

APPENDIX C
BIOLOGICAL ASSESSMENT

**Biological Assessment for
Threatened and Endangered Species
Under Section 7 of the Endangered Species Act
for the U. S. Department of Energy
Conveyance of Parcel ED-6
to the City of Oak Ridge, Tennessee**



May 2007

**U.S. Department of Energy
Oak Ridge Office
Oak Ridge, Tennessee**

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ACRONYMS

BA	biological assessment
BHE	BHE Environmental, Inc.
dbh	diameter at breast height
DOE	U. S. Department of Energy
EA	Environmental Assessment
EFPC	East Fork Poplar Creek
HSI	Habitat Suitability Index
KBWG	Kentucky Bat Working Group
ORR	Oak Ridge Reservation
ROW	right-of-way
TVA	Tennessee Valley Authority
USFWS	U. S. Fish and Wildlife Service

**BIOLOGICAL ASSESSMENT FOR
THREATENED AND ENDANGERED SPECIES
UNDER SECTION 7 OF THE ENDANGERED SPECIES ACT
FOR THE U. S. DEPARTMENT OF ENERGY
CONVEYANCE OF PARCEL ED-6
TO THE CITY OF OAK RIDGE, TENNESSEE**

1. SUMMARY

This biological assessment (BA) assesses the potential for adverse effects on two federally listed animal species that could result from the conveyance of Parcel ED-6 by the U. S. Department of Energy (DOE) to the city of Oak Ridge. Parcel ED-6 consists of approximately 336 acres located on the eastern end of the Oak Ridge Reservation (ORR) (Fig. 1) within the city limits of Oak Ridge. The species discussed in this BA are those mentioned in a letter from the U. S. Fish and Wildlife Service (USFWS) to DOE, dated January 19, 2001, regarding the preparation of an Environmental Assessment (EA) for the proposed conveyance (USFWS 2005). USFWS determined that the gray bat (*Myotis grisescens*) and the Indiana bat (*Myotis sodalis*) might occur on or near the Parcel ED-6 property. Both species are federally listed as endangered.

Between July 29 and August 1, 2005, BHE Environmental, Inc. (BHE), completed a mist net survey to investigate the presence of the Indiana bat and/or gray bat in Parcel ED-6 (BHE 2005). BHE surveyed three sites with mist nets and qualitatively assessed habitat suitability for summering Indiana bats. Methods of the mist net survey followed recommendations of the Indiana Bat Recovery Team (USFWS 1999a) and guidance from the USFWS Tennessee Field Office. The timing of the survey, level of effort, and survey conditions were appropriate for investigating presence of the Indiana bat during the maternity season. The qualitative habitat assessment was conducted using principles of the Habitat Suitability Index (HSI) Model for Indiana Bat Summer Habitat (Rommé et al. 1995).

No Indiana bats or gray bats were captured during the survey. Sixty-seven bats of three species were captured in the proposed project area: the big brown bat (*Eptesicus fuscus*), red bat (*Lasiurus borealis*), and eastern pipistrelle (*Pipistrellus subflavus*). None of the three species captured is federally or state listed as endangered or threatened, and they are afforded no legal protection beyond measures that protect common species of wildlife.

Results of the habitat assessment indicated none of Parcel ED-6 provides high-quality summer habitat for Indiana bats. Approximately 61 acres provide moderate-quality summer habitat, and 278 acres provide low-quality summer habitat for Indiana bats. Approximately 16 acres do not provide suitable summer habitat for Indiana bats. Note: At the time BHE conducted the habitat assessment, the acreage of Parcel ED-6 was about 360 acres. Subsequent to their initial work, the proposed western boundary of the parcel was changed, which resulted in the parcel now being about 336 acres.

Based on the review of the 2005 mist net survey and habitat assessment, DOE and USFWS agreed to conduct another mist net survey at three additional sites within Parcel ED-6. This additional mist net survey was conducted by BHE during July 11–16, 2006 (BHE 2006). Mist net locations were selected following an on-site meeting with representatives from USFWS and DOE in April 2006, and subsequent guidance from USFWS. Eight bats were captured during the survey. All of the captures were at one site and no bats were captured at the other two sites. Two species were identified during the survey: big brown bats and red bats.

