

DRAFT ENVIRONMENTAL ASSESSMENT

SECTION 202 DICKENSON COUNTY NONSTRUCTURAL PROJECT
DICKENSON COUNTY PUBLIC SCHOOLS
CONSOLIDATED MIDDLE/HIGH SCHOOL COMPLEX
DICKENSON COUNTY, VIRGINIA

**APPENDIX O – BAT SURVEY STUDY PLAN, SUMMARY LETTER, AND SURVEY,
ENVIRONMENTAL SOLUTIONS & INNOVATIONS, INC., JUNE 2012**

U.S. ARMY CORPS OF ENGINEERS

HUNTINGTON DISTRICT

HUNTINGTON, WEST VIRGINIA

NOVEMBER 2012

STUDY PLAN:

MIST NET SURVEY FOR ENDANGERED BATS ON
DICKENSON COUNTY SCHOOLS CONSOLIDATED CAMPUS,
DICKENSON COUNTY, VIRGINIA

30 May 2012

Submitted to:

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and

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Prepared by:



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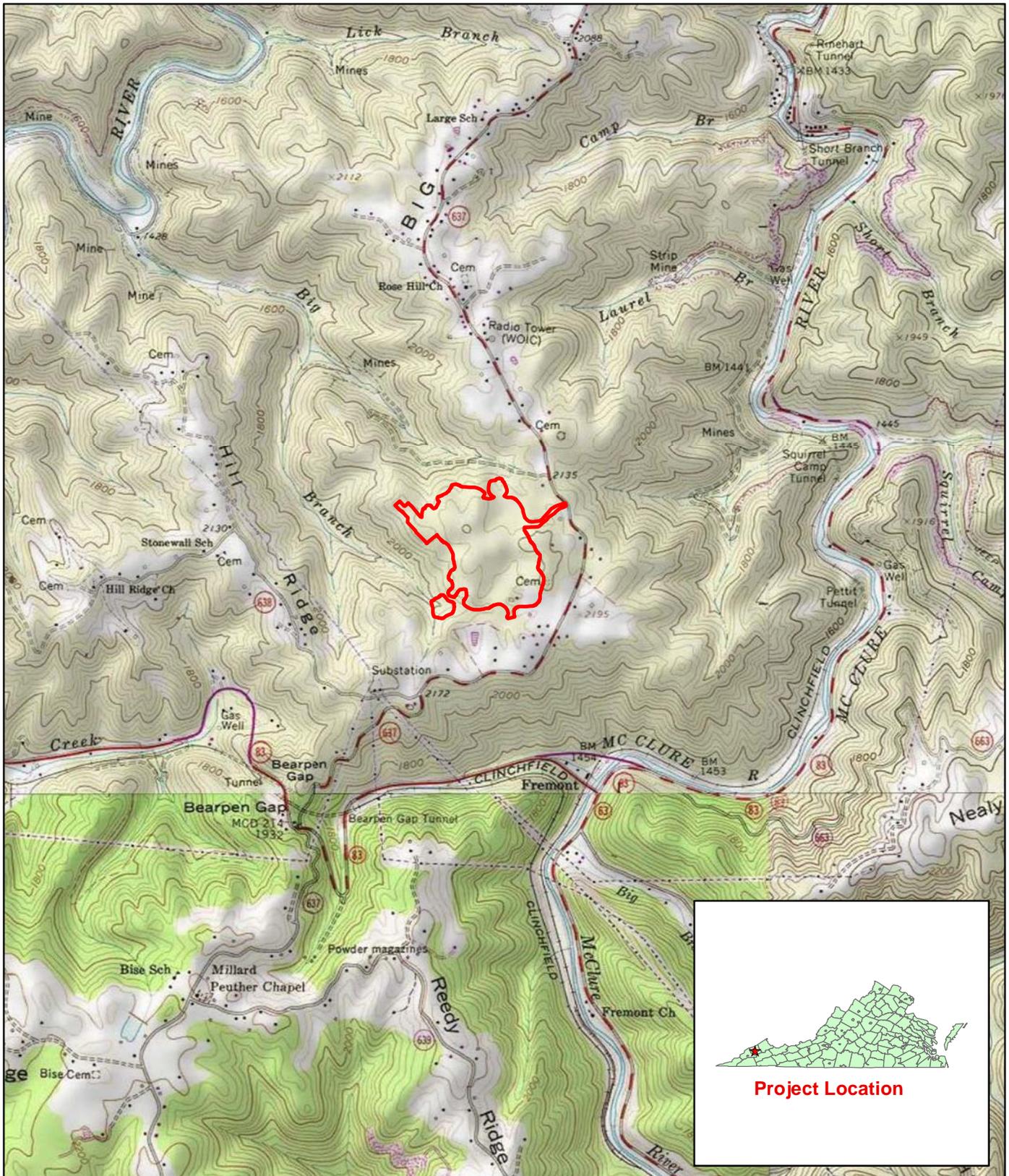


