (1,214 ha) during the next three years.

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.

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.

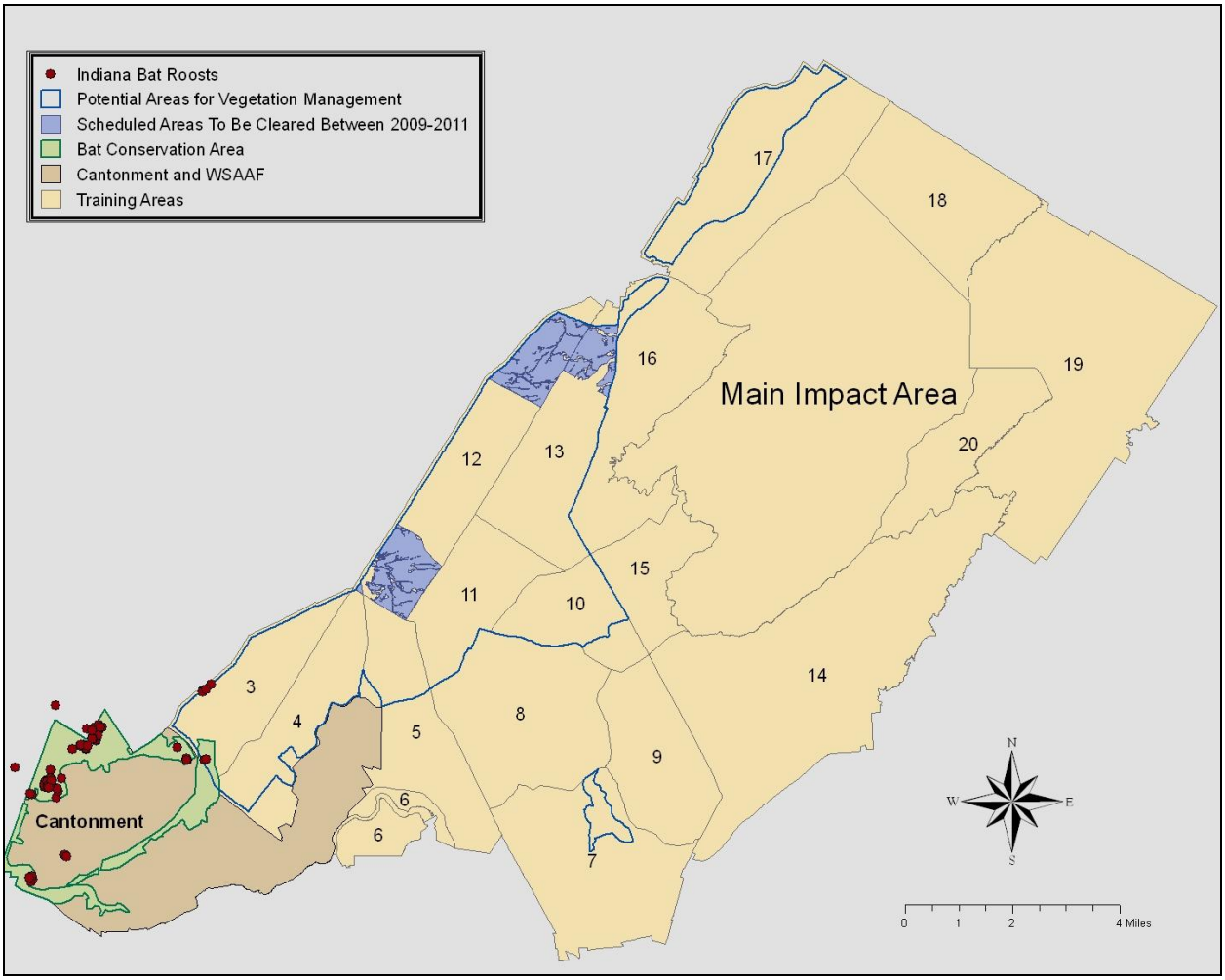
Vegetation management activities typically avoid delineated water bodies/wetlands. Although there is no formal buffer requirement around wetlands, a 20-30 ft (6-9 m) buffer is typically maintained around identified wetlands. By retaining shrubs and small trees around wetlands, it passively directs military 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.

Vegetation Management for Maintenance

Vegetation management for maintenance purposes includes maintaining right-of-ways for roads, railroad tracks, and utility lines; clearing vegetation from trails and fencelines; mowing landscaped yards, parade grounds, and other open areas; and removing individual trees due to aesthetics, roots growing into underground pipes or branches growing into utility lines, or other issues. Maintenance of transportation and utility right-of-ways occur throughout the installation on approximately 95 mi (153 km) of fence lines, 650 mi (1046 km) of roadways, 85 mi (137 km) of utility lines and an estimated 30 mi (48 km) of recreation trails. Clearance of roads, trails, utility corridors, and fences includes grass mowing, brush removal, and tree trimming. Mowing of grassy areas is done primarily in the Cantonment Area and areas around the WSAAF during the warmer growing seasons with no time of year restriction. Typically, removing trees < 4 in DBH or 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. Trees > 4 in DBH would typically be removed during the tree clearing window (October 1 – April 15), however, there are emergency situations when trees need to be removed usually due to natural events such as wind storms—these trees can be considered hazard trees.

Trees that are considered aesthetically unappealing for landscaping purposes may be removed during the tree clearing window (October 1 - April 15). These trees are typically trees that have structural defects, do not leaf-out completely, and/or are dead. Trees that need to be removed for aesthetic reasons are not the same as hazard trees, because they do not pose an immediate risk to harming people or damaging property. See below for a description of hazard tree management. No more than 200 trees > 4 in DBH per year would be removed for landscaping purposes.

Figure 2.11. Primary focal area for management of grasslands and shrublands (2009-2011) although vegetation management may occur throughout the installation.



Invasive Species Management

In the future, invasive shrub species, such as buckthorn (*Rhamnus* spp.) and honeysuckle (*Lonicera* spp.) may become an environmental or training concern and will need to be managed. At this time, no funding and no plans exist for managing these species, nor have surveys been conducted to determine the areas of concern and extent of the species. Anecdotally, invasive

shrub species appear to be more prevalent in fragmented habitats, such as those found in the Cantonment Area; and removal methods would likely include mechanical and chemical means similar to what is discussed in this vegetation management section and the pesticides section (Section 2.6).

Wildlife Habitat Management

At this time, management of shrubland habitat has been focused on early successional forests as discussed in *Section 2.3 Forest Management*. Grassland habitat is managed de facto through the management of areas for maneuver training as mentioned previously in this section.

Hazard Trees

Hazard trees are those trees considered to be a threat to human health and safety, or may cause property damage to buildings, vehicles, utilities or other infrastructure. Each identified hazard tree is handled on a case-by-case basis. The number of hazard trees that need to be removed is unpredictable due to unforeseen human health and safety concerns and natural disturbances, however the potential exists that up to 400 trees per year may need to be removed throughout the installation. Based on previous occurrences, most hazardous trees are removed between October 1 to April 15, however potentially up to 25 hazard trees per year (based on approximate numbers from past years) may need to be removed during the restricted tree clearing period (April 16 – September 30).

Fort Drum's Forest Management Program will evaluate all hazardous trees and rank each tree based on the following tree and site characteristics:

- Defect severity
- Defect location in relation to stress points
- Species failure profile (wood strength, decay susceptibility, and growth characteristics)
- Crown size and weight distribution
- Plant health (vitality)
- Plant value
- Size of defective plant part
- Exposure
- Slope and aspect
- Prevailing wind direction
- Site changes
- Soil conditions
- Target values and site use intensity

A total risk rating for each tree will be calculated using protocol established in Smiley et al. (2007). Hazardous trees that are determined to be low or moderate risk will be removed between October 1 – April 15. High or critical classified trees may be cut anytime. However, if between April 16 – September 30, Fort Drum's Fish and Wildlife Management Program personnel will be notified in advance for further assessment. Hazard trees with no exfoliating bark or deemed unsuitable for bats, as determined by Fort Drum Fish and Wildlife biologists, may be removed without any additional actions. For all other hazard trees, an emergence survey must be conducted to note the presence of any bats. If bats are not present during an exit count, then the hazard tree will be removed immediately after the exit count. If bats are seen exiting the hazard tree, then the USFWS will be contacted for further consultation.

Furthermore, if an atypical number of trees are required to be removed due to an unplanned natural event (i.e. wind storm), the USFWS will be notified.

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 1 and 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 – September 30, 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

2.4.3.1 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, vegetation management activities will have no known direct effects to hibernating Indiana bats.

Roosting

Vegetation management primarily involves the clearance of shrubs, small trees <4 in DBH, tree trimming, and the mowing of grass. To our knowledge, no Indiana bat roosts identified in either Fort Drum's surveys or in the literature have been located in shrubs or in grasses.

Subsequently, clearance of shrubs and mowing of grass on Fort Drum is unlikely to result in no direct effects of Indiana bats.

Removal of hazardous trees during the hibernation period has the same effects as tree removal for construction, therefore it is anticipated that no known direct effects to roosting Indiana bats will occur.

However, removal of hazard trees during the non-hibernation period may result in direct effects to Indiana bats. Reproductive females, males, and young (non-volant and volant) may roost in a hazard tree, depending on the trees' characteristics. Felling of a hazard tree during the non-hibernation may result in injury or mortality of non-volant young and adult individuals who do not fly off during a disturbance. Hazard trees that are classified as being a high risk tree and need to be removed will be surveyed for bats. If no bats are found, then the hazard tree will be promptly removed. If no bats are present, then no known direct effects to Indiana bats are expected to occur when the tree is felled. Further consultation is needed if bats are present. Based on previous occurrences, it is rare that hazard trees need to be removed within the restricted cut period.

Foraging

Vegetation management activities occur during daylight hours and are expected to have no known direct effects on foraging Indiana bats.

2.4.3.2 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, vegetation management activities are expected to have no known indirect effects to hibernating Indiana bats.

Roosting

Removal of small trees within the forest understory during the non-hibernation period are expected to have little negative effect on roosting Indiana bats since they typically roost in trees > 4 in DBH (Kurta et al. 2002; Britzke et al. 2006). According to fall and summer surveys for Indiana bats on-post, the majority of roost trees on Fort Drum were > 4 in DBH, however two roost trees were between 3-4 in DBH (ESI 2008a, 2008b). One summer roost tree was used in July and had an emergence count of three bats (the marked bat was a lactating adult female). A separate marked Indiana bat (juvenile female) used this same roost tree 10 days later and emerged alone. During the fall, an adult post-lactating female was tracked to a 3 in DBH roost tree. All identified roosts < 4 in DBH were in snags. The likelihood that removal of small trees during the non-hibernation period would negatively impact Indiana bats is discountable because of the number of other larger trees available for roosts. Additionally, removing some of the understory may benefit Indiana bats by increasing accessibility to remaining roost trees >4 in DBH.

It is understood that repeated clearing of the forest understory compounded by extensive use for training purposes, could potentially impact tree regeneration. With a loss in tree regeneration, forests may not be adequately replaced as trees age, which could lead to a loss of suitable roost sites for Indiana bats. However, Fort Drum's Forest Management Program

ensures the continued propagation of mature forests (See *Section 2.3*), so the likelihood of losing future roosting habitat to non-timber vegetation management is discountable.

Foraging

Maintenance and creation of grasslands and open shrublands will continue to provide foraging habitat for bats. Insects respond to vegetation management activities differently depending on time of year actions are conducted, amount of acreage treated, and the individual species (Swengel 2001). Many species of insects will decline immediately albeit temporarily after cutting/mowing, particularly if done during the growing season (Munguira & Thomas 1992; Feber & Smith 1995), however if land is left untreated, insect diversity will shift as the flora changes over time (Erhardt 1995). Maintenance of herbaceous vegetation will provide habitat for many species of Lepidopterans (moths) and Coleopterans (beetles) (Morris & Rispin 1988), which are prey for Indiana bats.

Although some insect species may decline temporarily after cutting, the amount of acreage that will be cleared is relatively small compared to available habitat. Over three years, only 11% of the total grassland/shrubland habitat in the focal area on Fort Drum will be temporarily impacted by vegetation management. Clearing will not occur in large contiguous blocks, and ample natural habitat and corresponding insect abundance will remain available throughout the next three years. Impacts to foraging areas and insect prey for Indiana bats will be discountable considering the amount of natural habitat remaining and the reclaimation/maintenance of grasslands/open shrublands.

Indiana bats are known to utilize corridors such as trails, roads, and streams for foraging and for travel to foraging areas. Removal of shrubs and small trees along trails and roads may further open travel corridors for Indiana bats. On Fort Drum, several travel corridors are present throughout the installation and are used by Indiana bats as they move from roost sites to foraging areas (ESI 2008a, 2008b). Corridors in the Cantonment Area are most likely to be utilized by Indiana bats given the proximity to known roost sites and foraging locations. The likelihood of having negative impacts to traveling and foraging is discountable given the amount of natural habitat remaining around corridors for roosting and foraging.

As Fort Drum continues to be developed, more areas will be converted from natural habitat into maintained landscapes (Refer to Section 2.1.3 for impacts to Indiana bats from construction). This conversion to developed landscapes will lead to a shift (typically a reduction) in insect diversity and abundance (Frankie & Ehler 1978; Clark et al. 2007). Mowing of lawns for residential/aesthetic purposes will maintain manicured landscapes and its associated levels of insect diversity and abundance. Given the impacts to Indiana bats from the creation of landscaped yards, there should be no additional negative impacts from lawn maintenance and therefore the likelihood to have negative indirect effects to foraging is discountable.

Vegetation management activities are not expected to be conducted in delineated wetlands and water sources or in such a manner to expose large amounts of soil. Subsequently, soil run-off into streams is expected to be minimal and it should not affect water quality. Impacts to water quality and associated aquatic insect abundance will be discountable since erosion and direct destruction of wetlands are not issues for non-timber vegetation management. Negative impacts to Indiana bats are unlikely and, therefore, are discountable given that ample water sources are present throughout the installation and water bodies/wetlands within treatment areas will be minimally impacted, if at all.

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

Prescribed fire is primarily used on Fort Drum to improve line-of-sight on ranges and observation points for direct and indirect firing, maintain grassland/open shrubland for open maneuver training, and to reduce fuel accumulation to minimize wildfire risk. Prescribed fires are not planned to be used for forest management activities in 2009-2011, nor is it anticipated to occur within forests. However, if a need arises to conduct prescribed fire activities in a forested environment, an individual consultation with the USFWS will be initiated.

Currently, all prescribed burns are administered by the Integrated Training Area Management (ITAM) Program and conducted through the USDA Forest Service, who provide trained staff to support burning requirements and who design prescribed fire work plans. Work plans for each prescribed burn will vary depending on location and environmental conditions (Table 2.6), however each plan will consider topography, fuel data, atmospheric conditions (i.e. wind speed and direction, relative humidity, etc.), fire breaks, safety concerns, expected fire behavior, mop up procedures, and contingency plans in case of emergencies.

Due to seasonal precipitation patterns on Fort Drum, prescribed burning takes place during the spring dormant season (late April-early May). Adequate burning conditions are typically not achieved during the growing season due to high fuel moisture content. Prescribed fires are implemented using aerial and/or ground based ignition with various ignition patterns and techniques to include backing, strip-heading, spotting, flanking, perimeter firing or combination of them as designated by the Burn Boss and/or Ignition Specialist. Ignition devices may include drip torches, fusees, flare guns or similar type, ATV mounted ignition devices, Premo Mark 3 plastic sphere dispensers (PSD), and/or Terra Torches.

Burn units are delineated on existing human-made or natural boundaries, such as roads or streams. Fire breaks may be constructed around culturally sensitive areas or other structures to prevent fire damage to these areas. Fire breaks are constructed by putting in plow lines using a tractor to disc a strip of land (typically grassland) around selected areas. No trees will be removed during the construction of fire breaks. Occasionally, trucks with water pumps may be used to establish a wet line around culturally sensitive areas or around structures.