DOE concludes, based on the results of the mist net surveys and the information presented in this BA, that the proposed transfer of Parcel ED-6 to the city of Oak Ridge is not likely to adversely affect either of the listed species. Neither species appears likely to be present on Parcel ED-6, and proposed or designated critical habitats for the species are not present on or near the parcel. No caves, other suitable hibernacula, or roosting habitat for gray bats is present at Parcel ED-6. However, caves that could provide potential roosting habitat for the gray bat are present within 5 miles of the property. Although the ultimate use of Parcel ED-6 would eventually require removal of trees, the majority of the potential summer habitat on the parcel is considered low to moderate quality for Indiana bats. Also, there is better quality summer habitat and adequate numbers of suitable and potentially suitable roost trees available immediately adjacent to Parcel ED-6 in the Blackoak Ridge Conservation Easement area. Surface water resources on the parcel are limited to intermittent streams, but East Fork Poplar Creek (EFPC) provides a permanent source of water within 100 ft of Parcel ED-6.

2. DESCRIPTION OF THE PROPOSED ACTION

DOE proposes to convey Parcel ED-6 to the city of Oak Ridge for the development of new housing. Parcel ED-6 is being transferred because DOE has determined that the property is excess (i.e., property is not needed to fulfill DOE current or foreseeable future requirements). The need for DOE action is the result of a request from the city of Oak Ridge to transfer Parcel ED-6 under 10 *Code of Federal Regulations* Part 770. This regulation, entitled *Transfer of Real Property at Defense Nuclear Facilities for Economic Development*, allows DOE to transfer real property to local communities for economic development purposes.

For the purposes of analysis, it is assumed that after the transfer, the city of Oak Ridge would sell the property to a private developer. City staff would review the residential development plans to ensure compliance with all applicable zoning ordinance requirements and other engineering-related ordinances and standards. For bounding purposes, it is also assumed that the new residential development would be primarily concentrated on the portion of the parcel that is located west of Wisconsin Avenue and north of East Quarry Road. Constraints on developing the other portions of the parcel include the Tennessee Valley Authority (TVA) power line and right-of-way (ROW), steep topography (i.e., slopes >10%), and the North Boundary Greenway trail. Thus, some areas of the parcel are more conducive to development than others.

3. STATUS AND BIOLOGY OF THE LISTED SPECIES

The general ecology of the gray bat and Indiana bat is summarized below. Unless otherwise noted, general biological information on the species is derived from the published literature, reports, and Internet resources listed under each species heading.

3.1 GRAY BAT

3.1.1 Status

Gray bats were listed by the federal government as endangered on April 28, 1976. The total gray bat population across the species range has declined drastically since the early 1960s. Because gray bat colonies roost only in caves and cave-like habitats, the decline of the species is attributed chiefly to

human disturbance and vandalism. Suspected contributing factors include contamination by pesticides, chemical pollution or siltation of waterways over which gray bats forage, and loss of foraging habitat.

A recovery plan for gray bats was developed in 1982 (USFWS 1982). The primary objective of the recovery plan is to move the gray bat from endangered to threatened status. In summary, objectives of the Gray Bat Recovery Plan include: (1) prevent disturbance to important roost habitat; (2) maintain, protect, and restore foraging habitat; and (3) monitor population trends.

3.1.2 Biology

Unless otherwise noted or referenced, the following general biological information on the gray bat is derived from USFWS (1991), Harvey (1992), and Kentucky Bat Working Group (KBWG) (2000). The core range of the endangered gray bat encompasses the cave regions of Alabama, northern Arkansas, Kentucky, Missouri, and Tennessee, but a few occur in northwestern Florida, western Georgia, southwestern Kansas, southern Indiana, southern and southwestern Illinois, northeastern Oklahoma, northeastern Mississippi, western Virginia, and possibly western North Carolina. Gray bats are restricted to caves or cave-like habitats, and few caves meet their specific roost requirements. These restrictions result in about 95% of the population's hibernating in only eight or nine caves. For hibernation, the roost site must have an average temperature of 5.6°C to 11.1°C (42°F to 52°F). Most of the caves used by gray bats for hibernation have deep vertical passages with large rooms that function as cold air traps. Summer caves must be warm, between 13.9°C and 25.0°C (57°F and 77°F), or have small rooms or domes that can trap the body heat of roosting bats. Summer caves are normally located close to rivers or lakes where the bats feed. Gray bats have been known to fly 12 miles or more from their colony to feed.