1.0 Introduction and Project Description

D. R. Allen & Associates, P.C. (D. R. Allen) proposes to construct the Dickenson County Schools Consolidated Campus (Project). The Project is in Dickenson County, Virginia along the southern portion of Big Ridge, locally known as Rose Ridge, and involves construction of a new consolidated high school campus with athletic fields and all necessary parking and support facilities, including an on-site waste water treatment plant. In addition, road improvements to State Route 637 will be completed along with the demolition of Ervington High School, Clinchco Elementary School, Sandlick Elementary School, and some attendant structures at Haysi High School.

Approximately 27.5 hectares (68 ac) are proposed to be disturbed by Project activities on the main campus site of which 24.3 hectares (60 ac) (88%) are forested. Of the forested vegetation that will be permanently removed, approximately 13.4 hectares (33 ac) (55%) have been previously impacted by logging, with the remaining 10.9 hectares (27 ac) (45%) consisting of mature second growth forest. The Project area is within the range of the federally-endangered Indiana bat (*Myotis sodalis*), gray bat (*Myotis grisescens*), and Virginia big-eared bat (*Corynorhinus townsendii virginianus*). Pursuant to Section 7(a)(2) and Section 9 of the Endangered Species Act, clearing of forested land has the ability to impact populations of these species. In accordance with the Act, specifically as it pertains to the removal of habitat potentially used by endangered bats, and on behalf Dickenson County, D. R. Allen & Associates (DRA) contracted Environmental Solutions & Innovations, Inc. (ESI) to perform summer mist netting to conduct endangered bat studies on the proposed Project. Studies will be carried out under ESI's U.S. Fish and Wildlife (USFWS) Federal Fish and Wildlife Permit (TE02373A-3) and Virginia Department of Game and Inland Fisheries (VDGIF) Threatened and Endangered Species Permit and Scientific Collection Permit (044926 and 044927).

Through submittal of this study plan, ESI is requesting concurrence and site-specific authorization from USFWS in order to conduct the proposed survey activities.



 Project Location

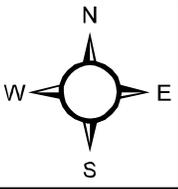


Figure 1. Location of Dickenson County Schools Consolidated Campus, Dickenson County, Virginia.

Project No. 393  0 500 1,000 Meters
Base Map: USGS 7.5-Minute Topographic Map

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2.0 Mist Netting

Efforts to survey for endangered bats are difficult to standardize because of the large amount of variability that exists at an individual survey site or between survey sites in the same Project area. However, a number of practices used for summer surveys for Indiana bats have provided structure for implementation of netting guidelines provided by the Indiana Bat Recovery Team in the 2007 Indiana Bat Draft Recovery Plan (First Revision) and Draft Survey Protocol (Table 1). As such, these guidelines will be followed for all mist netting on this Project.

Table 1. USFWS Indiana Bat Mist Net Survey Guidelines

| NETTING GUIDELINES | |
|---------------------------|--|
| 1. | Netting Season: 1 June (in VA) to 15 August, when Indiana bats occupy summer habitat. |
| 2. | Equipment (Mist Nets): constructed of the finest, lowest visibility mesh commercially available – monofilament or black nylon – with the mesh size approximately 1½ inch (1¼ –1¾) (38 mm). |
| 3. | Net Placement: mist nets extend approximately from water or ground level to tree canopy and are bounded by foliage on the sides. Net width and height are adjusted for the fullest coverage of the flight corridor at each site. A “typical” net set consists of three (or more) nets “stacked” on top of one another; width may vary up to 60 feet (20 m). |
| 4. | Net Site Spacing: <ul style="list-style-type: none">◆ Streams – one net site per 0.6 mile (1 km)◆ Land Tracts – two net sites per 246 acres (1 square km) |
| 5. | Minimum Level of Effort Per Net Site: <ul style="list-style-type: none">◆ Two net locations (sets) per net site, with locations (sets) at least 100 feet (30 m) apart◆ Two (calendar) nights of netting◆ At least four net–nights (1 net–night = 1 net set deployed for 1 night); typically, two net sets are deployed at one site for two nights, resulting in four net-nights◆ Sample Period: begin at dusk and net for 5 hours (approximately 0200h)◆ Nets are monitored at approximately 10-minute intervals◆ No disturbance near the nets between checks |
| 6. | Weather Conditions: net only if the following weather conditions are met: <ul style="list-style-type: none">◆ No precipitation◆ Temperature ≥ 10°C (50°F)◆ No strong winds |