Table 2.6 Fire parameters for prescribed burns on Fort Drum.

PARAMETER	RANGE	PREFERRED
Dates:	April 15-May 15	April 15-May 15
Temperature:	45-85° F	70-75°F
Relative Humidity	15-55%	25-35%
Mid-Flame Windspeed	0-10 mph	3-6 mph
Wind Direction	Depends on location	Southwest
1-hour fuel moisture	5-11%	6-8%
10-hour fuel moisture	6-15%	8-10%

For fire suppression, burn units are designed so fires will burn out naturally. However, wet lines will be established around forested areas to preclude fire from entering, to the maximum extent practicable. Spot fires may be controlled by hand tools or backpack sprayers. Depending on fire conditions or risks, helicopters with bambi buckets may be used to extinguish fire. Water is gathered from nearby water bodies and will be dispersed over land or returned to the same water body in order to minimize the risk of spreading invasive species. Although not currently used, the potential exists that surfactants (i.e. Lipofoam) may be used in the future for mop-up operations or control lines. Future use is expected to be used infrequently and in small-sized areas. All prescribed burns are conducted in accordance with the Fort Drum Integrated Wildland Fire Management Plan (U.S. Army 2005).

Approximately 6,500 ac (2,630 ha) outside the Main Impact Area are expected to be burned during the next three years (Figure 2.12). The proposed sizes and locations of prescribed fires outside the Main Impact Area are unlikely to change in the next three years due to the complex procedural process associated with implementing prescribed burns. Of the total acreage, about 2,500 ac (1,012 ha) may be burned annually. The remaining acreage will be burned on a cycle of every 3-5 years in order to maintain their vegetative status as grasslands or semi-open shrublands. Refer to Table 2.7 for habitat types that are within the proposed burn boundaries.

Within the Main Impact Area, prescribed fires may be conducted in the north and south boxes (~5,420 ac (~2193 ha)) in order to facilitate military training activities (refer to *Section 2.2.3* for military training impacts). Human health and safety concerns restrict personnel from entering the Main Impact Area, so non-mechanical methods are the primary means for managing vegetation in that area (Refer to *Section 2.6.3* for pesticide impacts). Although fire may be a tool used to manage vegetation in the Main Impact Area, prescribed burns will most likely be used infrequently due to variable moisture conditions within the targeted area. If more than 6,500 ac (2,630 ha) are required to be burned in the next three years of this BA due to unforeseen circumstances, consultation with the USFWS will be re-initiated.

Figure 2.12 Locations of scheduled prescribed fires on Fort Drum.

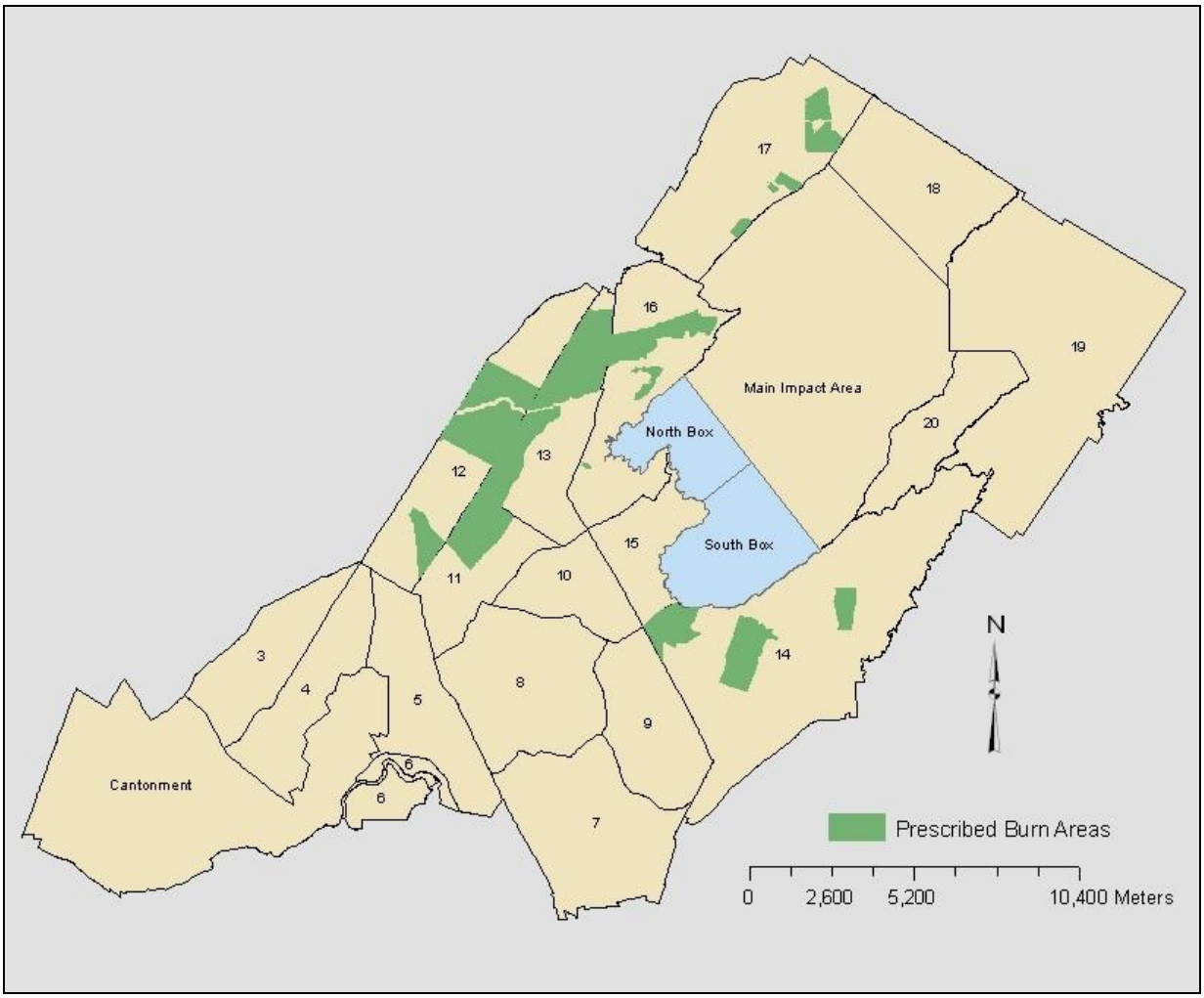


Table 2.7 Types and acreages of vegetative cover that are encompassed within the prescribed burn area boundaries that are located outside the Main Impact Area.

Vegetative Cover Type	Acres
Grassland	3,278
Shrubland	882
Conifer Forest/Plantation	28
Deciduous Forest	1,768
Mixed Forest	254
Other	268
Total	6,479

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

While prescribed fire can be a beneficial tool to aid in management of natural vegetation, prescribed fire may have direct and indirect effects on Indiana bats.

2.5.3.1 Direct Effects

Hibernation

No hibernacula are known to exist on Fort Drum, and the nearest known hibernaculum to Fort Drum is over 10 mi (16 km) away from the nearest potential prescribed burn unit. Therefore prescribed fire activities are expected to have no known direct effects to hibernating Indiana bats.

Roosting

Fire, heat or smoke near these spring/summer roosts could directly affect roosting individuals if they are unable to escape the area. Females are pregnant between April-June and will give birth to a single pup during early summer. The female may carry the pup when it is smaller in size, however as the pup grows it will remain at the maternity roost until it can fly on its own. It

is during this time period when smoke and heat could have the greatest negative direct effect on immobile individuals (i.e., early summer through late-summer).

Fort Drum's scheduled spring prescribed fires are not expected to affect non-volant young in known or undiscovered maternity colonies since burning is restricted to late April-early May and is primarily conducted in grassland or shrubland habitats. Even if smoke from prescribed burns drifts into forests and disturbs roosting male and pregnant female bats (in undiscovered maternity colony), Indiana bats are capable of leaving the area; and smoke effects are likely to be ephemeral in nature. The rate at which the flames spread during these burns does not typically produce a high volume of smoke for long intervals. Additionally, maximum duration of any smoke output would typically be only 2-3 hours after the start of the burn. Smoke duration on smaller burn units will be much less. Further, no known roosting (maternity or male) areas are known to exist within close proximity to any of the burn units. Therefore, the likelihood that there will be direct effects to roosting Indiana bats by prescribed fire is discountable.

Foraging

Indiana bats foraging immediately following a prescribed burn could potentially fly into smoke that may still be present. However, it is assumed that Indiana bats would forage elsewhere if residual smoke was a problem. All efforts, whenever possible, will be made to have all flames extinguished and smoke generation minimized by sunset to reduce smoke impacts, although ample foraging habitat is present throughout the installation, including near burn areas. Therefore, the likelihood of Indiana bats being directly affected by smoke while foraging is discountable.

2.5.3.2 Indirect Effects

Hibernation

No hibernacula are known to exist on Fort Drum, and the nearest known hibernaculum to Fort Drum is over 10 mi (16 km) away from the nearest potential prescribed burn unit. Therefore, prescribed fire activities are expected to have no known indirect effects to hibernating Indiana bats.

Roosting

Fires conducted in forests may destroy or create roost trees depending on fire intensity and trees species susceptibility (Carter et al. 2000). However, landcover within and around most burn units on Fort Drum is primarily grassland and shrublands. Since no burning is targeted within forested areas, and any incidental burning that may result within these areas is being minimized to the maximum extent practicable, changes in forest structure resulting from fire should be minimal. Additionally, although there are some small diameter hardwoods mixed throughout the burn units, they are found in small numbers and are of unsuitable size to be useful for consistent roosting. Because of these factors, the potential to lose one or more primary roost trees is unlikely and the potential to adversely affect maternity colonies (or a significant amount of habitat suitable for maternity colonies) is discountable. Furthermore, all known roosts (maternity and male) areas are > 3 mi (5.3 km) from any of the burn units. Therefore, the likelihood of losing roosting habitat is discountable.

Foraging

Prescribed burns are not currently scheduled to be conducted within or adjacent to known Indiana bat foraging areas. However, little is known about the foraging behavior of Indiana bats on Fort Drum, so it is possible burn sites may encompass undiscovered Indiana bat foraging areas. If some of these areas are serving as potential foraging habitat, the effects of immediate loss of vegetative structure and insect abundance should be minimal considering ample foraging habitat is present throughout Fort Drum. If Indiana bats are utilizing burned sites, they may ultimately benefit from prescribed fires, as fire can create favorable vegetation conditions for increased insect production and activity (Swengel 2001). Immediately following a prescribed fire, insect abundance may decrease, but will rebound as the site re-vegetates and is recolonized (Swengel 2001)—typically within 2-3 weeks after a burn, a flush of live vegetation will occur. Further, because these burn units are not in one contiguous block or located within known primary foraging areas, and large amounts of other more suitable foraging habitat is distributed among the burn units and in the surrounding areas, the likelihood that prescribed burning will have negative indirect effects to foraging Indiana bats is discountable.

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. 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 (IPMP; U.S. Army 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 catergory 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 C). 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 U.S. Army 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 and is used 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. Pesticides usage is reported yearly in accordance with pesticide permits by PAI. Below is an expected amount of pesticide usage based on previous years (Table 2.8).

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 is anticipated that up to three applications of herbicides will be aerially applied, primarily over the Ranges and Main Impact Area, for line-of-sight issues. Up to 1,500 ac (607 ha) per year may be treated aerially. No aerial applications will occur over the Cantonment Area or Bat Conservation Area without further consultation with the USFWS.

Table 2.8 Anticipated amount of herbicides that will be used between 2009-2011 and their expected half-life in soils.

Pesticide Trade Name	Pesticide Active Ingredient(s)	PAI for 3 Years	Average Half-Life in Soil (Days)
Dicamba	Dimethylamine	5	14-28
Rodeo	Glyphosate	3.51	47
Quick Pro	Glyphosate Diquat	3.51	47
Oust XP	Sulfometron	3.51	10.00
Escort XP	Metasulfron	80.52	30.00
Roundup Pro	Glyphosate	237.3	47
Accord	Glyphosate	5,294.82	47
Garlon 4	Triclopyr	5.21	30
Tordon 101	Picloram 2,4-D	3.6	90
Pathway	Picloram 2,4-D	3.6	90
Pathfinder II	Triclopyr	1.2	30

Arthropod Control

Most insect control is conducted in and around buildings or warehouses for human health and safety issues (i.e. fleas, flies, bees), building integrity issues (i.e. termites, carpenter ants), or for nuisance complaints (i.e. ants, cockroaches) (U.S. Army 2008). Refer to Appendix I 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/catepillars, 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.

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 1 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 1 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 5 mi (8 km) per hour. 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.

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 (i.e. Accord, Roundup, etc.), 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 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 in and around the Main Impact Area, which is greater than 6 mi (9.6 km) from known roosting locations. Because of the distance and because of measures to control pesticide drift, known primary and maternity colonies are unlikely to be directly affected by pesticides, including drift. Although known roosting and foraging areas are not likely to be directly affected, undiscovered roost locations may be potentially affected by aerial spraying of pesticides. Through inhalation or direct contact with the skin, pesticides have the potential to cause injury or mortality to undiscovered roosting Indiana bats, including pups (see Tables 2.9 and 2.10 and Material Safety Data Sheets for more information).

Glyphosate, the most commonly used herbicide active ingredient on Fort Drum, may cause minor skin and temporary eye irritation (http://npic.orst.edu/npicfact.htm). When ingested at higher doses (1500 mg/kg/day), glyphosate was reported to be associated with lower body weights in offspring of rats. Additionally, pregnant rats exposed to 3500 mg/kg/day of glyphosate had higher mortality rates and gained less weight than rats exposed to lesser amounts. For pesticide studies, pesticides typically are fed to rats at higher concentrations than what is normally encountered in real world applications. Indiana bats that are located in undiscovered roosting areas on Fort Drum are unlikely to ingest or inhale sufficient quantities of glyphosate that would result in observable direct effects, including effects to reproduction, because applications will be conducted in accordance with the label. Label recommendations provide maximum amounts of pesticides that may be applied within a given area. Aerial application of glyphosate occurs infrequently (at most once per year) and is not likely to be ingested by Indiana bats in large quantities. Because aerial application is infrequent and excessive amounts of pesticides will not be used within a given area, then aerial application of glyphosate may affect but is not likely to adversely affect undiscovered roosting Indiana bats. The other pesticides that may potentially be spread aerially have similar direct effects to

glyphosate on small mammals (e.g. Syracuse Environmental Research Associates 2004b, c), and may affect but are not likely to adversely affect Indiana bats.

Table 2.9 Herbicide toxicity risks to small mammals.

Pesticide Trade Name	Pesticide Active Ingredient(s)	Bioaccumulates	Inhalation Toxicity	Skin Toxicity
Dicamba	Dimethylamine	no	very low	moderate
Rodeo	Glyphosate	no	low	low
Quick Pro	Glyphosate Diquat	no	low	low
Oust Extra	Sulfometron	no	very low	low
Escort	Metsulfuron	no	very low	low
Roundup Pro	Glyphosate	no	low	low
Accord Concentrate	Glyphosate	no	low	low

Table 2.10 Categories for levels of toxicity.

	Toxicity			
	High	Moderate	Low	Very Low
Oral LD50 (mg/kg)	< 50	50-500	500-5000	>5000
Dermal LD50 (mg/kg)	<200	200-2000	2000-5000	>5000
Inhalation LC50 (mg/l)	<0.05 mg/kg	0.05-0.5	0.5-2	>2

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; 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 effects (both known and unknown effects). 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.