Gray bats roost, breed, rear young, and hibernate in caves year round. They migrate between summer and winter caves and will use transient or stopover caves along the way. One-way migrating distance between winter and summer caves may vary from as little as 16.09 km (10 miles) to well over 321.8 km (200 miles). Mating occurs as bats return to winter caves in September and October. By November, most gray bats are hibernating. Adult females begin to emerge in late March, followed by juveniles and adult males. Females store sperm over the winter and become pregnant the following spring. A few hundred to many thousands of pregnant females congregate to form maternity colonies. Males and nonreproductive females gather in smaller groups to form what are known as bachelor colonies. A single pup is born in late May or early June. The young begin to fly 20 to 25 days after birth. Gray bats feed primarily on flying insects over lakes, rivers, and streams. Aquatic insects, particularly mayflies, make up most of their diet.

Information about the occurrence of gray bats on the ORR is limited. In November 1994, a single dead gray bat was found in a display cabinet in Building 9204-3 at the Y-12 National Security Complex. The bat was probably an isolated individual juvenile that became lost, disoriented, and trapped. Mist netting for bats was conducted on the lower EFPC and its tributaries in May 1992 and again in May through June 1997 (DOE 1997). The 1997 survey included portions of lower Bear Creek near its confluence with lower EFPC. The creeks in this area provided good gray bat foraging habitat at the time of the surveys. No gray bats were recorded among the six species captured. More recent acoustic surveys between 2002 and 2004 have found gray bats at Melton Hill Lake and the K-1007-P1 Holding Pond near East Tennessee Technology Park (Harvey 2005). More than 20 caves have been identified on the ORR. Mitchell et al. (1996) surveyed seven of the caves (Copper Ridge, Flashlight Heaven, Walker Branch, Big Turtle, Little Turtle, Pinnacle, and Bull Bluff) but found no gray bats. There was an unverified report of ten gray bats roosting in Little Turtle Cave in September 1996. These bats were observed roosting and were not further disturbed; therefore, a definite, in-the-hand identification was not made (Webb 1996). Examination of photographs taken of the roosting bats indicate that they appeared to be *Myotis* and more than likely were gray bats, but the species could not be positively determined (Major 2000 and Henry 2000).

None of the caves on the ORR has been completely and systematically surveyed for bats, except for the limited surveys reported in Mitchell et al. (1996) and the 1996 report of *Myotis* roosting in Little Turtle Cave. The caves within the vicinity of the project area may not provide adequate hibernacula for gray bats, but they could provide transient or stopover roosting habitat for migrating gray bats. Suitable foraging habitat for gray bats within the vicinity of Parcel ED-6 includes EFPC.

Because no caves are present within Parcel ED-6, none would be disturbed as a result of the transfer. Development of the parcel would also not directly impact any potential foraging habitat that exists in the vicinity or indirectly affect aquatic insect fauna on which the gray bats would prey. Thus, the proposed transfer is unlikely to adversely affect the gray bat or its habitat.

3.2 INDIANA BAT

3.2.1 Status

Indiana bats were listed by the federal government as endangered on March 11, 1967. Populations across the species range (as recorded from counts in hibernacula) have declined since the late 1950s. A principal cause of decline is destruction of hibernacula from collapse, flooding, or vandalism by humans. Suspected contributing factors include loss of suitable summer habitat and contamination by pesticides (USFWS 1999a).

A recovery plan for Indiana bats was developed in 1983 (USFWS 1983). An Agency Draft Revised Recovery Plan was distributed by USFWS in 1999. In summary, objectives of the Indiana Bat Recovery Plan include: (1) protect hibernacula; (2) maintain, protect, and restore summer maternity habitat; (3) monitor population trends through winter censusing; (4) educate the public; and (5) continue research.