Source: U.S. Fish and Wildlife Service, 2007

2.1 Level of Effort

Guidelines set by the Indiana Bat Recovery Team in the 2007 Indiana Bat Draft Recovery Plan (First Revision) suggest one net site per kilometer (0.6 mi) of potentially suitable habitat proposed for removal. ESI proposes to conduct mist netting at **2 sites** to provide adequate survey coverage of the 27.5 hectares (68 ac) Project area (Figure 1). Each net site consists of two net sets operated for 2 nights each, for a total of 4 net nights per site, or a minimum total of 8 net nights for 2 sites.

2.2 Net Placement

Mist nets are set to maximize coverage of flight paths used by Indiana bats along suitable travel corridors, foraging areas, and/or drinking areas. Riparian corridors are often used for travel or foraging by Indiana bats; however, upland corridors (e.g., trails or logging roads) also provide suitable sites. In upland areas, net sites in the vicinity of road ruts holding water have resulted in Indiana bat captures in many portions of the range. Site selection is based upon the extent of canopy cover, presence of an open flyway, and forest conditions near the site. The actual location and orientation of each net set is determined in the field by a qualified bat biologist.

2.3 Bat Capture

Bats are live-caught in mist nets and released unharmed near the point of capture. Captured bats are identified to species, sex, age class, and reproductive condition. Weight and right forearm length of each individual are also recorded. Age is determined by examining the epiphyseal-diaphyseal fusion of long bones in the wing. Reproductive condition of female bats is recorded as pregnant (based on gentle abdominal palpation), lactating, post lactating, or non-reproductive. Time and location/net site of captured bats is recorded. Processing is typically completed within 30 minutes of the time each bat is removed from the net.

2.4 Protocol for Addressing White-nose Syndrome

White-nose syndrome (WNS) is a disease that is killing millions of bats in the eastern U.S. The disease, which was first found in New York is spreading and is now as far west as Oklahoma. All current USFWS and VDGIF guidelines for WNS decontamination, containment, and avoidance will be implemented. Biologists will be kept aware of all current and changing WNS regulations. Bat handling will follow current WNS protocols set by the USFWS and requirements of VDGIF. Captured bats are examined for damage associated with WNS to the wing and uropatagium (tail) membranes, including use of white and/or ultraviolet light. Wing damage is categorized using the Wing-Damage Index Used for Characterizing Wing Condition of Bats Affected by White-nose Syndrome established by Jon Reichard in 2008.

2.5 Habitat Characterization

Concurrent with mist netting, habitat is described for each net site. The emphasis of this description is habitat form: size and relative abundance of large trees and snags that potentially serve as roost trees, canopy closure, understory clutter/openness, water availability, and flight corridors. Habitat form is emphasized because the Indiana bat roosts in a great many species of trees. Tree species composition is included in the assessment.

ESI's habitat characterization does more than emphasize species of large trees near the net. It identifies components of the canopy and subcanopy layers. All trees that reach into the canopy are canopy trees, regardless of their diameter/size. As defined in the Indiana Bat Habitat Suitability Index Model, dominant trees are the large trees in the canopy (>40 centimeters [16 in] diameter at breast height [dbh]) that have the greatest likelihood of being used by maternity colonies of Indiana bats. Many smaller trees are often also found in the canopy, and in some situations, the canopy can be entirely composed of smaller diameter trees. ESI's habitat characterization identifies dominant and subdominant elements of the canopy.