Impacts to undiscovered roosting bats from ground dispersal of herbicides will be similar to impacts from aerial application of pesticides. Undiscovered roosting Indiana bats may inhale or 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. Overall, 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. In addition, herbicides will be dispersed in accordance with their label. Herbicides will not be applied in excess of what is recommended for a given area, thus minimizing exposure risks to Indiana bats. Subsequently, Indiana bats within the undiscovered maternity colony 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

Pesticides may indirectly provide additional roosting habitat for Indiana bats on Fort Drum. Applied herbicides are expected to cause tree die-off, which can create snags with exfoliating bark or cavities. Snags would be primarily created in the Training Areas, in and around the Main Impact Area, where the majority of herbicides are expected to be applied. However, through the hatchet injection method, any unwanted tree or group of trees could be injected with herbicide to create a potential roost 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 may 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 the white-nose syndrome has been reported. The white nose syndrome may compound the effects of pesticides and 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. Methoprene (Altosid XR), which is used to disrupt dipteran life cycles, has been noted to bioaccumulate in crayfish

and bluegill sunfish, however methoprene showed very low toxicity in mammals even at high oral doses (Csondes 2004). Methoprene is only applied to water sources thus aquatic organisms are in greater contact with the chemical than terrestrial wildlife, which may explain why crustaceans are more susceptible to bioaccumulation. Methoprene has been shown to have very little effects on mammals even in large doses, subsequently it 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, BTI and BTK 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 are discountable.

When applied in accordance with the label, herbicide impacts to aquatic invertebrates and other non-target organisms should be minimized. Accord, the most heavily used herbicide on Fort Drum, and Escort XP are practically non-toxic to terrestrial and aquatic invertebrates (J for MSDS). Round Up Pro is slightly toxic to aquatic invertebrates, but is practically non-toxic to terrestrial invertebrates. Subsequently, Round Up Pro may affect some aquatic insects if it is applied to water or if permitted to enter waterways, however it's half-life in water is <7 days, resulting in minimum effects to potential Indiana bat prey. 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 affects on potential prey for the Indiana bat, thus effects to Indiana bats are discountable.

2.6.4 Conclusion

With conservation measures in place and by complying with the pesticide label, the use of pesticides may affect, but is not likely to adversely affect known Indiana bats. However, pesticide use may affect and is likely to adversely affect the undiscovered maternity colony.

2.7 Wildlife Management/Vertebrate Pest Control

There are several wildlife management/vertebrate pest control actions that occur on Fort Drum (e.g., wildlife surveys, fish stocking, etc.), but four have been identified to have some potential to impact Indiana bats: bat management, beaver management, BASH management, and vertebrate pest control.

The Fort Drum Fish & Wildlife Management Program is responsible for most fish and wildlife issues on Fort Drum. Overall management of natural resources is addressed in the Integrated Natural Resources Management Plan (U.S. Army in progress). Pest management on Fort Drum

is governed by the Integrated Pest Management Plan (U.S. Army 2008). Many individual vertebrate pest problems in buildings, motorpools, barracks, and the like are handled by Fort Drum's Pest Control Program (Directorate of Public Works); a contractor is hired by Fort Drum Mountain Community Homes to conduct pest control activities in residential housing. See Section 2.6 for Pesticides and insect control.

2.7.1 Wildlife Management/Vertebrate Pest Control Activities

Bat Management

There are an estimated 20 incidences of bats reported in or near structures on Fort Drum per year. Although currently no Indiana bats have been found utilizing structures on Fort Drum (including the bat hotel and LeRay Mansion maternity areas), Indiana bats are known to use buildings and structures in the Northeastern U.S. and New York State (Butchkoski & Hassinger 2002). Because of this possibility, all efforts are made to safely capture individual bats and release them. No lethal control methods are permitted on Fort Drum. If a bat is acting abnormal or has bitten someone, then it will be submitted for rabies testing; otherwise bats will be managed via non-lethal methods.

The Fish & Wildlife Management Program will assist and coordinate other programs such as Pest Control, Fort Drum's Cultural Resources Program and/or the Directorate of Morale, Welfare & Recreation-Housing to assist with individual bat removal from buildings. For example, the Fish & Wildlife Management Program has been working to systematically remove a large bat maternity colony from the LeRay Mansion. It is unknown how long bats have been roosting in LeRay Mansion, however, it is thought that the colony has been present for at least 20+ years in the attic spaces, old chimneys, and space above the kitchen area. In the fall of 2003, concerns were raised about the proximity of the colony to the kitchen area of the Mansion (the main part of the colony roosts above the kitchen), and the effect of the guano on the historic structure.

In May of 2004, a bat hotel capable of holding 800-1000 myotis-sized bats was placed near LeRay Mansion for the first phase of the project. In the summer of 2004, an exit count for the Mansion indicated that there were at least 500+ bats using LeRay Mansion. In summer of 2005, there were approximately 200 bats found to be using the hotel. No exit count was performed for LeRay Mansion, however, staff from the Fish & Wildlife Management Program did discover that bats were no longer using the attic and chimney areas. In 2006, exit counts performed in the summer found approximately 550 bats emerging from LeRay Mansion and 600 bats emerging from the hotel. There were also approximately 100 non-volant pups still roosting in the hotel. This was the first indication that the hotel and LeRay Mansion were probably one large maternity colony. Species composition of the maternity colony was still unknown, however, acoustical analysis of bat echolocation calls from the area indicated that both little brown and Indiana bats could be within the maternity colony. In the summer of 2007, both LeRay Mansion and the hotel were surveyed using a modified harp trap technique, and 387 bats were caught at LeRay Mansion and 304 at the hotel. Approximately 50% of the total number of bats using the two structures were captured, and only little brown bats were identified.

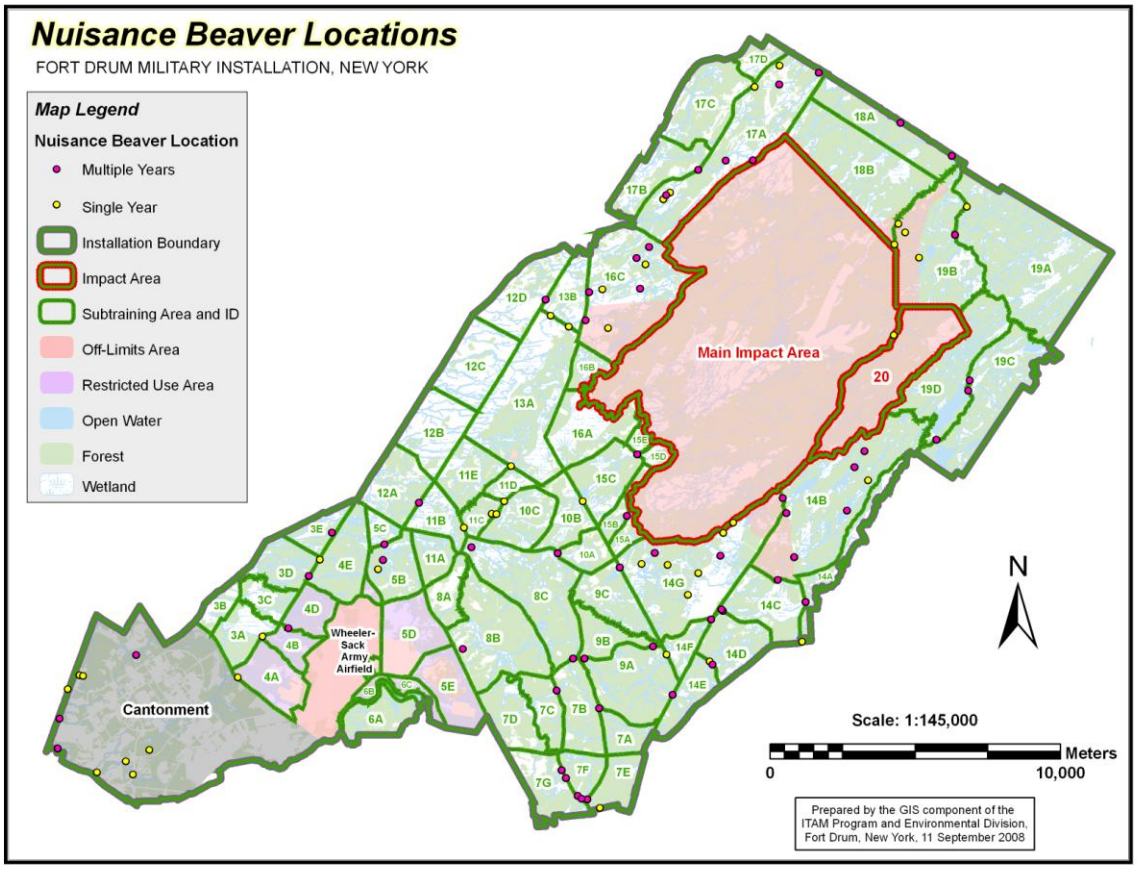
Additional bat boxes with large capacities will be erected in the spring of 2009 for the remaining members of the colony still within LeRay Mansion. Depending on funding, final exclusion for bats using LeRay Mansion will then follow. Any future exclusion of colonies of bats (such as the LeRay Mansion colony) will only be done through systematic phases as identified above. 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.

Beaver Management

The Fish & Wildlife Management Program manages beaver (*Castor canadensis*) in accordance with a Standard Activities Permit issued by NYSDEC. Nuisance beaver situations are handled by removing or breaching dams, clearing culverts, and/or installing flood control devices. When these actions can not control problems, beavers will be lethally trapped from the area with volunteer nuisance trappers, contract support personnel, Fort Drum personnel and/or personnel from other federal agencies. Active beaver management is a complaint-driven process. Since 2002, on average, approximately 30 culverts have been cleaned, 10 dams breached or removed, and 98 beavers were trapped and removed at 16 sites per year (Figure 2.13). However, recreational trapping during the regular beaver trapping season is also encouraged as a proactive measure to avoid nuisance beaver situations in the future. Aerial surveys are conducted each autumn to record active beaver locations, and a map is created and made available to recreational trappers.

Figure 2.13. Nuisance beaver locations on Fort Drum.



BASH Management

The Fish & Wildlife Management Program participates in the Bird Hazard Working Group with WSAAF personnel in accordance with the Bird/Animal Aircraft Strike Hazard (BASH) Plan. The goal of the working group and plan is to minimize wildlife-aircraft strikes. The most effective means of minimizing this risk is through habitat modification. In 2005, the Fish & Wildlife Management Program was a proponent to remove 300 ac of forested habitat in and around WSAAF to reduce roosting and foraging opportunities for wild turkey (*Meleagris gallopavo*). Grassland habitat is also maintained between 7-14 in within and around WSAAF airfield to reduce other bird/aircraft conflicts (U.S. Army 2007b).

For wildlife actually present on the airfield, WSAAF personnel typically respond and will first attempt to use non-lethal techniques. In the rare times when non-lethal techniques are ineffective, shotguns will be used to lethally remove wildlife. The number of birds depredated at WSAAF since 2001 range from 0 (in 2001 and 2004) to a high of 54 (in 2006). Of the birds depredated, 75% have been Ring-billed gulls (*Larus delawarensis*) and 17% American crows (*Corvus brachyrhynchos*). Most depredation activities occur in the morning. No shooting occurs at night, and shooting only occurs in restricted zones within WSAAF. Bats are not considered a BASH problem at WSAAF and no wildlife strikes have been reported involving a bat.

Pest Control

Other vertebrate pest control complaints not involving bats usually involve commensal rodents, moles (order Insectivora), raccoons (*Procyon lotor*), squirrels (order Rodentia), skunks (order Carnivora), and woodchucks (order Rodentia). Each issue is handled on a case-by-case basis depending on the pest species and the situation. When possible, wildlife is deterred from areas by removing features that are attractive to the animals (e.g. eliminating potential food/nesting sources, plugging openings into buildings, etc.). If deterrence efforts are ineffective, then it may be necessary to set live traps and relocate or euthanize animals, or use lethal control methods such as trapping, shooting, and/ or chemical control. All pest control efforts are performed in accordance with the most current Animal Welfare guidelines (http://awic.nal.usda.gov).

Lethal traps are primarily used for rodents and moles. Adhesive traps are allowable for rodent and insect control in buildings, however, if placed incorrectly, they may inadvertently capture bats. Both adult and juvenile bats are susceptible to capture in glue traps which could result in injury or mortality. To prevent accidental capture of bats, no adhesive traps can 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. If bats are present within the building, then live traps for rodents will be used instead of glue traps.

If there are large scale infestations of rodents and moles, chemical means may be necessary to effectively manage the outbreak. Pesticides will be applied as formulated bait and may include Talpirid (EPA # 12455-101), Generation (EPA # 12455-79), Talon G (EPA # 10182-41), or Quintox (EPA # 3240-28-12455). Based on previous years, up to 0.0033 pounds of active ingredients may be used on Fort Drum for rodent or mole control between 2009-2011. Bait stations will not be placed where it may be accessible to children or pets and must be monitored to prevent access to non-target animals.

Other species such as Rock doves (*Columba livia*) or European starlings (*Sturnus vulgaris*), may be lethally controlled via trapping or shooting. No shooting is done at night.

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

2.7.3.1 Direct Effects

Hibernation

Pest management activities such as sealing cracks and crevices during winter months, could potentially disturb or result in the death of Indiana bats hibernating in buildings. However, the likelihood that Indiana bats will be present in buildings during the hibernation period is unlikely considering their specific thermal requirements (Tuttle & Kennedy 2002). There are no known records of Indiana bats (or any bats) hibernating in buildings on Fort Drum or in the surrounding area, and the closest known hibernaculum is 6.5 mi (10.5 km) away. In late March and early April of 2007, the area used as a maternity colony at LeRay Mansion was entered to remove accumulated guano and no bats were present. Bats emerging from the maternity roost were captured in the summer of 2007, and only little brown bats were identified. If hibernating bats are noted in buildings, then measures will be implemented to protect the hibernaculum. Because no Indiana bats are known to roost within buildings on Fort Drum, the likelihood that pest management activities would adversely affect hibernating bats is unlikely and effects are discountable.

All other activities addressed are expected to have no known direct effects on hibernation due to the distance (6.5 mi (10.5 km)) from the known hibernaculum.

Roosting

Pest management activities are typically associated with pests in and around human structures. Although Indiana bats have been known to occasionally roost in or on buildings (Butchkoski &

Hassinger 2002), their typical roosting habitat is underneath exfoliating bark on dead trees or within tree cavities (Kurta et al. 1993; Britzke et al. 2006). All known Indiana bat roosts (including male, female, and maternity colonies) on Fort Drum have been located in trees within forested habitat, and no Indiana bat has been observed roosting in a building on the installation. Ample tree roosting habitat is available throughout the installation, so it is assumed that Indiana bats are less likely to roost in buildings.

However, if Indiana bats are found in a building, conservation measures are in place to capture any bat alive and release it outside. Capturing individual bats could stress the animal and lead to capture myopathy, although this is rarely reported in bats; or, it could lead to unintentional injury and/or death. On Fort Drum, human-bat conflicts are relatively uncommon and have typically involved little brown bats (*Myotis lucifugus*) or big brown bats (*Eptesicus fuscus*) which are known to utilize buildings on the installation for roosting. Only if the bat (or any animal) exhibits abnormal behavior will it be euthanized and submitted for rabies testing.

Due to the preference of natural roosts by Indiana bats, the overall low number of bats reported in buildings on Fort Drum, and the conservation measures in place to capture bats alive and release them, the likelihood that pest management activities will adversely affect roosting Indiana bats (either male or female) is discountable.

All known roosting trees have been removed in and around WSAAF to discourage large-bodied birds (e.g., wild turkey, red-tailed hawks (*Buteo jamaicensis*), and turkey vultures (*Cathartes aura*)) from being potential wildlife-aircraft strike hazards. If a roost tree for birds was discovered to be a potential safety concern, it would be addressed the same as hazard trees in Section 2.4 Vegetation Management.

Other wildlife management activities are not expected to disturb or destroy roosting habitat thus no known direct effects are anticipated.

Foraging

Lethal control of birds at WSAAF is a last resort. When depredation activities occur, they typically occur in the morning. No shooting occurs at night, and shooting is done only in restricted zones within WSAAF. BASH activities are anticipated to have no direct effects on foraging Indiana bats, because it does not occur when Indiana bats are active. Other wildlife management or pest control activities do not affect foraging bats and are expected to have no known direct effects.