3.2.2 Biology

Unless otherwise noted or referenced, the following general biological information on the Indiana bat is derived from USFWS (1991, 1999a, 1999b, 2000), Harvey (1992), and KBWG (1997, 2000). The Indiana bat is a migratory species found throughout much of the eastern half of the United States from Oklahoma, Iowa, and Wisconsin east to Vermont and south to northwestern Florida. For hibernation, Indiana bats prefer limestone caves with stable temperatures of 3.3 to 6.1°C (38 to 43°F) and high relative humidity. As with the gray bat, few caves meet the specific roost requirements of the species. Subsequently, more than 85% of the population hibernates in only nine sites. However, Indiana bats have been found hibernating in a few abandoned mines, a tunnel, and a hydroelectric dam. The bats hibernate from October to April, depending on climatic conditions. Density in tightly packed clusters is usually estimated at 3228 bats per square meter (300 bats per square foot), although as many as 5165 bats per square meter (480 per square foot) have been reported.

Female Indiana bats depart hibernation caves before males and arrive at summer maternity roosts in mid-May. A single offspring is born between late June and early July. The young bats can fly within a month of birth. Early researchers considered floodplain and riparian forest to be the primary roosting and foraging habitats used during the summer by the Indiana bat, and these forest types unquestionably are important. More recently, upland forest has been shown to be used by Indiana bats for roosting. Within the range of the species, the existence of Indiana bats in a particular area may be governed by the availability of natural roost structures, primarily standing dead trees with loose bark. The suitability of any tree as a roost site is determined by (1) its condition (dead or alive), (2) the quantity of loose bark, (3) the tree's solar exposure and location in relation to other trees, and (4) the tree's spatial relationship to water sources and foraging areas. The most important characteristic of roost trees is probably not species but

structure (i.e., exfoliating bark with space for bats to roost between the bark and the bole of the tree). To a limited extent, tree cavities and crevices are also used for roosting. Maternity colonies use multiple primary roost trees, which are used by a majority of the bats most of the summer, and a number of “secondary” roosts, which are used intermittently and by fewer bats, especially during periods of precipitation or extreme temperatures. The summer roost of adult males is often near maternity roosts, but where most spend the day is unknown. Others remain near the hibernaculum, and a few males are found in other caves during summer. Researchers have found that primary roosts are generally in openings or at the edge of forest stands, while alternate roosts can be either in the open or in the interior of the forest stands. Indiana bats use roosts in the spring and fall similar to those selected during the summer. During the fall, when Indiana bats swarm and mate at their hibernacula, male bats roost in trees nearby during the day and fly to the cave during the night.

Indiana bats forage in and around the tree canopy of floodplain, riparian, and upland forest. In riparian areas, Indiana bats forage primarily around and near riparian and floodplain trees (e.g., sycamore, cottonwood, black walnut, black willow, and oaks) and solitary trees and forest edge on the floodplain. Streams, associated floodplain forests, and impounded bodies of water (e.g., ponds, wetlands, and reservoirs) are preferred foraging habitat for pregnant and lactating Indiana bats, some of which may fly up to 1.5 miles from upland roosts. Indiana bats also forage within the canopy of upland forests, over clearings with early successional vegetation (e.g., old fields), along the borders of croplands, along wooded fencerows, and over farm ponds in pastures. Indiana bats return nightly to their foraging areas. Indiana bats feed strictly on flying insects, and their selection of prey items reflects the environment in which they forage. Both aquatic and terrestrial insects are consumed. Moths, caddisflies, flies, mosquitoes, and midges are major prey items. Other prey includes bees, wasps, flying ants, beetles, leafhoppers, and treehoppers. During September, the bats depart for hibernation caves.

Information about the occurrence of Indiana bats on the ORR is limited. Mist netting for bats was conducted on lower EFPC and its tributaries in May 1992 and again in May through June 1997 (DOE 1997). The 1997 survey included portions of lower Bear Creek near its confluence with lower EFPC. The creeks in this area provided Indiana bat summer roosting and foraging habitat at the time of the surveys. No Indiana bats were recorded among the six species captured. More recent acoustic surveys between 2002 and 2004 did not find Indiana bats in the area (Melton Hill Lake or the K-1007-P1 Holding Pond near the East Tennessee Technology Park) (Harvey 2005).

In Tennessee, the nearest hibernating population of Indiana bats exists in White Oak Blowhole Cave, located in Blount County in the western end of the Great Smoky Mountains National Park. This cave has been designated as critical habitat for this species. A few Indiana bats also hibernate in Bull Cave, also located in Blount County. No maternity roosts have been located on the ORR or as yet in Tennessee. However, in July 1999, a small colony of Indiana bats was discovered roosting in a dead hemlock tree on the Cheoah Ranger District of the Nantahala National Forest in Graham County, North Carolina. This discovery represents the first record of a reproductive female Indiana bat being found south of Kentucky. Recent collections of individual Indiana bats have also been recorded from the Cherokee National Forest near Tellico Lake in Monroe County, Tennessee. These reports indicate that summer colonies of the species may be present in east Tennessee. The habitat from which these individuals were collected is similar to suitable habitat found on the ORR.