The subcanopy, or understory, vegetation layer is well defined in classical ecological literature. It is that portion of the forest structure between the ground vegetation (to approximately 0.6 meter [2 ft]) and the canopy layers, usually beginning at about 7.6 meters (24.9 ft). Vegetation in the understory may come from:

- Lower branches of overstory trees
- Small trees that will grow into the overstory
- Small trees and shrubs that are confined to the understory

The amount of understory, or clutter, is also recorded, as many bat species, including the Indiana bat, tend to avoid areas of high clutter.

Each net site is documented with a sketch on the Net Site Habitat Description data sheet.

2.6 Weather and Temperature

Weather conditions are monitored each night of survey to assure compliance with mist netting guidelines. Conditions recorded include: temperature, wind speed and direction, percent cloud cover, and moon phase (if visible). A standard mercury thermometer is used to record temperature, wind speed is determined by use of the Beaufort wind scale, and cloud cover is visually estimated. Weather data recorded are provided in an appendix to the final report.

3.0 Capture of Endangered Bats

3.1 Transmitter Attachment

After collecting morphometric data, any endangered bats captured while mist netting will be fitted with radio-transmitters. A maximum of three transmitters will be attached per net site, and as feasible, transmitters will be placed on females or juveniles in preference to males. Transmitters are obtained from Transmitters are typically obtained from either ®HoloHil Systems Ltd. or ®Blackburn Transmitters. Bat transmitter weights range from 0.25 to 0.5 grams. Whenever possible, ESI uses 0.25 to 0.35 gram transmitters, as they are the lightest commercially available and put the least stress possible upon the bats. Batteries on these transmitters typically last from 7 to 14 days. Transmitters are activated and tested before attachment. A small interscapular area is trimmed of fur and the transmitter is attached to this area with non-toxic surgical adhesive. The adhesive degrades over time (typically 1 to 4 weeks) and the transmitter falls off the bat. Biologists record the transmitter weight, weight of the bat before and after transmitter attachment, and holding time. Bats are released unharmed near the points of capture. Standardized data forms are used for transmitter attachment information.

ESI will notify USFWS of any Indiana bat captures by the next business day.

3.2 Diurnal Roost Telemetry

To locate roosting bats, ESI tracks radio-telemetry signals using either a ®Wildlife Materials TRX-2000S PLL Synthesized Tracking Receiver, an ®Advanced Telemetry Systems, Inc. Model R2000 Scanning Receiver, or a ®Titley Australis 26k receiver with three-element folding Yagi directional antennas manufactured by either ®Wildlife Materials, Inc. or ®Titley Electronics, PTY LTD. Receivers are not water resistant and will not be used during periods of rain.

Beginning the day after bat capture and transmitter attachment, ESI biologists use telemetry to locate each bat's diurnal roost. Roost trees are identified to species and diameter at breast height (dbh) is measured. The approximate height at which the bat is roosting and general condition of the roost tree (dead, live, dying, % bark cover, etc.) is noted. A description of habitat near the roost tree is recorded. Occasionally, Indiana bats roost in man-made structures, most frequently bridges. Standardized data forms are used to characterize roost trees and assess associated habitat; the form also provides for assessment of man-made structures used as roosts. Roosts are flagged or marked in another acceptable manner for ease of future identification. Coordinates of each roost are recorded with a GPS unit. When

feasible, distances among roost trees and other notable landscape features are determined.

Indiana bats will be tracked for approximately 6 days after the date of capture or until the transmitter is shed or fails, whichever happens first. Emergence counts will be performed on each identified Indiana bat roost tree for 3 days. In situations where multiple bats are being tracked and each bat uses a new roost daily, it can quickly become financially and logistically infeasible to complete 3 days of emergence on all trees. In those situations, all trees will be watched for at least 1 day. Beyond that, ESI biologists will use their best judgment to select which trees receive further observation.

Gray and Virginia big-eared bats are difficult to track due to their cave-dwelling habits. No portals are located on the Project; however, ESI will still attempt to track individuals of these species for a maximum of 3 days in an effort to supplement population information for USFWS and VGDIF.

4.0 Timeline and Reporting

Mist net surveys will be initiated as soon as possible in June 2012. If surveys are negative for Indiana bats, ESI will likely request concurrence on a determination of May Affect, Not Likely to Adversely Affect. No portals will be impacted by the proposed Project, so gray or Virginia big-eared bats are not likely to be adversely affected.