2.7.3.2 Indirect Effects

Roosting

Bat Management: Although there are no known incidents of Indiana bats using human-made structures on Fort Drum, sealing cracks and crevices during the winter could lead to loss of potential roosting areas. Because there are 1) low occurrences of bat-related incidences in buildings in any given year, 2) no known Indiana bat occurrences in buildings on Fort Drum, and 3) ample natural roosting habitat available and conserved in the Bat Conservation Area, Pest Control activities may affect but are unlikely to adversely affect roosting habitat for Indiana bats. Although no Indiana bats were found while trapping LeRay Mansion and a bat hotel area, Indiana bats have the potential to use LeRay Mansion as a roost. Not all bats roosting in LeRay Mansion or the bat hotel were captured, therefore it cannot be said there are no Indiana

bats using this structure. Because of this, excluding the rest of the maternity colony from LeRay Mansion could potentially lead to the loss of a roost site for Indiana bats. However, alternate roosting opportunities have already been established within the area, and additional roosting structures will be placed nearby prior to the final exclusion. Additionally, a Bat Conservation Area containing suitable roosting habitat has been established on Fort Drum. Therefore, the likelihood that excluding the known maternity colony from LeRay Mansion is not anticipated to adversely affect any Indiana bats and effects are discountable.

BASH Management: Past habitat manipulations to deter wild turkey from utilizing WSAAF have resulted in large patches of forest being removed in and around WSAAF that could have potentially contained suitable roosting habitat for Indiana bat. Currently, there are no additional plans to perform these types of habitat modifications for BASH-related activities. If a roost tree for a bird is identified as a potential safety concern, it would be addressed the same as hazard trees in Section 2.4 Vegetation Management. It is unlikely that Indiana bats will be affected since most roost trees of BASH concern have already been addressed, thus effects are discountable. All other BASH activities are expected to have no known indirect effects to roosting Indiana bats.

Beaver Management: Beaver actively create large diameter snags suitable for Indiana bat roosting when they damage but do not fell trees through chewing. Additionally, beaver can flood forested areas, creating unfavorable conditions for certain tree species. Over time, these trees may die and create snags, potential roosting areas for Indiana bats. Removing or breaching dams, or lethally removing beaver from wetland areas could potentially alter micro-hydrology in the area. Large expanses of flooded beaver impoundments could be reduced back to normal stream channels. These changes could result in less flooding in forested areas, which could potentially alter the roosting habitat in the local area.

However, there is a healthy beaver population on Fort Drum, and relatively few sites have dams breached or removed and beaver trapped compared to the total number of active beaver colonies. Additionally, beaver populations naturally fluctuate, and colonies routinely move in and out of areas depending on food supply and local water conditions. As beavers disperse, natural fluctuations of the micro-hydrology occur when unattended dams are removed through natural processes. Finally, the amount of suitable roosting habitat outside of active beaver areas on Fort Drum is substantial and the majority of known roost sites are not in areas with frequent flooding. Therefore, beaver control on Fort Drum may affect but is not likely to adversely affect the amount and type of roosting habitat available for Indiana bat.

Pest Control: Other pest control activities are expected to have no known indirect effects to roosting Indiana bats.

Foraging

Beaver Management: Many bat species, including Indiana bats, forage over riparian zones, stream corridors, and beaver ponds (e.g. LaVal et al. 1977; Holloway & Barclay 2000). Beavers actively change micro-hydrology within localized areas, and the amount and type of insect forage base may subsequently change as well. Flooded beaver impoundments may have different insect communities than those found in smaller stream habitats (Collen & Gibson 2000). Removing or breaching dams, or lethally removing beaver from wetland areas could potentially re-alter micro-hydrology in the area and reduce large expanses of flooded area back to normal stream channels. These changes could potentially alter the type of foraging habitat available as well as the amount and type of forage base within a local area.

However, there is a robust beaver population on Fort Drum, and relatively few dams have been breached or removed compared to the total number of active beaver colonies. Additionally, beaver populations naturally fluctuate, and colonies routinely move in and out of areas depending on food supply and local water conditions. As beavers move, natural fluctuations of the micro-hydrology occurs when unattended dams are removed through natural processes. Finally, the amount of suitable foraging habitat outside of active beaver areas on Fort Drum is substantial and available for Indiana bats. Therefore, the likelihood that beaver control on Fort Drum adversely affects the type of foraging habitat for Indiana bats is unlikely, and effects are discountable.

Other wildlife management activities have no known indirect effects to foraging bats.

2.7.4 Conclusion

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

2.8 Outdoor Recreation

Various outdoor recreational activities occur on Fort Drum, both in the Training Area and the Cantonment Area. In general, activities in the Training Area and hunting and fishing on the entire installation are administered by Fort Drum's Fish and Wildlife Management Program; activities in the Cantonment Area are administered by the Directorate of Morale, Welfare, and Recreation. Approximately 3,000 recreational permits are issued per year for hunting, fishing, trapping, wildlife viewing and other recreational activities on Fort Drum (2,805 permits were issued in FY07). Recreation permits are required only to recreate in the Training Area or hunt and fish in the Cantonment Area.

The following recreational activities occur on Fort Drum: hunting; fishing; boating (including canoeing and kayaking); trapping; camping; target and skeet shooting; wildlife viewing and/or photography; harvesting berries, mushrooms, ramps/leeks, asparagus, and/or rhubarb; picnicking; hiking; geocaching; dog walking and training; cross country skiing; snowshoeing; biking; snowmobiling (only in Training Areas 7E, 7F, and 7G); ATV riding (only on designated recreational roads in Training Areas 7E, 7F, 7G); horseback riding; and paintball.

Only three recreational activities have been identified as having potential impacts to the Indiana bat: hunting, skeet shooting, and ATV use. The remaining activities are anticipated to have no known direct or indirect effects to Indiana bats.

2.8.1 Outdoor Recreation Activities

Hunting

Hunting is allowed in the Training Area and the Cantonment Area. Fort Drum is Wildlife Management Unit 6H and follows NYSDEC regulations for hunting seasons and bag limits (NYSDEC 2008). Hunters are required to follow all rules established by NYSDEC and Fort Drum Regulation 420-3 Hunting, Fishing, Trapping & Camping. Only archery hunting is allowed in the Cantonment Area and only from elevated stands, primarily tree stands. Approximately 200 hunters are eligible to hunt in the Cantonment Area (194 were eligible to hunt in FY07).

Hunting in the Training Area may be done with any legal hunting implement including firearms and archery and can occur from the ground or elevated stands. Potentially two-thirds of all permit holders could hunt (1,787 could hunt in FY07).

Most hunting occurs in October and November when Indiana bats are presumably in the hibernaculum, but hunting occurs in May (turkey season) and begins in mid-September for early bear season and late-September for early deer season.

Skeet & Target Shooting

In general, target shooting with a firearm is only allowed on designated ranges and usually for only a few weekends per year. These are the same ranges soldiers utilize (see *Section 2.2.3* Military Training for impacts). However, a skeet range is located adjacent to the Bat Conservation Area within the Cantonment Area and the range fan is part of a known foraging area of Indiana bats. Skeet shooting involves using shotguns to shoot at clay pigeons. The current hours of operation are 8am-8pm. Individuals may shoot shotguns at clay pigeons at this range. Clay pigeons that can be recycled are picked up, however broken pieces are left in the shoot area.

ATVs

Currently ATVs are only authorized to be used on designated recreational roads in Training Area 7E, F, and G (Figure 2.14). All ATV users are required to complete an ATV user course and are informed of the rules to recreate on Fort Drum. Although there are potential concerns for wetlands, water quality and erosion issues for the off-road use of ATVs, the current use of roads by ATVs on Fort Drum is considered to be no different than other vehicle traffic.

There are plans to construct ATV trails in other areas of Fort Drum, but these actions will need further consultation with the USFWS as plans develop.

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 1 hour before sunset. This measure will prevent the accidental shooting of an Indiana bat during the non-hibernation seasons.

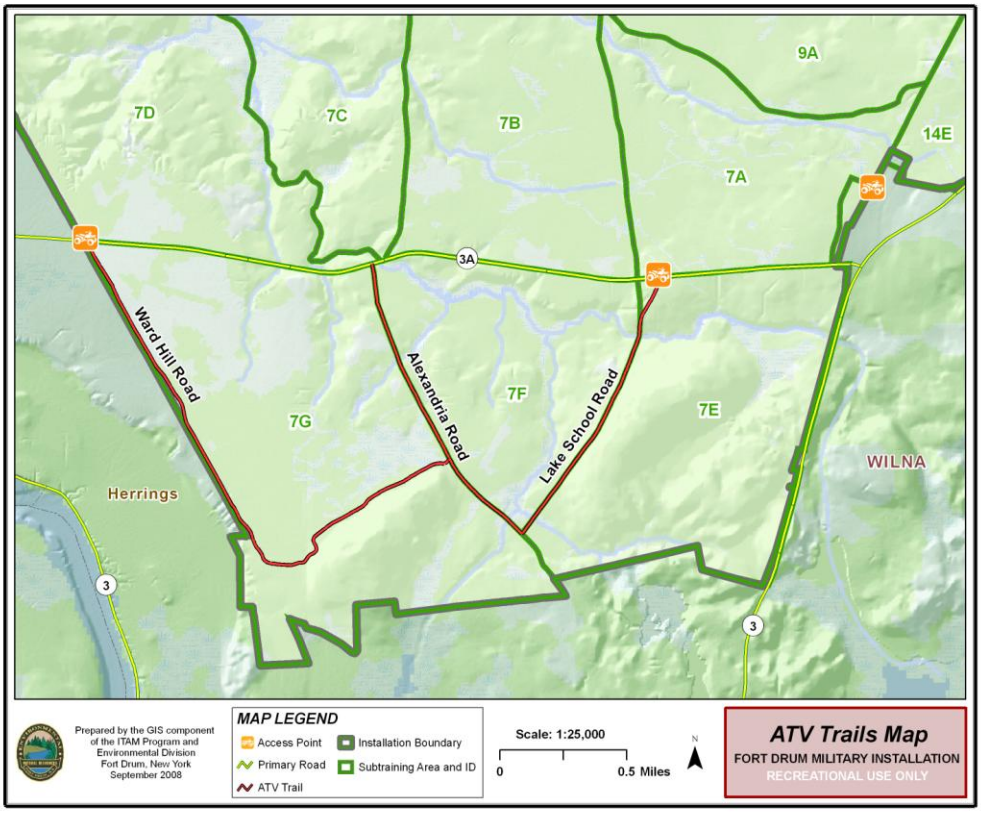
2.8.3 Effects to Indiana bats

2.8.3.1 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, outdoor recreational activities are anticipated to have no known direct effects to hibernating Indiana bats.

Figure 2.14. Approved designated ATV trails on Fort Drum.



Roosting

Hunting activities have the potential to directly affect roosting Indiana bats if a hunter should place a stand in an Indiana bat roost. Hunters are unlikely to place tree stands in snags due to the instability of snags and the risk that the tree may fall. Thus, Indiana bats roosting in standing dead trees are not likely to be adversely affected by tree stands during the nonhibernation seasons. Tree stands may disturb roosting Indiana bats or damage roosts that are located within crevices of live trees or are in a dead tree limb of a live tree. Installment of a tree stand may cause Indiana bats to abandon the roost. Hunting primarily occurs in the fall-winter when Indiana bats are moving to the hibernaculum or are already in the hibernaculum, so Indiana bats are more likely to roost alone or in small groups within trees or are within the hibernacululm. A small number of Indiana bats within the Bat Conservation Area may be affected by tree stands, but since hunting is typically hunted in seasons when Indiana bats are less likely to be present, the use of tree stands may affect but is not likely to adversely affect roosting Indiana bats.

Hunting activities also have the potential to directly affect roosting Indiana bats if a hunter should shoot at game flying through the air or in a tree and the shot hits a tree containing roosting Indiana bats. The likelihood of this happening is expected to be extremely rare, given the combination of occurrences that need to come together (i.e., the hunter being in a location suitable for Indiana bats to be roosting and game birds or waterfowl to be flying, the hunter shooting at the right angle into a tree to hit and kill an Indiana bat, etc.). Additionally, most

Indiana bats would presumably be within the hibernaculum when the majority of hunting is conducted (October-February). Hunting in May has the potential to strike pregnant Indiana bats roosting in the Training Area. Firearm hunting is not allowed in the Cantonment Area where the majority of Indiana bats found on Fort Drum are known to roost. Hunting in TA 3 could potentially affect known roost sites and hunting throughout the Training Area may affect undiscovered roost sites. However, hunting activities are unlikely to directly affect roosting Indiana bats since the combination of events that must occur are unlikely to happen.

All other recreational activities are expected to have no known direct effect on roosting Indiana bats.

Foraging

Skeet shooting could potentially result in injury or mortality of a foraging Indiana bat if skeet shooting was conducted in extreme early morning or at sunset when Indiana bats may be active. The skeet range is located adjacent to several known Indiana bat roosts, including primary roosts, and it is part of known foraging ranges for summer and fall Indiana bats on Fort Drum. The likelihood that an Indiana bat could be struck during skeet shooting is highly probable. However, a conservation measure is in place to restrict the hours of operation for the skeet range, so it is not operational during times when Indiana bats are foraging.

Subsequently, foraging Indiana bats are unlikely to be adversely affected by operations at the skeet range and impacts are discountable.

All other recreational activities are expected to have no known direct effect on foraging Indiana bats.

2.8.3.2 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, outdoor recreational activities are expected to have no known indirect effects to hibernating Indiana bats.

Roosting

There is potential that individuals hunting game may shoot into a forested area which has Indiana bat roosts. Fired projectiles may strike an Indiana bat roost and remove bark from the tree, rendering the roost unsuitable for future use. Snags are ephemeral in nature and frequently slough bark. Indiana bats are known to frequently switch roosts assumed because of the fleeting nature of snags. Since Fort Drum has an abundance of snags throughout the installation and because strikes of snags are expected to occur infrequently, Indiana bats are unlikely to be adversely affected by hunting. Thus effects are discountable.

All other recreational activities are expected to have no known indirect effect on roosting Indiana bats.

Foraging

Legal use of ATVs in TA7 should have no known indirect effects to Indiana bats as ATV's will remain on the road at all times and will not damage vegetation in the area. However, unauthorized ATV use off-trail may damage vegetation which can expose the soil to the elements and could lead to increased soil erosion. Soil erosion may lead to declines in water quality. Lower water quality may reduce aquatic insect availability, which are prey for Indiana bats. In addition, streams/wetlands may be converted overtime into mud pits that are unsuitable for drinking by Indiana bats. At this time, ATV use is only permitted within TA7, and TA7 outside the 4 mile radius around known Indiana bat roosts (i.e. the area assumed to be used by foraging Indiana bats). Due to the distance from known sites and ample water and natural habitat available in the area, it is unlikely that ATV use will adversely affect known foraging Indiana bats. Thus, effects are discountable.

2.8.4 Conclusion

The majority of recreational activities with the exclusion of ATV use, hunting, and skeet shooting, are expected to have no known effects on Indiana bats. Given the conservation measures, recreational activities may affect but are not likely to adversely affect Indiana bats.

3.0 Conservation Measures

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 J.) This section deals 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 contains 93% (46 out of 49) of the known tree roosts, including 4 suspected primary roosts, that were identified during the summer and fall of 2007. (The 3 roosts not included in the BCA were located off Fort Drum.)

The BCA appears to be 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, Eagle Ridge housing project) 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).

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 roost trees identified within the boundaries of the BCA will be felled. This includes roost trees identified in the future.