4. ECOLOGICAL DESCRIPTION OF THE SITE

The majority of the parcel is undeveloped and serves multiple uses that include utility easement, limited security and facility buffer, wildlife management, forestry, and environmental monitoring. The

parcel is currently zoned as Federal Industry and Research. Development on the property includes a TVA power line and ROW, three roads (Wisconsin Avenue, North Boundary Patrol Road, and East Quarry Road), a water pump station, and water tank. The North Boundary Patrol Road also serves as the North Boundary Greenway Trail through a license DOE granted to the city in 1999. Wisconsin Avenue is maintained by the city and provides access to the residential development located along Whippoorwill Drive. Land uses immediately adjacent to Parcel ED-6 are varied. Residential developments are located to the north and east of the parcel. The area to the west of the parcel is part of the Blackoak Ridge Conservation Easement. Although not immediately adjacent to Parcel ED-6, the Horizon Center Industrial Park is located west of the parcel. Oak Ridge Turnpike (State Route 95) runs along the southern portion of the parcel. Land use further south of the highway is primarily agricultural, with some limited residential development.

Vegetation on Parcel ED-6 includes mixed hardwood, mixed hardwood/pine, mixed hardwood/cedar, pine, kudzu, prairie, and maintained lawn habitats.

Mixed hardwoods occur on the steeply sloping eastern and western portions of the parcel. This community is characterized by dominant mature trees consisting of white oak (*Quercus alba*), black oak (*Quercus velutina*), southern red oak (*Quercus falcate*), mockernut hickory (*Carya tormentosa*), yellow-poplar (*Liriodendron tulipifera*), sugar maple (*Acer saccharum*), and red maple (*Acer rubrum*), along with a variety of other trees and shrubs.

The mixed hardwood/pine habitat type also occurs on the steeper slopes within the center and eastern portions of the site. Dominant species of this plant community include a variety of mature oaks, hickories, and miscellaneous other hardwood species in association with shortleaf pine (*Pinus echinata*), Virginia pine (*Pinus virginiana*), and eastern white pine (*Pinus strobe*). This habitat type also includes areas of mixed-aged (mature and immature) scrub hardwood stands that have developed where the mature pines were impacted by the southern pine beetle.

Mixed hardwood/cedar habitat occupies most of the south side of the parcel on gently sloping to nearly level land of lower elevations. Dominant species of this plant community include mature chinquapin oak (*Quercus muehlenbergii*), black walnut (*Juglans nigra*), American elm (*Ulmus americana*), slippery elm (*Ulmus rubra*), boxelder (*Acer negundo*), green ash (*Fraxinus pennsylvatica*), and eastern red cedar (*Juniperus virginiana*).

The loblolly pine (*Pinus taeda*) habitat type is found in scattered areas throughout the site. In most cases, this type includes relatively homogenous stands of loblolly pine of varying age. This habitat type occurs in former mature pine plantations that were impacted by the southern pine beetle infestation in the 1990s and that have since regenerated back to pine via natural recruitment. In most cases, these are immature stands (10 to 15 years), but there are pockets of older trees that were not affected by the pine beetle.

A fairly large (approximately 3 acres) patch of kudzu vine (*Pueraria montana*) has developed in the southeast corner of the parcel in the TVA ROW and along the North Boundary Road Greenway. Additionally, there are a number of other exotic, invasive plants on the property. These plants occur throughout the parcel in all habitat types. Some of the primary species observed include autumn-olive (*Elaeagnus umbellate*), Chinese privet (*Ligustrum sinense*), English privet (*Ligustrum vulgare*), Japanese honeysuckle (*Lonicera japonica*), bush honeysuckle (*Lonicera maacaii*), and Nepal grass. In addition, several mimosa trees (*Albizia julibrissin*) are present along the gravel access road on the south side of the property.