ESI's detailed technical report will include results and discussion of the mist net survey. Copies of field data sheets and an interpretation of those data will also be included. The report will also include maps clearly identifying the Project area, mist net sites, excluded areas, kilometer buffers, and diurnal roost trees (if applicable). Representative photographs of net sites will be included, along with all data sheets. The final report will be submitted to the Virginia Field Office of USFWS.

ESI requests that negative mist net survey results be valid for 3 years from the date of field survey completion. If mist net surveys are negative for endangered bats, trees on the property can be cleared at any time during the 3-year period.

USFWS and VDGIF will be notified within 1 business day (via phone and/or email) upon capture of any endangered species.



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Pesi 393.02

7 June 2012

Mr. Lance DeBord
D. R. Allen & Associates, P.C.
P. O. Box 573
Abingdon, VA 24212-0573

RE: Mist Net Survey for Endangered Bats on Dickenson County Schools Consolidated Campus, Dickenson County, Virginia

Dear Mr. DeBord:

Environmental Solutions & Innovations, Inc. (ESI) conducted an endangered bat survey on the Dickenson County Schools Consolidated Campus in Dickenson County, Virginia. ESI submitted a study plan to the U. S. Fish and Wildlife Service (USFWS) Virginia Ecological Services Field Office before conducting the survey. The study plan was approved by USFWS before the survey began.

The survey was conducted between 2 and 5 June 2012 by a biologist subpermitted under ESI's Federal USFWS Permit # TE02373A-4, Virginia Department of Game and Inland Fisheries (VDGIF) Threatened and Endangered Species Permit # 044926, and VDGIF Scientific Collection Permit # 044927.

No state or federally threatened or endangered species of bats were captured. We do not expect USFWS to determine the project will negatively affect threatened or endangered bats. In the next few weeks we will summarize the data and send you a draft report to review.

Please do not hesitate to contact me with any questions.

Sincerely,

A handwritten signature in blue ink, appearing to read "Jason Duffey", is written over a light yellow rectangular background.

Jason Duffey
Project Manager

MIST NET SURVEY FOR ENDANGERED BATS ON
DICKENSON COUNTY SCHOOLS CONSOLIDATED CAMPUS,
DICKENSON COUNTY, VIRGINIA

21 June 2012

Prepared for:

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Executive Summary

The Dickenson County Schools Consolidated Campus (Project) involves construction of a new consolidated high school campus with athletic fields and all necessary parking and support facilities. Approximately 27.5 hectares (68 ac) are proposed to be disturbed by Project activities on the main campus site of which 24.3 hectares (60 ac [88%]) are forested. The Project area is within the range of the federally-endangered Indiana bat (*Myotis sodalis*), gray bat (*Myotis grisescens*), and Virginia big-eared bat (*Corynorhinus townsendii virginianus*). Pursuant to Section 7(a)(2) and Section 9 of the Endangered Species Act, clearing of forested land has the ability to affect populations of these species. In accordance with the Act, specifically as it pertains to the removal of habitat potentially used by endangered bats, and on behalf of Dickenson County, D. R. Allen & Associates, P.C., contracted Environmental Solutions & Innovations, Inc. (ESI) to perform summer mist netting on the Project area. ESI completed all field efforts in accordance with our U.S. Fish and Wildlife (USFWS) Federal Fish and Wildlife Permit (TE02373A-3) and Virginia Department of Game and Inland Fisheries (VDGIF) Threatened and Endangered Species Permit and Scientific Collection Permit (044926 and 044927).

Based on mist netting guidelines of the USFWS, two sites within/near the Project area were selected and surveyed 2 through 5 June 2012. Twenty bats representing two species were captured over 8 complete net nights of the survey. No endangered bats were captured during mist netting surveys.

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Appendices

- Appendix A: Completed Mist Net Survey Data Sheets
- Appendix B: Mist Net Site Photographs

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1.0 Introduction

The Federal Endangered Species Act (ESA) [16 U.S.C. 1531 *et seq.*] was codified into law in 1973. This law provides for the listing, conservation, and recovery of endangered and threatened species of plants and wildlife. Under the ESA, the U.S. Fish and Wildlife Service (USFWS) is mandated to monitor and protect listed species. Many states enacted similar laws.