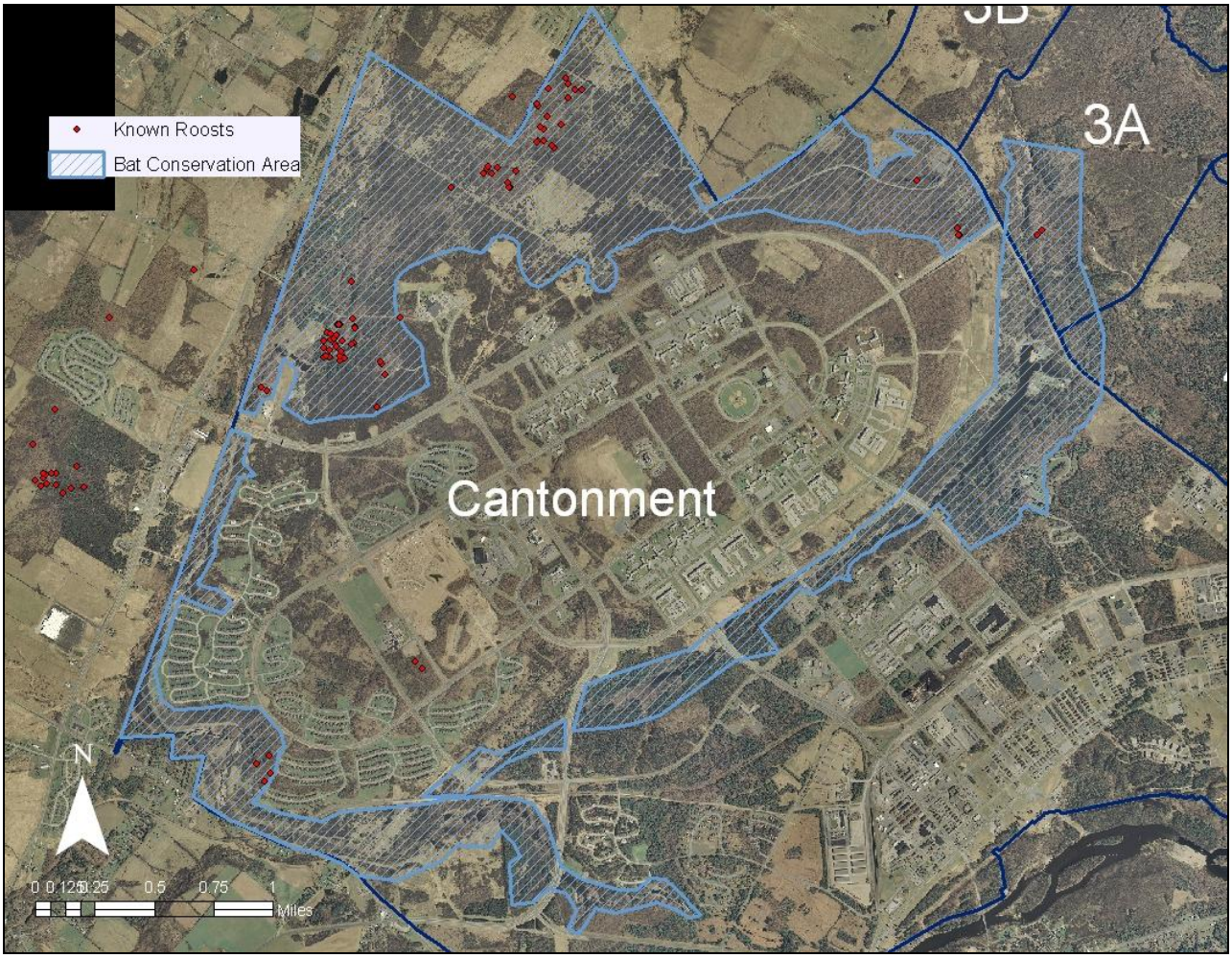
2. Construction. The primary activity not allowed in the BCA is construction activities resulting in the permanent loss of natural habitat. No permanent facility will be constructed within the BCA with the exception of some additional facilities (e.g., cabins, picnic shelters, parking lots, a campground, 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 1 - 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



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.

With the exception of colored smoke used at the three identified mobile MOUTs, smoke and obscurants will not be used within 100 m of forested areas or within 1000 m of Fort Drum's boundary between April 16 – September 30 to minimize impacts to roosting Indiana bats. See *Section 2.2 Military Training* for more information on impacts.

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 1 - 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

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 since 2003, but the data was not analyzed until 2006. Although these detectors can not positively identify an Indiana bat, detectors can collect echolocation sequences that may be tentatively identified to Myotis species. 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. Acoustical surveys will be utilized into the foreseeable future.

In 2007, the first comprehensive survey was initiated on Fort Drum to assess the summer status of Indiana bats and identify maternity areas. Eighty-one sites were surveyed during the summer of 2007 and 1,380 bats were captured including 18 Indiana bats. Ten of the 18 Indiana bats were radio-tagged and tracked to summer day roosts. Twenty-three roosts were found in the Cantonment Area and one roost was in Training Area 3. Harp traps were also used in two locations to capture bats exiting from the LeRay Mansion and the bat house near the LeRay Mansion. No Indiana bats were identified at LeRay Mansion or the bat house.

In late 2007, a survey was initiated to assess the fall status of Indiana bats and identify foraging areas on the installation. Thirty-five bats were captured at six sites in September in the Cantonment Area including three Indiana bats. All three Indiana bats were radio-tagged and followed to roosts during the day and tracked while foraging at night. Twenty-nine roost trees were identified in the Cantonment Area during this time. All three bats were found to be foraging over the northern portion of the Cantonment Area as well as areas to the north and east off the installation. All three bats were still roosting and foraging on Fort Drum after October 1—one bat as late as October 12 (ESI 2008b).

In May 2008, intensive surveys of the Indiana bat to determine movements and habitat use in and around the Cantonment Area began. This effort is planned to continue in 2009 and funding requests have already been submitted. A comprehensive survey for Indiana bats will continue in the Training Area in June – August 2008 with an additional 40 sites planned to be surveyed. Other Indiana bat survey efforts focusing on specific habitat types will begin in the Training Area in 2009 and continue until at least 2010. Acoustical surveys will also continue to collect information about foraging bats on Fort Drum and target other areas for further survey efforts. A funding request has also been submitted to conduct a habitat survey in the Cantonment Area of known Indiana bat roosting areas starting in 2009. This information may be used in the future to develop a predictor model of potential bat habitat on Fort Drum as well as develop a forest bat management plan. In the event that additional maternity colonies are found, then it will be necessary to contact the USFWS and to review this BA to determine the adequacy of the conservation measures

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.

- March 23, 2006: Spring 2006 Fort Drum Fish & Wildlife Management Program *Blaze Orange* newsletter featured a short article entitled *Bat Management* (Pg. 6) [The *Blaze Orange* newsletter is a semi-annual newsletter published by Fort Drum's Fish & Wildlife Management Program and sent two all outdoor recreationists and residents on Fort Drum.]
- February 21, 2007: Article printed in the Watertown Daily Times by Nicolas Zimmerman entitled: *Fort Drum seeking biologist to study Indiana bat* (Pg. B3) [Interviewed on February 20, 2007]

- April 11, 2007: Spring 2007 Fort Drum Fish & Wildlife Management Program *Blaze Orange* newsletter featured an article entitled *Bats & Bat Management on Fort Drum* (Pg. 1&6)
- April 20, 2007: 6th Annual Earth Day at Fort Drum had a small bat display with an example bat house with directions
- April 26, 2007: Featured presentation at Fort Drum's Civilian of the Quarter Luncheon at Fort Drum entitled: *Bats of Fort Drum*.
- June 13, 2007: A radio interview aired on North Country Public Radio by Jonathan Brown re: Fort Drum's Indiana bat project [based on an interview the same day]
- July 5, 2007: Article printed in the *Fort Drum Blizzard* by Fort Drum's Fish & Wildlife Management Program entitled: *Indiana bat surveys begin on Fort Drum* (Pg. 14).
- August 5, 2007: Article printed in the *Watertown Daily Times* by Nicolas Zimmerman entitled *Drum's Impact on Bats Studies* (Pg. A1 & A7) [based on visit and interview on July 24, 2007]
- August 20, 2007: Fall 2007 Fort Drum Fish & Wildlife Management Program *Blaze Orange* newsletter featured an article entitled *Indiana Bat Surveys Begin on Fort Drum* (Pg. 6)
- August 30, 2007: Two radio programs were aired on North Country Public Radio by Jonathan Brown—one was about endangered species and the military and the second was about capturing bats.
- September 15, 2007: Participated in the Thompson Park Zoo's Fragile Wilderness featuring a Bats of Fort Drum display based on the theme of "Backyard Wildlife"
- September 29, 2007: National Public Lands Day was celebrated at Fort Drum and one of the activities was constructing bat houses. The event was featured by three different local news organizations.
- September 30, 2007: Article printed in the *Watertown Daily Times* by Kelly Vadney entitled *Bats Get Cozy New Flats* (Pg. B1) [based on visit to Fort Drum for National Public Lands Day on July 29, 2007]
- April 4, 2008: Spring 2008 Fort Drum Fish & Wildlife Management Program *Blaze Orange* newsletter featured two articles entitled Bat Surveys on Fort Drum (pg. 6) and Bats Dying in New York (Pg. 7).
- April 18, 2008: 7th Annual Earth Day at Fort Drum had a Bats of Fort Drum display.
- May 9, 2008: A presentation was made to a Fifth Grade class at Carthage Elementary School entitled: *Bats & Endangered Species*.
- August 23, 2008: Participated in the Thompson Park Zoo's Fragile Wilderness featuring a Bats of Fort Drum display based on the theme of "Backyard Wildlife."

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 U.S. Marine Corps "We're Saving A Few Good Species" posters.

3.4 Army Compatible Use Buffer (ACUB) Program

The Army Compatible Use Buffer (ACUB) Program was created to establish buffer areas around Army installations to limit effects of encroachment and maximize land inside the installation that can be used to support the mission. The ACUB Program can also be used to meet environmental regulatory requirements for endangered species conservation and off-post wetland mitigation which would 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 wildlife habitats.

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 ACUB program. The ACUB program is one of the responsibilities of PAIO. Natural resources professionals will assist in a supporting role whenever called upon. Potential ACUB partners at Fort Drum include Ducks Unlimited Great Lakes/ Atlantic Regional Office; Thousand Islands Land Trust; Tug Hill Tomorrow Land Trust; Jefferson County Agricultural Development Corporation; New York State Office of Parks, Recreation & Historic Preservation; NYSDEC; and USFWS.

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 U.S. Fish & Wildlife Service has identified undeveloped wooded areas near Fort Drum as priority ACUB areas to provide potential habitat for the federally endangered 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 will be incorporated into the program.

3.5 Conclusion

The establishment of the Bat Conservation Area, monitoring and research efforts, outreach efforts, and establishment of Army Compatible Use Buffer areas will all have discountable or wholly beneficial impacts to the Indiana bat and other forest bat species.

4.0 Cumulative Effects

This section assesses cumulative effects in the action area as defined in Section 1.4. 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). This analysis is not limited to the "footprint" of the action nor is it limited by the Federal agency's authority. Rather, it is a biological determination of the reach of the proposed action on listed species.

In the spring/summer action area, one known maternity colony was identified to utilize Fort Drum and the Town of LeRay for roosting and foraging and one undiscovered maternity is assumed to also forage and roost on Fort Drum. In the fall action area, Indiana bats are associated with three known maternity colonies and one undiscovered maternity colony.

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 Section 1.3.2), agriculture, timber harvesting, and outdoor recreation. Although many of these are private actions, some involve permitting through the U.S. Army Corps of Engineers (USACE) 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 developing a master plan 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. The USFWS has also recently been involved with the I-81 Fort Drum Connector project.

Because of the active involvement of the USFWS 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 on Indiana bats.

5.0 Overall Conclusion

Proposed activities on Fort Drum Military Installation for 2009-2011 are likely to adversely affect Indiana bats during all seasons except winter. Table 5.1 summarizes the effects analysis of each activity in this BA.

Table. 5.1 Overall Effects Summary. (0 = No effect or discountable; - = may affect; -- = likely to adversely affect; + = beneficial effect)

ACTIVITY	ATTRIBUTE	DIRECT EFFECT	INDIRECT EFFECT
Construction	Hibernation	0	0
	Roosting	--	--
	Foraging	--	--
Military Training	Hibernation	0	0
	Roosting	-	0
	Foraging	0	0
Forest Management	Hibernation	0	0
	Roosting	--	--
	Foraging	0	0
Mechanical Vegetation Management	Hibernation	0	0
	Roosting	--	--
	Foraging	0	0
Prescribed Fire	Hibernation	0	0
	Roosting	0	0
	Foraging	0	0
Pesticide Application	Hibernation	0	0
	Roosting	--	+
	Foraging	0	0
Wildlife Management/ Vertebrate Pest Control	Hibernation	0	0
	Roosting	0	0
	Foraging	0	0
Outdoor Recreation	Hibernation	0	0
	Roosting	0	0
	Foraging	0	0

Although many of the conservation measures will minimize or negate the impacts of the proposed actions, and some conservations measures will have discountable or wholly beneficial impacts, the permanent loss of habitat remains the primary impact to the Indiana bat. The majority of permanent habitat loss is occurring around known locations of Indiana bat roosts (i.e. Cantonment Area), thus restricting areas that provide roosting and foraging opportunities. The cumulative effects of removing foraging and roosting habitats both on- and off-post are likely to contribute additional stress to Indiana bats, particularly before and after hibernation. It could potentially reduce reproductive success and it may have compounded effects associated with white nose syndrome.

Of the conservation measures, the two with the most significant impact and of greatest importance is the establishment of the BCA and the time of year tree clearing period. These two measures protect known and unknown roosting and foraging habitats for Indiana bats, including maternity colonies with non-volant young. Future monitoring and research efforts will continue to determine Indiana bat use of Fort Drum.

As more information is gathered about Indiana bats on Fort Drum and the effects of WNS, Fort Drum will be better able to make appropriate management decisions and subsequent conservation measures for the next installation-wide biological assessment beginning 2012.