The prairie community type is present within and adjacent to the TVA power line ROW that crosses the southern portion of the site. This habitat is typically maintained by prescribed burning, but it has developed in the TVA ROW because of periodical clearing to eliminate woody vegetation. Dominant species include big bluestem grass (*Andropogon gerardii*), broomsedge grass (*Andropogon virginicus*), and various other native warm-season grasses, along with scrubby immature hardwoods and shrubs (blackberries and sumac).

Maintained lawn occurs in areas that are frequently mowed. Dominant plants include Kentucky-31 fescue and various other lawn grasses, as well as herbaceous plants. This manmade landscape feature is present near the water tower on the ridge top and the utility building on the east side, as well as along the roadside ROWs.

Surface water features on Parcel ED-6 are limited. Storm water runoff from the parcel either infiltrates into the ground or drains to one of four intermittent streams, which eventually discharge into EFPC. These intermittent streams are dry for much of the year and typically have only ephemeral flow after precipitation events. Parcel ED-6 is located outside of the EFPC floodplain and the published Oak Ridge flood hazard zone boundaries. A walkover survey of Parcel ED-6, conducted by wetland scientists in October 2004, did not identify the presence of any wetlands on the property.

5. MIST NET SURVEYS AND HABITAT ASSESSMENT

5.1 MIST NET SURVEYS

BHE was retained to conduct two mist net surveys to identify the presence of summering Indiana bats and/or gray bats and to assess habitat suitability for the species within Parcel ED-6 (BHE 2005, 2006). The results of the mist net surveys and habitat suitability assessment are summarized below.

The level of survey effort for this project was established using survey guidelines developed by the Indiana Bat Recovery Team (USFWS 1999a). Potential areas for mist net placement were identified by BHE using a topographic map of the proposed project area and through coordination with the USFWS Tennessee Field Office. Actual locations of the sites were selected during field reconnaissance. To the extent practicable, mist net sites were distributed so as to sample forested habitat throughout the parcel (Fig. 2).

The initial mist net survey was conducted between July 29 and August 1, 2005. Mist net site selection was based upon extent of canopy cover and presence of an open flyway. Two net sets were erected at each site and spaced at least 100 ft apart. At each site, 2 net sets were each operated for 2 nights, resulting in a total of 12 net nights for the entire survey [2 nets × 2 nights × 3 sites = 12 net nights). A “net night” is defined as the operation of one set for one night. To the extent possible, nets were placed so as to be bordered on top and sides by vegetation to create a funneling effect to facilitate capture of bats. Mist nets were deployed at dusk and monitored every 15 to 20 min for at least 5 hr.

Sixty-seven bats of three species were captured during the survey (Table 1). No Indiana bats or gray bats were captured. The big brown bat (*Eptesicus fuscus*) was the species most commonly encountered, making up 75% of the total capture. The other two species were the red bat (*Lasiurus borealis*) and the eastern pipistrelle (*Pipistrellus subflavus*). Post-lactating adult females and juveniles of all three species were captured.

Table 1. 2005 Mist netting results from Parcel ED-6

Site No.	Date Surveyed (2005)	Big Brown Bat <i>Eptesicus fuscus</i>					Red Bat <i>Lasiurus borealis</i>			Eastern Pipistrelle <i>Pipistrellus subflavus</i>			Total
		PLF	NRF	M	J	E	PLF	NRF	J	PLF	J	E	
1	7/29, 7/30	3	1	2	4	1	1	1	3				16
2	7/29, 7/30	22		4	5	4			3		1	1	40
3	7/31, 8/1	1		1		2	2		2	1	2		11
Totals		50			12			5			67		

E = escape before age or gender determined.
 J = juvenile (either gender).
 M = adult male.
 NRF = non-reproductive adult female.
 PLF= post lactating adult female.

BHE conducted a second mist nest survey for Parcel ED-6 during July 11–16, 2006. This survey consisted of sampling three additional locations on the parcel. The three additional locations were selected based on USFWS recommendations and field reconnaissance. The level of effort was identical to the initial mist net survey.

Eight bats were captured during the 2006 survey (Table 2). No Indiana bats or gray bats were captured. All of the captured bats were from Site 4. Only big brown bats and red bats were captured and identified during the survey.