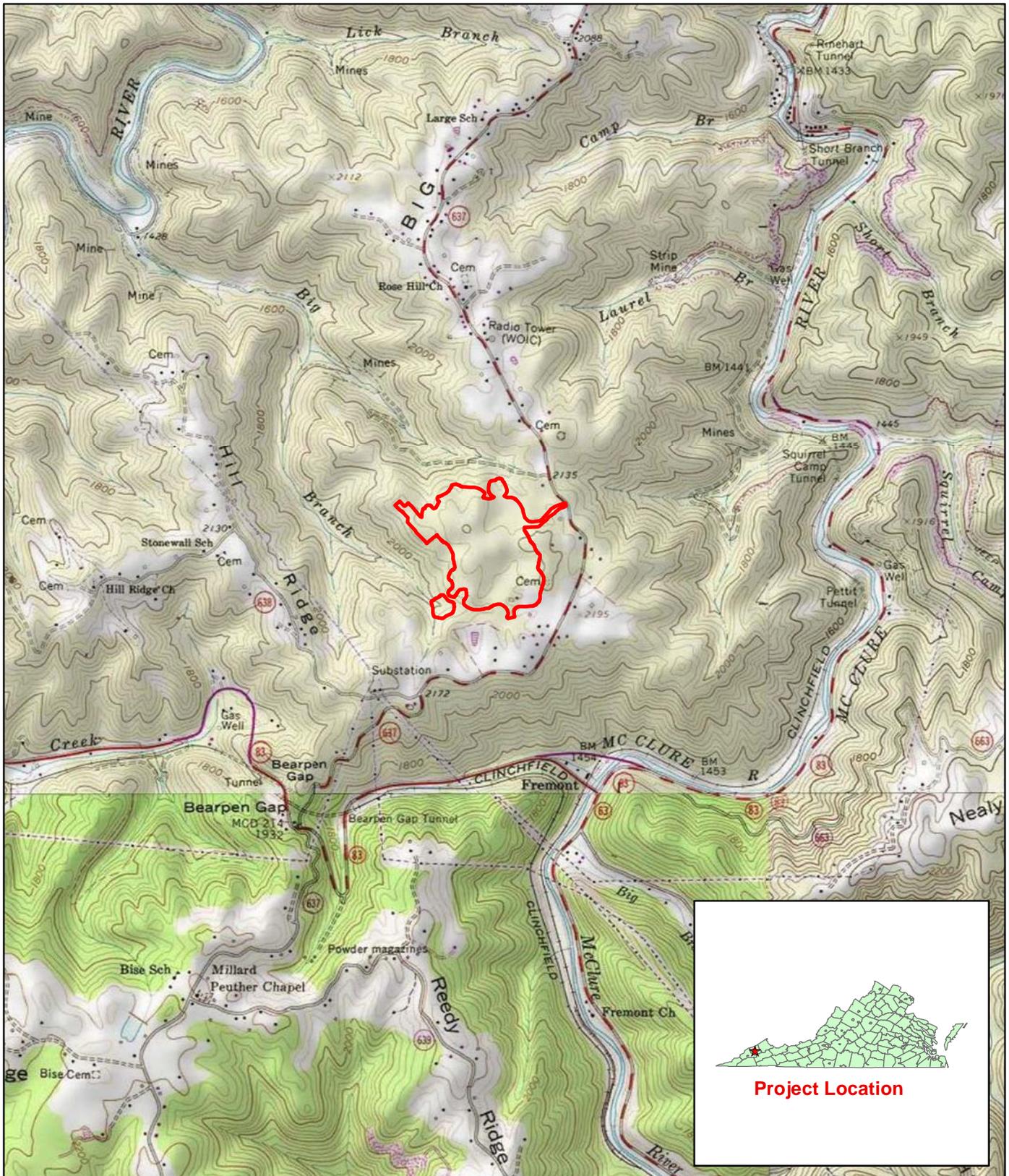
Section 7(a)(2) of the ESA states that each federal agency shall insure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed species or result in destruction or adverse modification of designated critical habitat. Federal actions include (1) expenditure of federal funds for roads, buildings, or other construction projects, and (2) approval of a permit or license, and the activities resulting from such permit or license. Compliance is required regardless of whether involvement is apparent, such as issuance of a federal permit, or less direct, such as federal oversight of a state-operated program.

Section 9 of the ESA prohibits the “take” of listed species. “Take” is defined by the ESA as “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect” [16 U.S.C. 1532(19)]. USFWS further defines “harm” to include significant habitat modification or degradation [50 CFR §17.3]. Actions of federal agencies that do not result in jeopardy or adverse modification, but that could result in a take, must also be addressed under Section 7.