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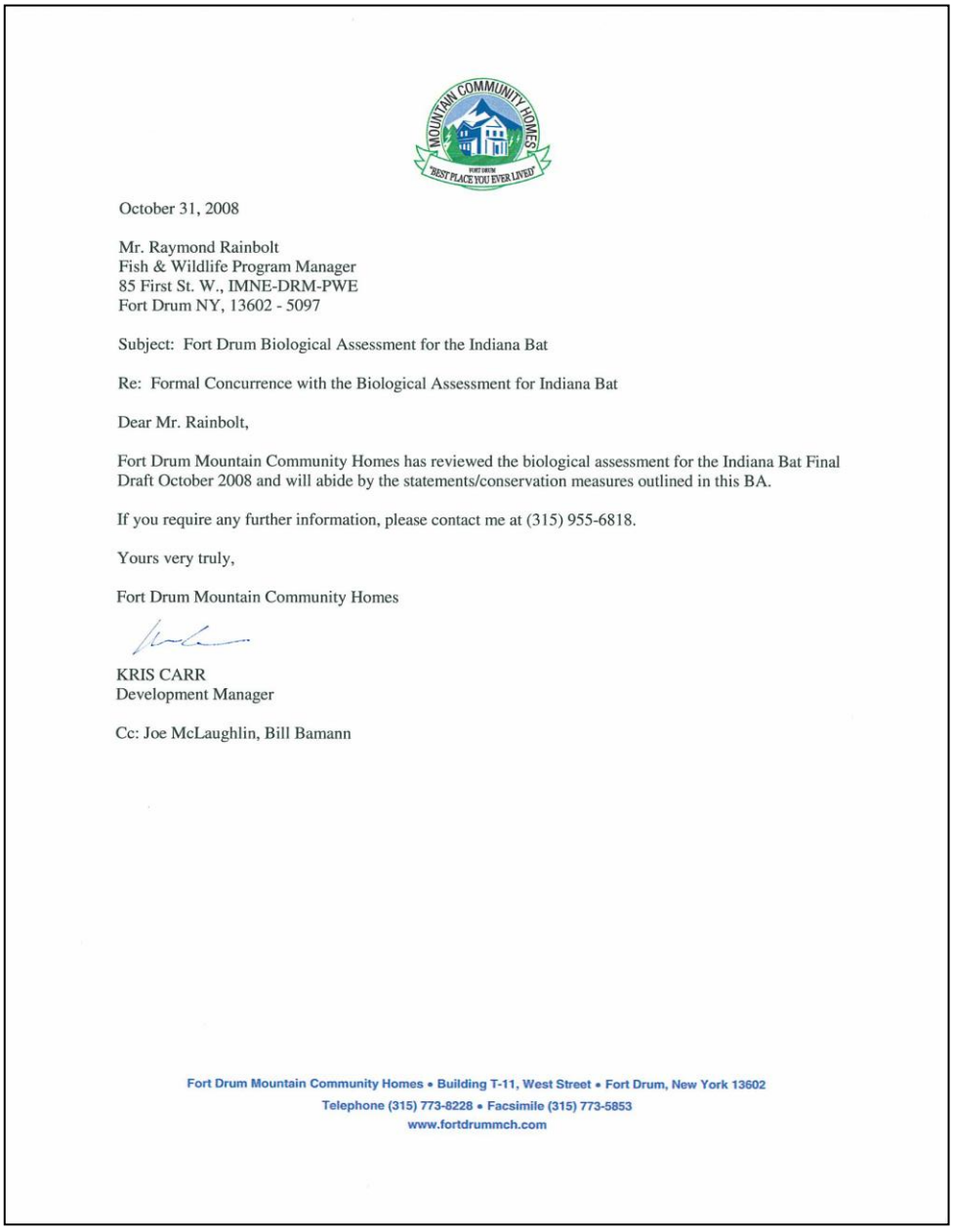
7.0 Appendices

Appendix A. Letter of Concurrence from Fort Drum Mountain Community Homes



October 31, 2008

Mr. Raymond Rainbolt
Fish & Wildlife Program Manager
85 First St. W., IMNE-DRM-PWE
Fort Drum NY, 13602 - 5097

Subject: Fort Drum Biological Assessment for the Indiana Bat

Re: Formal Concurrence with the Biological Assessment for Indiana Bat

Dear Mr. Rainbolt,

Fort Drum Mountain Community Homes has reviewed the biological assessment for the Indiana Bat Final Draft October 2008 and will abide by the statements/conservation measures outlined in this BA.

If you require any further information, please contact me at (315) 955-6818.

Yours very truly,

Fort Drum Mountain Community Homes

KRIS CARR
Development Manager

Cc: Joe McLaughlin, Bill Bamann

Fort Drum Mountain Community Homes • Building T-11, West Street • Fort Drum, New York 13602
Telephone (315) 773-8228 • Facsimile (315) 773-5853
www.fortdrummch.com

Appendix B1. Letter of Correspondence with the U.S. Fish and Wildlife Service

DEPARTMENT OF THE ARMY
HEADQUARTERS, UNITED STATES ARMY GARRISON
FORT DRUM, NEW YORK 13602-5000

REPLY TO
ATTENTION OF

July 18, 2006

Office of the Director
Public Works

Laury Zicari
U.S. Fish & Wildlife Service
New York State Field Office
3817 Luker Rd.
Cortland NY 13045

Dear Ms. Zicari,

It was a pleasure to meet you and Ms. Niver on your visit to Fort Drum on June 27.

We appreciate the willingness of the USFWS to cooperate with Fort Drum, especially during this time when 10th Mountain Division Soldiers are deployed across the world participating in the Global War on Terrorism.

Balancing mission requirements and the conservation of the Indiana bat will take successful planning and effective management. We believe the best approach at this time, to meet all of our requirements, is to assume presence of the Indiana bat and move forward accordingly.

Actions that have already been initiated or are currently ready to begin August 01, 2006 will most likely proceed. However, Fort Drum will pursue a "restricted tree falling" policy for future actions. This "restricted tree falling" policy will be implemented in potential Indiana bat habitat to minimize the direct and indirect impacts to the species.

This "restricted tree falling" policy will take effect between April 15 – September 30 of each calendar year. Although we recognize the guidelines for no tree falling from the USFWS New York Field Office are from April 01 – September 30, the April 15 start date should be adequate since it appears from past studies (Al Hicks, New York State Department of Environmental Conservation) that Indiana bats leave the Glen Park hibernaculum on or around April 15. Additionally, Fort Drum currently has a "no land clearing" window that begins April 15 in accordance with the Migratory Bird Treaty Act to avoid take of migratory birds for non-military readiness activities.

Fort Drum will also pursue funding in FY06 to analyze bat acoustical surveys that have been conducted and to conduct additional mist net survey for FY07 to determine

what extent Indiana bats may be utilizing Fort Drum. This funding is subject to approval by Army headquarters.

Fort Drum is committed to the conservation of the Indiana bat. We look forward to continued coordination and cooperation on this issue. My staff will be in touch with your office as we proceed with the consultation process. If you have questions, please contact Raymond Rainbolt, Fort Drum Fish & Wildlife Program Manager, at 315-772-9636 or Ray.Rainbolt@drum.army.mil.

Respectfully,

James W. Corriveau
Public Works Director

Appendix B2. Letter of Correspondence with the U.S. Fish and Wildlife Service

DEPARTMENT OF THE ARMY
HEADQUARTERS, UNITED STATES ARMY GARRISON
FORT DRUM, NEW YORK 13602-5000

REPLY TO
ATTENTION OF

August 23, 2006

Office of the Director
Public Works

Laury Zicari
U.S. Fish & Wildlife Service
New York State Field Office
3817 Luker Rd.
Cortland NY 13045

Dear Ms. Zicari,

This is a follow up to our letter of 10 July 2006. Since that correspondence, the presence of Indiana bats has been confirmed on Fort Drum. Mist-netting and subsequent radio-tracking work performed by Environmental Solutions & Innovations, LLC (ESI) at a proposed housing development in the Town of LeRay during the weeks of 7 and 14 August led to the discovery that at least 4 Indiana bats (3 males and 1 female) were utilizing Fort Drum for foraging. Additionally, Fort Drum staff assisted ESI contractors to gain access to the installation and track a radio-tagged male to two separate roost sites on three different days (August 18-20) within the cantonment area. Fort Drum staff continued to track the same bat to the same roost site on August 21.

I would also like to confirm that that the U.S. Army Garrison at Fort Drum is the lead agency for all activities occurring on Fort Drum in the counties of Jefferson and Lewis in northern New York pursuant to Section 7 of the Endangered Species Act.

Fort Drum is still currently pursuing funding in FY06 to analyze bat acoustical surveys, as well as, funding for FY07 for additional acoustical analysis and mist-net surveys.

If you have questions, please contact Raymond Rainbolt, Fort Drum Fish & Wildlife Program Manager, at 315-772-9636 or Ray.Rainbolt@drum.army.mil.

Respectfully,

James W. Corriveau
Public Works Director

cc: Fort Drum Mountain Community Development
U.S. Army Corps of Engineers

Appendix B3. Letter of Correspondence with the U.S. Fish and Wildlife Service

REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, UNITED STATES ARMY GARRISON, FORT DRUM
10000 10TH MOUNTAIN DIVISION DRIVE
FORT DRUM, NEW YORK 13602-5000

March 6, 2008

Office of the Director
Public Works

Laury Zicari
US Fish & Wildlife Service
New York State Field Office
3817 Luker Rd
Cortland, New York 13045

Dear Ms. Zicari:

This letter is to inform you of Fort Drum's implementation of a Bat Conservation Area (BCA). The BCA is a conservation measure as part of the on-going Section 7 consultation process, specifically RCI Site #3, between your office and Fort Drum.

The BCA is approximately 2200 acres mostly occurring in the undeveloped portion of the Cantonment Area including the Pleasant and West Creek corridors, with a small portion following Pleasant Creek northward into Training Areas 4A and 3A (see attached map). The BCA encompasses most known Indiana bat roosting and foraging areas based on the 2007 mist-netting and radio telemetry efforts, and past acoustical surveys.

Below are some of the general parameters for the BCA. Further details will be provided in the forthcoming Biological Assessment. However, in general, the permanent loss of bat habitat will be severely minimized within the boundaries of the BCA. The following are activities that are proposed to occur in the BCA:

a. Relatively low impact military training (e.g., land navigation and small unit tactics) currently exists in the northern portion of the BCA. This training will continue which may include the construction of temporary buildings (e.g., mock villages for urban warfare training) as long as no trees are removed. The area where known maternity roost trees occur may have some restrictions, but specific restrictions and limits have yet to be determined.

b. Most of the BCA is currently used for recreational purposes (e.g., archery hunting) and Physical Training (PT) by Soldiers. There is an extensive trail system throughout the area with plans to improve the trails both in quantity and quality. Any new trails will avoid trees and wetlands if at all possible—if trees >4" DBH must be removed, consultation will occur with the USFWS and trees will only be removed during the October 1 - April 15 tree clearing window.

c. The portion of the BCA along the Pleasant Creek corridor includes Remington Park. Some limited construction for additional park facilities (e.g., cabins, picnic shelters, a campground, etc.) is proposed. The amount of acreage is yet to be determined, but the "natural" character of Remington Park is expected to be maintained. Any new construction will avoid trees when possible—if trees >4" DBH must be removed, consultation will occur with the USFWS and trees will only be removed during the October 1 - April 15 tree clearing window.

d. Limited tree removal is expected as part of required maintenance activities for the perimeter fence or utilities, and hazard trees may be removed for safety concerns along roadways, trails, or parking areas. Any work that involves removal of trees greater than 4" DBH will occur only after consultation with the USFWS. Spraying of herbicides will continue to be conducted along the perimeter fence and utility line corridor to manage vegetation.

e. 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; continued fish and wildlife surveys and research; wetlands management including the potential to create or enhance wetland mitigation sites (one mitigation site is already located within the BCA); and forest management activities.

f. Although not expected, there is the potential the Installation Restoration Program (IRP) may need to remove trees in order to access contaminated ground water sites in response to any contamination episode. Consultation will occur with the USFWS and trees would only be removed during the October 1 - April 15 tree clearing window.

Fort Drum is still planning to conduct mistnet surveys and radio-track Indiana bats in 2008 to obtain more information on the species in northern New York and further refine the BCA now and in the future.

If you have questions, please contact Raymond Rainbolt, Fort Drum Fish & Wildlife Program Manager, at 315-772-9636 or Raymond.E.Rainbolt@us.army.mil.

Respectfully,

James W. Corriveau
Public Works Director

Enclosure

Appendix C. 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

Appendix D. Fort Drum Future Annual Ammunition Expenditure

FORT DRUM FUTURE ANNUAL AMMUNITION EXPENDITURE -- UNDER TRANSFORMATION			
Firing Location	**Weapon and Ammunition Type**	**DayShots 0700-2200**	**NightShots 2200-0700**
BAX	Simulator, Artillery, M21	10875	10875
CACTF	Simulator, Projectile Ground Burst, M115A2	500	500
	Simulator, Hand Grenade, M116A1	500	500
	Simulator, Artillery, M21	5000	5000
Impact Area	Bomb, MK82 (500 lbs)	200	0
	Bomb, MK84 (2,000 lbs)	25	0
Observation Point 3	60mm Mortar, HE	562	100
	60mm Mortar, Inert	132	24
	81mm Mortar, HE	62	12
	81mm Mortar, Inert	280	50
	120mm Mortar, HE	380	68
	120mm Mortar Inert	214	38
Observation Point 4	60mm Mortar, HE	562	100
	60mm Mortar, Inert	132	24
	81mm Mortar, HE	62	12
	81mm Mortar, Inert	280	50
	120mm Mortar, HE	380	68
	120mm Mortar Inert	214	38
Observation Point 5	60mm Mortar, HE	562	100
	60mm Mortar, Inert	132	24
	81mm Mortar, HE	62	12
	81mm Mortar, Inert	280	50
	120mm Mortar, HE	380	68
	120mm Mortar Inert	214	38
Observation Point 5A	60mm Mortar, HE	562	100
	60mm Mortar, Inert	132	24
	81mm Mortar, HE	62	12
	81mm Mortar, Inert	280	50
	120mm Mortar, HE	380	68
	120mm Mortar Inert	214	38
Range 17	40mm Grenade, HE	272	0
	Hand Grenade, Fragmentation	1902	0
	Hand Grenade, Offensive	13	0
	Demolition, C4 (1.25 lbs)	4	0
	Demolition, TNT (0.25 lb)	2	0

**Inert: any round that does not make noise upon impact (e.g. smoke, illumination, TP-T)*

FORT DRUM FUTURE ANNUAL AMMUNITION EXPENDITURE -- UNDER TRANSFORMATION			
Firing Location	**Weapon and Ammunition Type**	**DayShots 0700-2200**	**NightShots 2200-0700**
Range 19	Dynamite, Commercial (1 lb)	2	0
	Dynamite, Military (0.39 lb)	150	0
Range 22	40mm Grenade, HE	875	0
Range 23	25mm Gun, Inert	2260	0
	30mm Gun, Inert	1735	0
	40mm Grenade, HE	3	0
	57mm Recoiless Rifle, HE	25	0
	120mm Tank, Inert	1400	150
	Demolition, C4 (1.25 lbs)	37	0
	Simulator, Artillery, M21	141	0
	Simulator, Projectile Ground Burst, M115A2	113	0
	Missile, TOW, Inert	10	0
Range 24	40mm Grenade, HE	32	0
	Hand Grenade, Fragmentation	139	0
	Demolition, Bangalore, M028	21	0
	Demolition, Block H-6 (4 lbs)	50	0
	Demolition, C4 (1.25 lbs)	12	0
	Mine, Claymore, M18A1	42	0
	Simulator, Hand Grenade, M116A1	49	0
	Simulator, Projectile Ground Burst, M115A2	63	0
Range 25	Demolition, Bangalore, M028	47	0
	Demolition, C4 (1.25 lbs)	107	0
	Demolition, Cratering Charge (40 lbs)	2	0
	Demolition, Shaped Charge (15 lbs)	2	0
	Mine, Anti-tank Heavy, M15	2	0
	Mine, Anti-tank Heavy, M19	3	0
	Mine, Anti-tank Heavy, M21	1	0
	Mine, Anti-tank Light, M24	1	0
	Mine, Claymore, M18A1	9	0
	Simulator, Hand Grenade, M116A1	13	0
	Simulator, Projectile Ground Burst, M115A2	5	0
			0
Range 31	40mm Grenade, HE	83	0
Range 32	Demolition, C4 (1.25 lbs)	52	0
	Demolition, Sheet (0.875 lbs)	6	0
	Simulator, Hand Grenade, M116A1	21	0
	Simulator, Projectile Ground Burst, M115A2	4	0

**Inert: any round that does not make noise upon impact (e.g. smoke, illumination, TP-T)*

FORT DRUM FUTURE ANNUAL AMMUNITION EXPENDITURE -- UNDER TRANSFORMATION			
Firing Location	**Weapon and Ammunition Type**	**DayShots 0700-2200**	**NightShots 2200-0700**
Range 33	40mm Grenade, HE	7	0
	Hand Grenade, Fragmentation	72	0
	Demolition, Block H-6 (4 lbs)	37	0
	Demolition, C4 (1.25 lbs)	4	0
	Demolition, Cutter (0.2855 lbs)	16	0
	Demolition, Sheet (0.875 lbs)	7	0
	Simulator, Hand Grenade, M116A1	64	0
	Simulator, Projectile Ground Burst, M115A2	18	0
Range 35	Demolition, C4 (1.25 lbs)	32	0
	Dynamite, Military (0.39 lb)	8	0
Range 37	40mm Grenade, HE	1204	0
	Demolition, Bangalore, M028	16	0
	Demolition, C4 (1.25 lbs)	231	0
	Demolition, Cratering Charge (40 lbs)	2	0
	Demolition, Shaped Charge (15 lbs)	4	0
	Simulator, Artillery, M21	83	0
	Simulator, Hand Grenade, M116A1	46	0
	Simulator, Projectile Ground Burst, M115A2	11	0
	Missle, TOW, HE	4	0
Range 41A OS	40mm Grenade, HE	83	0
	Demolition, Bangalore, M028	14	0
	Demolition, C4 (1.25 lbs)	31	0
	Demolition, TNT (50 lbs)	2	0
	Mine, Claymore, M18A1	5	0
	Simulator, Hand Grenade, M116A1	5	0
	Simulator, Projectile Ground Burst, M115A2	12	0
	Rocket, AT-4, HE	6	0
	Rocket, SMAW, HE	4	0
Range 43	40mm Grenade, HE	4	0
	Demolition, C4 (1.25 lbs)	3	0
	Mine, Claymore, M18A1	3	0
	Simulator, Hand Grenade, M116A1	4	0
	Simulator, Projectile Ground Burst, M115A2	7	0
	Rocket, AT-4, HE	61	0