Table 2. 2006 Mist netting results from Parcel ED-6

Site No.	Date Surveyed (2005)	Big Brown Bat <i>Eptesicus fuscus</i>			Red Bat <i>Lasiurus borealis</i>		Total
		PLF	LF	J	LF	J	
4	7/11, 7/12	1	2	2	2	1	8
5	7/13, 7/14						
6	7/15, 7/16						
Totals		5			3		8

J = juvenile (either gender).
 LF = lactating adult female.
 PLF= post lactating adult female.

At the request of USFWS, BHE biologists also noted bat activity in the general vicinity of the net sites, as a qualitative indicator of potential bat activity on the parcel. Small numbers of bats were observed flying over the gravel road at Site 4. No bats were observed flying at or near Sites 5 or 6.

5.2 HABITAT ASSESSMENT

On July 29 through August 1, 2005, BHE conducted a pedestrian survey of Parcel ED-6. Experienced biologists qualitatively assessed suitability of habitat for summering Indiana bats. Habitat suitability was evaluated based upon estimates for the following components of summer habitat:

- percent overstory canopy cover,
- average diameter at breast height (dbh) of overstory canopy trees,
- average height to bottom of canopy,
- density of subcanopy vegetation,

- presence of potential roost trees,
- distance between the project site and a permanent water source, and
- percentage of forested land in the 74 acres surrounding the project area.

These parameters are some of the factors used in the summer HSI model, which was developed to quantify suitability of an area to support Indiana bats. In general, high-quality habitat occurs in relatively mature forest where overstory canopy cover is between 60 and 80%, subcanopy vegetation is relatively open, and potential roost trees are present. Estimates of the average diameter of canopy trees and height to the bottom of the canopy reflect the maturity of the trees. Dense vegetation in the subcanopy may impede the flight of foraging bats or obstruct access to roost sites. Habitat suitability is moderate or low when one or more parameters are suboptimal.

Potential Indiana bat roost trees include trees greater than 6 inches dbh. As defined by the HSI model, high-quality potential roost trees have greater than 25% exfoliating bark. Low- and moderate-quality potential roost trees have 0 to 10 and 11 to 25% exfoliating bark, respectively. Suitable summer habitat also includes availability of a permanent water source within 2.5 miles and forest covering at least 5% of the 74 acres surrounding the project area.

Landscape-scale characteristics of the parcel are suitable for summering Indiana bats. EFPC provides a permanent source of water within 100 ft of Parcel ED-6, and Watts Bar Lake is approximately 5 miles southwest of the parcel. Topographic maps indicate approximately 80% (60 acres) of the 74 acres surrounding the project area is forested.

None of Parcel ED-6 provides high-quality summer habitat for Indiana bats. BHE found moderate-quality summer habitat for Indiana bats in approximately 61 acres of Parcel ED-6 (Polygons 2 and 6). Moderate-quality habitat contains moderate- or high-quality potential roost trees and forest characteristics suitable for summering Indiana bats. Two areas provide relatively large oak and yellow poplar trees in the overstory, including several potential roost trees. Canopy cover is 85 to 90%, and density of understory vegetation varies from moderately dense to open.

Low-quality summer habitat occurs within 278 acres (78%) of the parcel. Areas that provide low-quality habitat are less likely to be used by roosting Indiana bats. Low-quality habitat contains no potential roost trees or contains several low-quality roost trees. Forest characteristics in low-quality habitat, including density of understory vegetation and average diameter of canopy trees, are generally suboptimal. Low-quality roost trees have less than 10% exfoliating bark. A single high-quality potential roost tree was identified in one area; however, that area provides low-quality roost habitat because the forest is primarily eastern red cedar and pines growing in dense stands. Understory vegetation in that area generally is dense, providing little space through which bats could fly.

6. POTENTIAL IMPACTS OF THE PROJECT ON LISTED SPECIES

Based on the information presented in this BA, DOE concludes that the proposed transfer of Parcel ED-6 to the city of Oak Ridge is not likely to adversely affect either of the listed species. Results of the mist net surveys did not confirm presence of the Indiana bat or gray bat in Parcel ED-6. Parcel ED-6 does not provide high-quality summer habitat for Indiana bats. Approximately 61 acres provide moderate-quality summer habitat, and 278 acres provide low-quality summer habitat for Indiana bats. No caves or other suitable hibernacula or roosting habitat for gray bats is present in Parcel ED-6.

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