On behalf of Dickenson County, D. R. Allen & Associates, P.C. (DRA) contracted Environmental Solutions & Innovations, Inc. (ESI) to perform summer mist net surveys associated within the proposed construction of the Dickenson County Schools Consolidated Campus (Project) in Dickenson County, Virginia (Figure 1). This is within the overall ranges of the federally endangered Indiana bat (*Myotis sodalis*), gray bat (*Myotis grisescens*) and Virginia big-eared bat (*Corynorhinus townsendii virginianus*); however, of the three species, only Indiana bats have been documented in Dickenson County. Pursuant to Section 7(a)(2) and Section 9 of the Endangered Species Act, clearing of forested land has the ability to impact endangered bats.

ESI completed all field efforts in accordance with our U.S. Fish and Wildlife (USFWS) Federal Fish and Wildlife Permit (TE02373A-3) and Virginia Department of Game and Inland Fisheries (VDGIF) Threatened and Endangered Species Permit and Scientific Collection Permit (044926 and 044927).





 Project Location

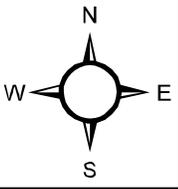


Figure 1. Location of Dickenson County Schools Consolidated Campus, Dickenson County, Virginia.

Project No. 393  0 500 1,000 Meters
Base Map: USGS 7.5-Minute Topographic Map



ENVIRONMENTAL SOLUTIONS & INNOVATIONS, INC.

2.0 Project Description

DRA proposes to construct a new consolidated high school campus with athletic fields and all necessary parking and support facilities, including an on-site waste water treatment plant. In addition, road improvements to State Route 637 will be completed along with the demolition of Ervington High School, Clinchco Elementary School, Sandlick Elementary School, and some attendant structures at Haysi High School.

Approximately 27.5 hectares (68 ac) are proposed to be disturbed by Project activities on the main campus site of which 24.3 hectares (60 ac [88%]) are forested. Of the forested vegetation that will be permanently removed, approximately 13.4 hectares (33 ac [55%]) have been previously impacted by logging, with the remaining 10.9 hectares (27 ac [45%]) consisting of mature second growth forest. The Project area is within the range of the federally-endangered Indiana bat (*Myotis sodalis*), gray bat (*Myotis grisescens*), and Virginia big-eared bat (*Corynorhinus townsendii virginianus*).

3.0 Ecological Setting

3.1 Description

The Indiana bat is a medium-sized bat in the genus *Myotis*. The forearm length has a range of 35 to 41 millimeters (1.4 – 1.6 in). The head and body length range from 41 to 49 millimeters (1.6 – 1.9 in). Its appearance most closely resembles that of congeners little brown bat (*M. lucifugus*) and northern bat (*M. septentrionalis*). Indiana bats differ from similar *Myotis* species in that they have a distinctly keeled calcar (cartilage that extends from the ankle to support the tail membrane). Other minor differences include smaller and more delicate hind feet, shorter hairs on the feet that do not extend past the toenails, and a pink nose. The fur lacks luster, and the wing and ear membranes have a dull, flat coloration that does not contrast with the fur (USFWS 2007). Fur on the chest and belly is lighter than fur on the back, but is not as strongly contrasting as that of similar *Myotis* species. Overall color is slightly grayer, while the little brown bat and northern bat are browner. The skull has a crest and tends to be smaller, flatter, and narrower than that of the little brown bat (USFWS 2007).



3.2 Status

The USFWS listed the Indiana bat as endangered on 11 March 1967. The most current range-wide estimate of the population is 424,708 individuals (USFWS 2012) which represents about half of the estimated population of 1960. Listing was based on long-term declines of winter populations across the range of the species, although population changes are best documented where the species was most abundant in Kentucky, Missouri, and Indiana (Brack et al. 1984, Johnson et al. 2002, Whitaker et al. 2002, Brack et al. 2003, Sparks et al. 2008), although such information is now being acquired in most states. It is probable that habitat loss during summer (USFWS 2007) and winter disturbances during hibernation (Johnson et al. 1998) both contributed to the overall decline of the species.

The only official recovery plan for the species was completed on 14 October 1983. A revised draft was released in April 2007. Although widely used as a regulatory document, the 2007 version of the recovery plan has not been officially approved.