**Inert: any round that does not make noise upon impact (e.g. smoke, illumination, TP-T)*

FORT DRUM FUTURE ANNUAL AMMUNITION EXPENDITURE -- UNDER TRANSFORMATION			
Firing Location	**Weapon and Ammunition Type**	**DayShots 0700-2200**	**NightShots 2200-0700**
Range 44	Demolition, C4 (1.25 lbs)	13	0
	Mine, Claymore, M18A1	5	0
	Simulator, Hand Grenade, M116A1	77	0
	Simulator, Projectile Ground Burst, M115A2	108	0
	Missile, TOW, Inert	17	0
	Rocket, 2.75" - Hydra 70, HE	12	0
	Rocket, 2.75" - Hydra 70, Inert	134	0
Range 44 OS	Mine, Claymore, M18A1	2	0
	Simulator, Projectile Ground Burst, M115A2	4	0
Range 48	Missle, Hellfire, Inert	42	0
Range 50	40mm Grenade, HE	20	0
	Demolition, Bangalore, M028	223	0
	Demolition, Block H-6 (4 lbs)	179	0
	Demolition, C4 (1.25 lbs)	13495	0
	Demolition, Cratering Charge (40 lbs)	301	0
	Demolition, Cutter (0.2855 lbs)	11	0
	Demolition, PETN (2 lbs)	27	0
	Demolition, Shaped Charge, (0.07 lb)	6	0
	Demolition, Shaped Charge (0.857 lb)	2	0
	Demolition, Shaped Charge (15 lbs)	75	0
	Demolition, Shaped Charge (40 lbs)	60	0
	Demolition, Sheet (0.875 lbs)	92	0
	Demolition, TNT (0.25 lb)	77	0
	Demolition, TNT (1 lb)	34	0
	Demolition, TNT (50 lbs)	52	0
	Demolition, TNT (55 lbs)	2	0
	Demolition, TNT (8 lbs)	2	0
	Dynamite, Military (0.39 lb)	64	0
	Mine, Anti-tank Heavy, M15	69	0
	Mine, Anti-tank Heavy, M19	69	0
	Mine, Anti-tank Heavy, M21	71	0
	Mine, Claymore, M18A1	224	0
	MICLIC, HE	11	0
Range 51 MTC	Simulator, Projectile Ground Burst, M115A2	8	0
	Simulator, Hand Grenade, M116A1	10	0

**Inert: any round that does not make noise upon impact (e.g. smoke, illumination, TP-T)*

FORT DRUM FUTURE ANNUAL AMMUNITION EXPENDITURE -- UNDER TRANSFORMATION			
Firing Location	**Weapon and Ammunition Type**	**DayShots 0700-2200**	**NightShots 2200-0700**
Training Area 5D	105mm Howitzer, HE	663	117
	105mm Howitzer, Inert	75	78
Training Area 7D	105mm Howitzer, HE	663	117
	105mm Howitzer, Inert	75	78
	155mm Howitzer, HE	487	86
	155mm Howitzer, Inert	76	37
Training Area 8A (Hardened Artillery Point)	105mm Howitzer, HE	663	117
	105mm Howitzer, Inert	75	78
	155mm Howitzer, HE	487	86
	155mm Howitzer, Inert	76	37
Training Area 8B	105mm Howitzer, HE	2652	468
	105mm Howitzer, Inert	300	312
	155mm Howitzer, HE	487	86
	155mm Howitzer, Inert	76	37
Training Area 9C	105mm Howitzer, HE	663	117
	105mm Howitzer, Inert	75	78
	155mm Howitzer, HE	487	86
	155mm Howitzer, Inert	76	37
Training Area 10A	105mm Howitzer, HE	663	117
	105mm Howitzer, Inert	75	78
	155mm Howitzer, HE	487	86
	155mm Howitzer, Inert	76	37
Training Area 10B	105mm Howitzer, HE	663	117
	105mm Howitzer, Inert	75	78
	155mm Howitzer, HE	487	86
	155mm Howitzer, Inert	76	37
Training Area 10C	105mm Howitzer, HE	663	117
	105mm Howitzer, Inert	75	78
	155mm Howitzer, HE	487	86
	155mm Howitzer, Inert	76	37
Training Area 11E	105mm Howitzer, HE	1326	234
	105mm Howitzer, Inert	150	156

**Inert: any round that does not make noise upon impact (e.g. smoke, illumination, TP-T)*

FORT DRUM FUTURE ANNUAL AMMUNITION EXPENDITURE -- UNDER TRANSFORMATION			
Firing Location	**Weapon and Ammunition Type**	**DayShots 0700-2200**	**NightShots 2200-0700**
Training Area 12B	155mm Howitzer, HE	974	172
	155mm Howitzer, Inert	152	74
Training Area 13A	105mm Howitzer, HE	1326	234
	105mm Howitzer, Inert	150	156
	155mm Howitzer, HE	487	86
	155mm Howitzer, Inert	76	37
Training Area 14B	60mm Mortar, HE	281	50
	60mm Mortar, Inert	66	12
	81mm Mortar, HE	31	6
	81mm Mortar, Inert	140	25
	120mm Mortar, HE	190	34
	120mm Mortar Inert	107	19
Training Area 14C	105mm Howitzer, HE	1326	234
	105mm Howitzer, Inert	150	156
Training Area 14D	105mm Howitzer, HE	663	117
	105mm Howitzer, Inert	75	78
Training Area 17A	60mm Mortar, HE	281	50
	60mm Mortar, Inert	66	12
	81mm Mortar, HE	31	6
	81mm Mortar, Inert	140	25
	120mm Mortar, HE	190	34
	120mm Mortar Inert	107	19
Training Area 17B	105mm Howitzer, HE	663	117
	105mm Howitzer, Inert	75	78
Training Area 17D	155mm Howitzer, HE	487	86
	155mm Howitzer, Inert	76	37

**Inert: any round that does not make noise upon impact (e.g. smoke, illumination, TP-T)*

Appendix E. Rounds of smoke/obscurants deployed per area on Fort Drum over a three-year period between January 1, 2005-January 1, 2008.

Location	Colored Smoke	Smoke Hand Grenade	Smoke Pot	White Phosphorous	TOTAL
AARF	154	1	0	0	155
FP07	89	0	0	51	140
FP08	18	0	0	65	83
FP09	0	0	0	236	236
FP10	0	0	0	126	126
FP11	149	0	0	0	149
FP12	121	0	0	0	121
FP13	179	0	0	50	229
FP17	0	0	0	247	247
FUSA CONVOY	36	20	2	0	58
HARDEN ARTILLERY SITE	100	2	0	0	102
LZ BELVA	7		0	0	7
NBC	2	6	0	0	8
OP IMPACT	0	0	0	216	216
OP04	0	0	0	1113	1113
OP05	0	0	0	439	439
OP05A	0	0	0	235	235
OP06	0	0	0	400	400
OP06A	196	29	1	0	226
OP07	0	0	0	51	51
OP09	0	0	0	32	32
OP20	0	0	0	21	21
RNG17	20	0	0	0	20
RNG17A	20	0	0	0	20
RNG23	297	33	0	0	330
RNG24	99	10	1	203	313
RNG25	50	36	5	0	91
RNG32	154	48	0	0	202
RNG33	11	0	0	0	11
RNG35	7	0	0	0	7
RNG37	119	41	2	0	162
RNG39	7	0	0	0	7
RNG41A	0	2	0	0	2
RNG41A OS	72	6	0	0	78
RNG43	49	32	1	20	102
RNG44	36	0	0	0	36
RNG48	23	8	0	696	727
TA05A	101	184	8	0	293
TA05B	6		0	0	6
TA05D	105	76	0	0	181
TA05E	7	0	0	0	7
TA06C	10	0	0	0	10
TA07B	27	4	0	0	31

TA07C	45	0	0	0	45
TA07F	2	0	0	0	2
TA07G	638	277	0	0	915
TA08A	0	2	0	0	2
TA08B	29	5	0	0	34
TA08C	42	0	4	0	46
TA10A	12	6	0	0	18
TA11B	23	0	8	0	31
TA11C	4	2	0	0	6
TA11E	33	15	0	0	48
TA11EMOUT	69	35	10	0	114
TA12C	4	0	0	0	4
TA13A	18	20	3	0	41
TA13AMOUT	835	1062	23	0	1920
TA13B	0	9	0	0	9
TA14A	10	0	0	0	10
TA14D	0	4	0	0	4
TA14F	12	0	0	0	12
TA15A	0	0	0	300	300
TA15B	2	6	0	0	8
TA16A	20	0	0	0	20
TA17D	11	0	0	0	11
TOTAL	**4080**	**1981**	**68**	**4501**	**10630**

Appendix F. Concentration of TPA at Varying Distances (3D/International, Inc. 1997).

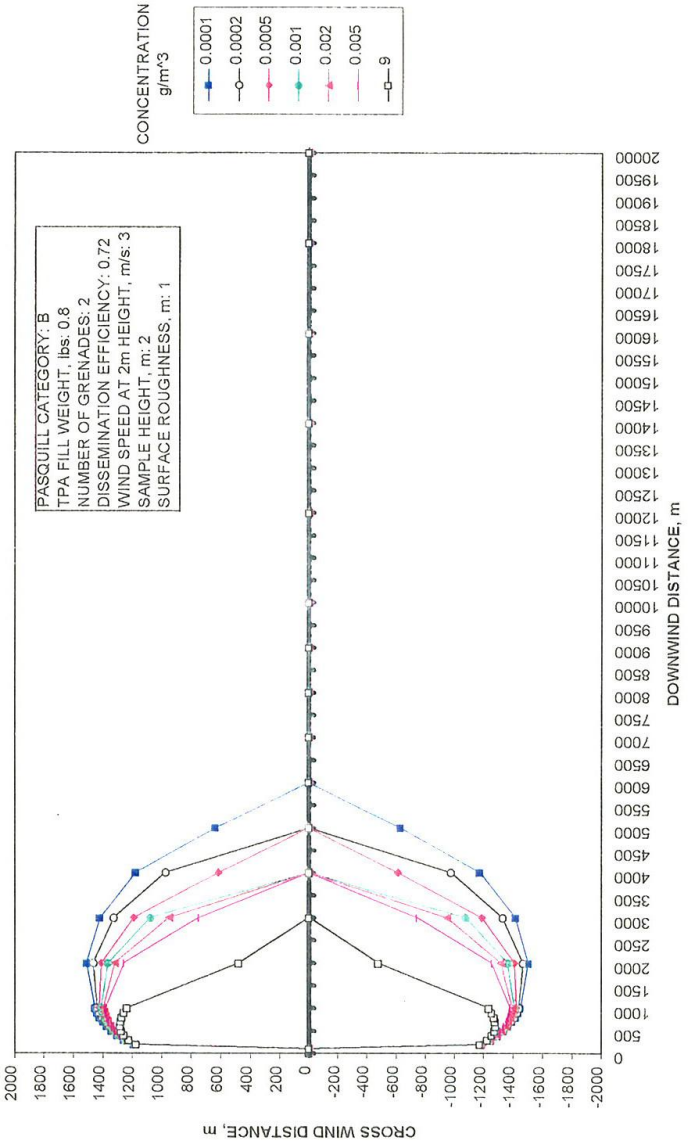


FIGURE 31. Concentration of terephthalic acid from smoke grenades (Pasquill B) at varying distances from smoke grenade training locations.

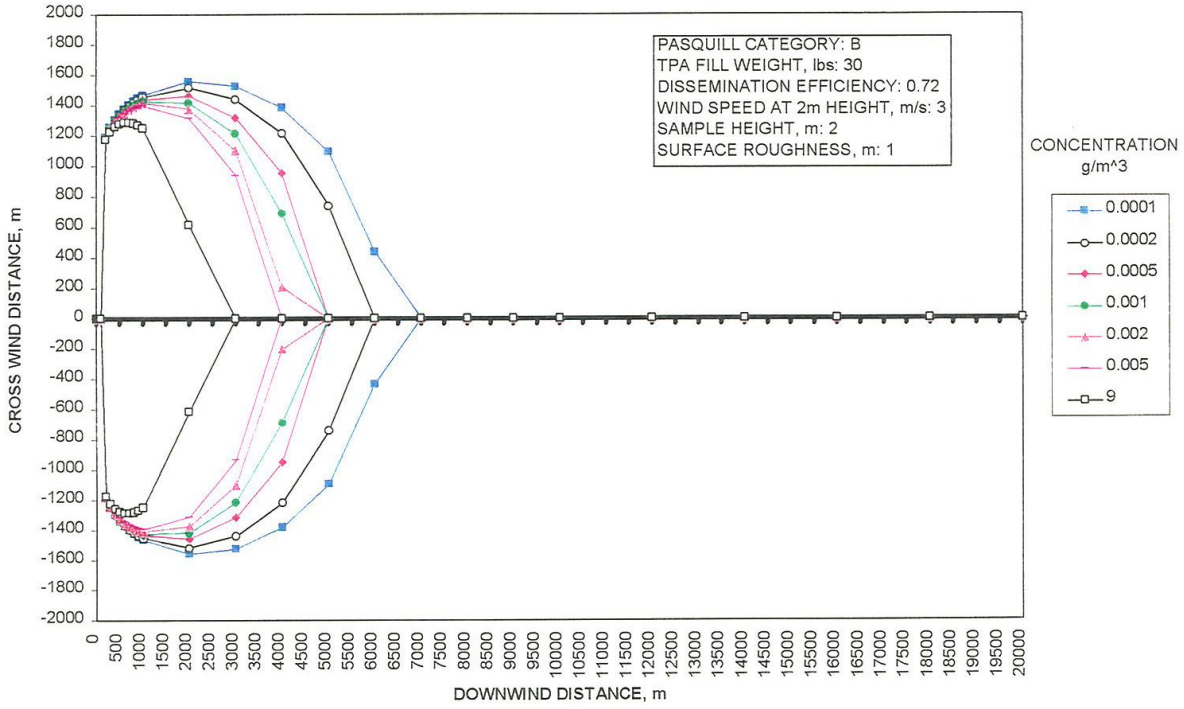


FIGURE 32. Concentration of terephthalic acid from smoke pots (Pasquill B) at varying distances from smoke pot training locations.

Appendix G. Concentration of Fog Oil at Varying Distances (3D/International, Inc. 1997).

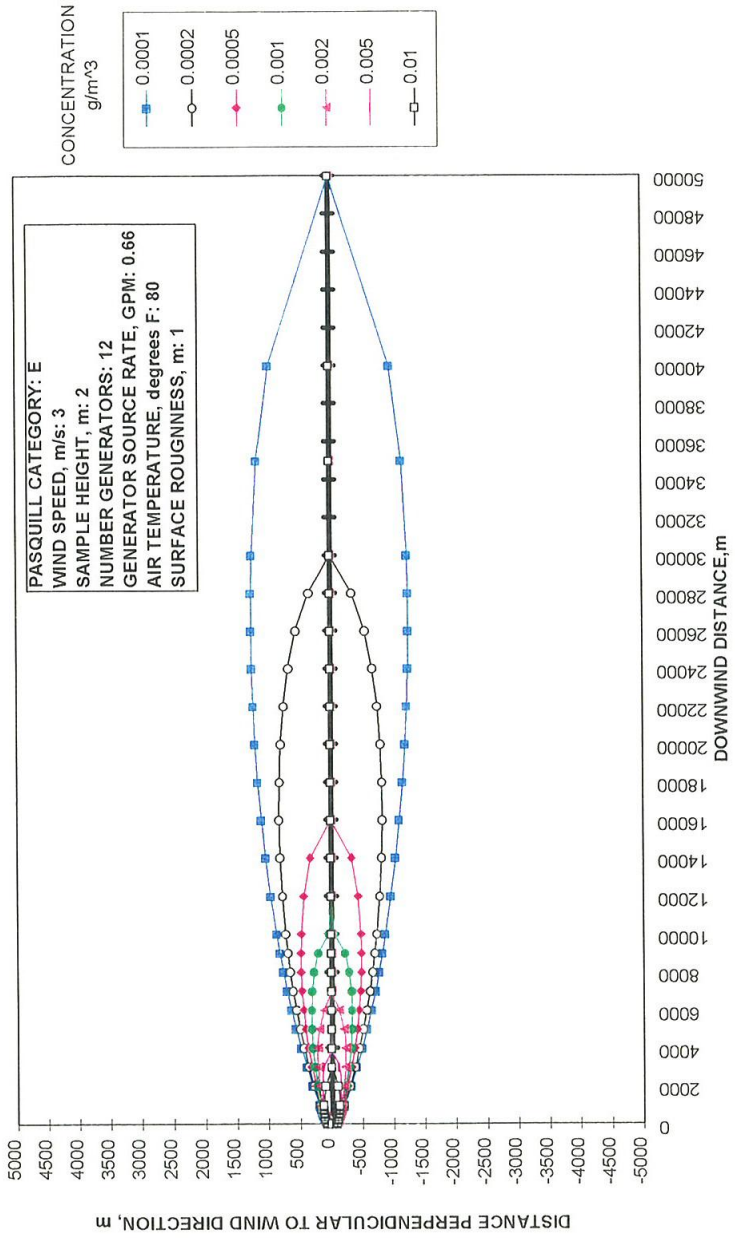


FIGURE 21. Concentration of fog oil smoke (Pasquill E) at varying distances from the mobile training areas.

U.S. ARMY ENGINEER CENTER AND FORT LEONARD WOOD
BIOLOGICAL ASSESSMENT - BRAC 1995

APPENDIX
EFFECT OF SELECTED CHEMICALS ON INDIANA BATS, GRAY BATS, AND BALD EAGLES AT FORT LEONARD WOOD, MISSOURI

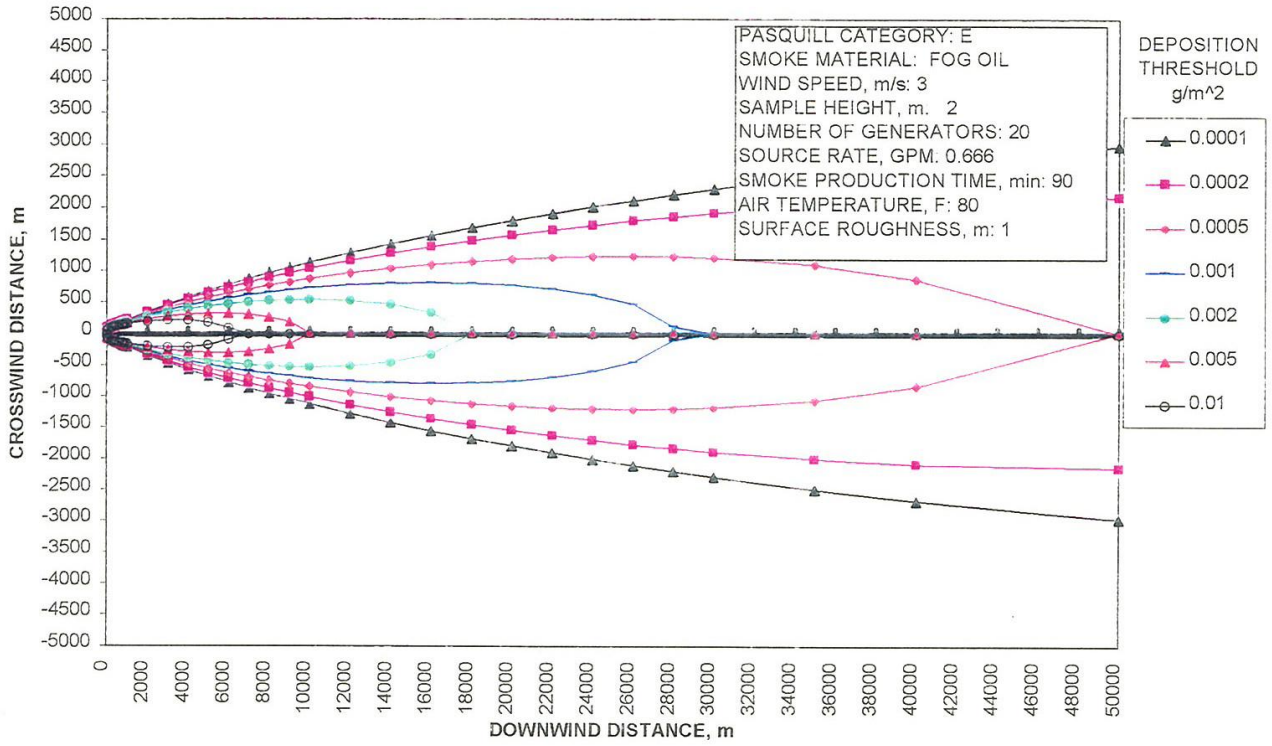


FIGURE 22. Deposition of fog oil smoke (Pasquill E) at varying distances from the static training area.

Appendix H. Proposed List of Herbicides for Use on Fort Drum.

Pesticide Trade Name/ Active Ingredient/ EPA #	% Active Ingredient(s)	Form	Target Pest(s)	Location to be Applied	Time of Year Applied	Manner of Application
Dicamba (Dimethylamine) EPA#64014-12	13.30%	Solution	Trees	Ranges	Summer/ Spring	canister/ hand wand
Rodeo (Glyphosate) EPA#524-343	53.80%	Solution	General Vegetation	Installation Wide	Summer/ Spring	Vehicle boom/wandsprayer/ Aerial
Quick Pro (Glyphosate Diquat) EPA#524-535	73.3%, 2.9%	Wettable Powder	General Vegetation	Installation Wide	Summer/ Spring	Vehicle boom/wand sprayer
Oust XP (Sulfametron) EPA#352-401	75.00%	Granular	General Vegetation	Installation Wide	Summer/ Spring	Vehicle boom/wand sprayer/ Aerial
Escort XP (Metasulfron) EPA#352-439	60.00%	Granular	General Vegetation	Installation Wide	Summer/ Spring	Vehicle boom/wandsprayer/ Aerial
Roundup Pro (Glyphosate) EPA#524-475	41.00%	Solution	General Vegetation	Installation Wide	Summer/ Spring	Vehicle boom/wandsprayer/ Aerial
Accord (Glyphosate) EPA#62719-324	53.80%	Solution	General Vegetation	Installation Wide	Summer/ Spring	Vehicle boom/wand sprayer/ Aerial
Garlon 4 (Triclopyr) EPA#62719-40	61.10%	Solution	General Vegetation	Installation Wide	Summer/ Spring	Vehicle boom/wand sprayer
Tordon 101 (Picloram 2,4-D) EPA#62719-5	10.2%, 39.6%	Solution	Trees	Installation Wide	Summer/ Spring	Hand (Hatchet Injection)
Pathway (Picloram 2,4-D) EPA#62719-31	5.4%, 20.9%	Solution	Trees	Installation Wide	Summer/ Spring	Hand (Hatchet Injection)
Pathfinder II (Triclopyr) EPA#62719-176	13.60%	Solution	Trees	Installation Wide	Summer/ Spring	Hand (Hatchet Injection)

Appendix I. Proposed List of Insecticides for Use on Fort Drum.

Pesticide Trade Name / Active Ingredient / EPA Registration #	Form	Target Pest(s)	Location to be Applied	Time of Year Applied	Manner of Application	PAI for 3 Years w/ buffer	Effect to Indiana Bats (y or n)
Thuricide (BTK 15.0%) EPA #4-226	Solution	Tent Caterpillar	In Woodlands or in Ornamental Trees	Summer/ Spring	Hand	9.30E-02	y
Summit Bactimos (BTI 10%) EPA #6218-47	Pellet	Mosquitoes	Mainly Cantonment Area, but sometimes Training Areas	Summer/ Spring	hand	9.30E-02	y
Altosid XR (Methoprene 2.1%) EPA #2724-421-64833	Briquette	Mosquitoes	Mainly Cantonment Area, but sometimes Training Areas	Summer/ Spring	hand	1.32E+00	y
Merit 0.5 G (Imidacloprid 0.5%) EPA # 3125-451	Granular	Grubs	Maintained grassy areas	Summer/ Spring	hand/tractor speader	1.19E-06	n
Maxforce FC Ant Bait Station (Fipronyl 0.01%) EPA # 64248-10	Bait	Ants	In and around buildings	Year round	hand	1.19E-06	n
Advion Ant Bait Arena (Indoxocarb 0.10%) EPA #352-664	Bait	Ants	In and around buildings	Year round	hand	1.19E-06	n
Advance Dual Choice (Perfluorooctan 0.01%) EPA #499-459	Bait	Ants	In and around buildings	Year round	hand	4.71E-03	n
Talstar PL G Bait (Bifenthrin 0.20%) EPA #279-3168	Granular	Ants	In and around buildings	Summer/ Spring	hand	7.32E-03	n
Advion Ant Bait Gel (Indoxocarb 0.05%) EPA #352-746	Bait	Ants	In buildings	Year round	hand	1.25E-01	n
388b Advance Bait Gel (Borax 5.40%) EPA #499-492	Bait	Ants	RCI Housing	Year round	hand	1.25E-01	n
Maxforce Carpenter Ant Gel (Fipronyl 0.01%) EPA #64249-21	Bait	Ants	In buildings	Year round	hand	4.39E-05	n
Pro Control Fogger (Pyrethrins 0.54%) EPA #499-465	Aerosol	Fleas	In buildings	Year round	hand	5.93E-01	n
Prozap Insect Guard (Dimethyl phosphate 18.0%) EPA #5481-338-36208	Microencapsulate	Flies	In buildings	Summer/ Spring	hand	unlimited	n
Tempo 20 WP (Cyfluthrin 20.0%) EPA #3125-377	Powder	General Insect	In buildings, on ranges, in recreation areas	Summer/ Spring	canister/ hand wand	5.03E-03	n

PT 565 PLO XLO (Pipronyl Butoxide 1.0%) EPA #499-310	Aerosol	General Insect	In buildings	Year round	hand	8.44E-03	n
Cy-Kick CS (Cyfluthrin 6.00%) EPA #499-304	Solution	General Insect	RCI Housing	Year round	canister/ hand wand	9.30	n
Ultracide (Pyrethrins 0.05%) EPA #499-404	Aerosol	General Insects	RCI Housing	Year round	hand	6.52E-02	n
CB D-Force HPX (Deltamethrin 0.06%) EPA #9444-217	Aerosol	General Insects	RCI Housing	Summer/ Spring	hand	1.33E	n
CB-80 (Pyrethrins 0.50%) EPA #9444-175	Aerosol	General Insects	RCI Housing	Year round	hand	1.33	n
Deet (Diethyl-meta-toluamide 34.34%) EPA #58007-1	Lotion	Mosquitoes	Body	Summer/ Spring	hand	unlimited	n
IDA Kits (Permethrin 0.40%) EPA #63120-3	Aerosol	Mosquitoes & Ticks	Clothing	Summer/ Spring	hand	unlimited	n
Maxforce Roach Gel Bait (Hydramethylnon 2.15%) EPA #64248-5	Bait	Roaches	In and around buildings	Year round	hand	3.16E-03	n
Advion Cockroach Gel Bait (Indoxocarb 0.60%) EPA #352-652	Bait	Roaches	In and around buildings	Year round	hand	3.16E-03	n
Delta Dust (Deltamethrin 0.05%) EPA #431-772	Dust	Wasps & hornets	Around buildings	Summer/ Spring	pressurized canister/ hand wand	5lb/year	n
Drion Dust (Pironyl Butoxide 40.0%) EPA #4816-353	Dust	Wasps & hornets	Around buildings	Summer/ Spring	pressurized canister/ hand wand	5lb/year	n
PT Perma Dust (Boric Acid 35.5%) EPA #499-384	Aerosol	Wasps & hornets	Around buildings	Summer/ Spring	hand	4.79E-02	n
PT Whitmire 515 Wasp Freeze (d-trans Allethrin 0.129%) EPA #499-362	Aerosol	Wasps & hornets	Around buildings	Summer/ Spring	hand	1.45	n

Appendix J. Conservation Measures and Beneficial Activities 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 1 and 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 – September 30) and east of the CSX railroad line will be monitored for Indiana bats, which will help Fort Drum identify potential Indiana bat areas for future consultations..

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, 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 minimze light pollution by angling lights downward or via

other light minimization measures. In addition, structures surrounding the BCA will be retrofitted to reduce lighting impacts in this known area of Indiana bat use. 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. During demolition of buildings, if bats of any species are discovered, all work must cease and Fort Drum's Fish and Wildlife Management Program must be immediately contacted. 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. Refer to Section 2.7 for description of bat management. 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 Fort Drum's Fish and Wildlife Management Program will contact USFWS to discuss the most appropriate measures that need to be taken to protect the Indiana bats.

8. 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.

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. 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.

5. 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. In the Training Area, smoke and obscurants must be used >100 m from known Indiana bat maternity roost areas (including roosts identified in the future) between April 16 – September 30; and the use of smoke and obscurants must be rotated among training areas to minimize impacts to any one area. The 100 m buffer serves to minimize the effects of smoke and obscurants by providing distance between the roost and the densest amount of smoke/obscurants. Training missions will be aware of maternity roost trees via the REC process and will be directed to avoid these areas (Appendix C). By minimizing the concentration of smoke around maternity roosts, it will reduce the risk of Indiana bats (including pups) from abandoning roosts. The rotation of smoke/obscurants between areas reduces impacts to any one area, thus minimizes the Indiana bats' risk to chronic exposure.

   No 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*. The one exception is the use of colored smoke at three mobile MOUTs within the LTAs (1 mobile MOUT is in an open area of the BCA and 1 is in an open area near the BCA). Only infrequent use of colored smoke is expected to be used in around the mobile MOUTs. With the exception of the 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 in accordance with *Fort Drum Regulation 350-6 Assignment and Operational Use of Local Training Areas*, vehicular traffic is restricted to open grassy areas within easy access of the road. 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 in accordance with *Fort Drum Regulation 350-6 Assignment and Operational Use of Local Training Areas*, POL operations are prohibited which minimizes the risk of accidental water/ground contamination.

5. Fort Drum will abide by the Fort Drum Integrated Wildland Fire Management Plan (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.

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. 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 1 and 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 east of the CSX railroad which may be harvested between August 15-September 30. 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 its associated non-volant young will be protected from this disturbance.

5. For timber harvests that may occur in August and September, 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.

6. 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).

7. No cutting of trees will occur within or along the bed or bank of streams protected under Article 15 of the NYS Environmental Conservation Law unless required to meet specific management goals and only after obtaining a permit from NYSDEC.

8. 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).

9. 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 1 and 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 – September 30, 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.

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 1 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 1 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 5 mi (8 km) per hour. 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.

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 (i.e. Accord, Roundup, etc.), 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.

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. One large bat structure has been successfully installed and utilized near LeRay Mansion. Bat houses may be erected nearby to provide alternate roosting opportunities for excluded 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.

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.