Federal Register Documents

[41 FR 41914](#); 24 September 1976: Final Critical Habitat, Critical habitat-mammals

[40 FR 58308](#) [58312](#); 16 December 1975: Proposed Critical Habitat, Critical habitat-mammals

[32 FR 4001](#); 11 March 1967: Final Listing, Endangered

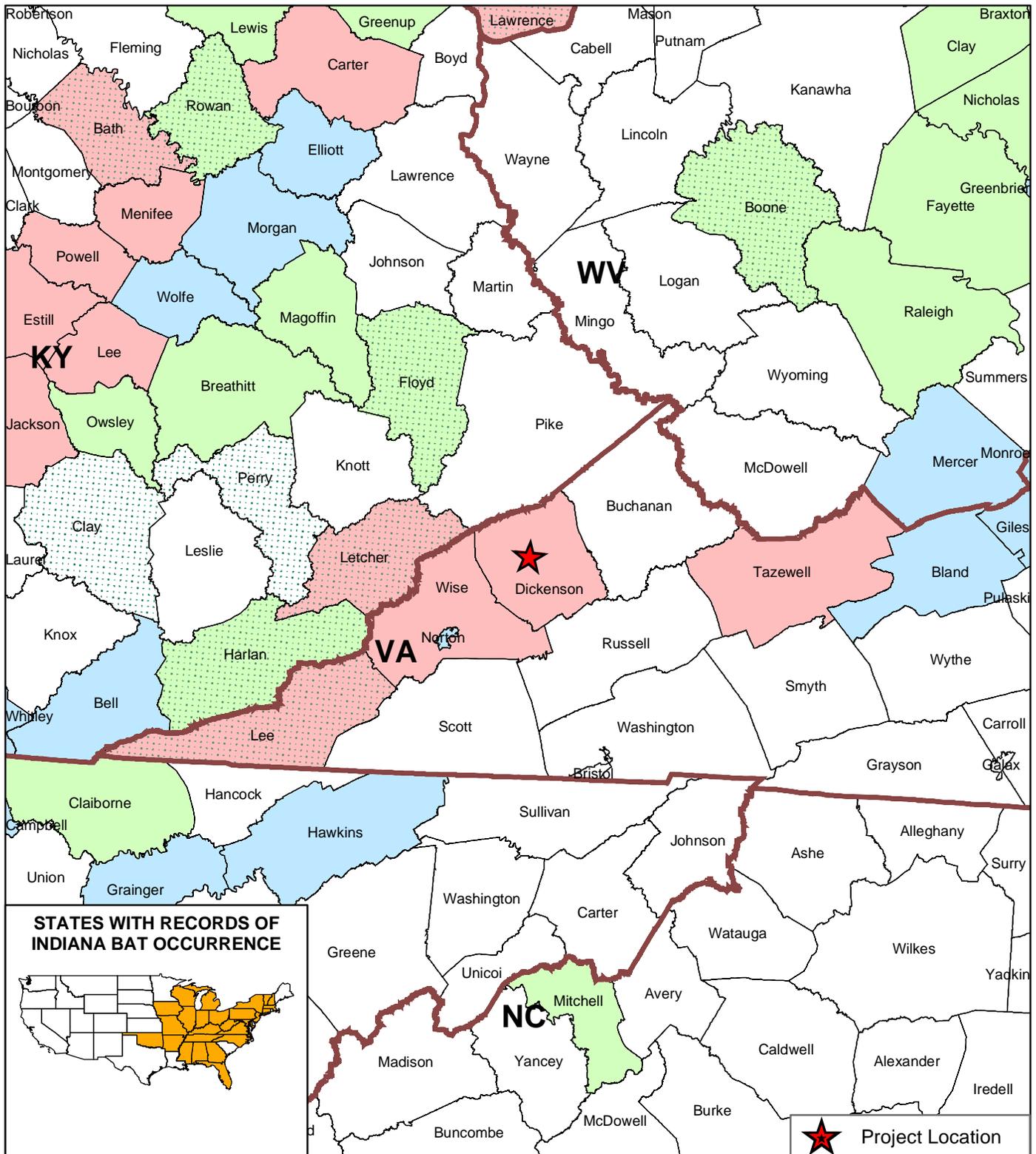
Critical habitat was designated on 24 September 1976, and includes 11 caves and 2 abandoned mines in Illinois, Indiana, Kentucky, Missouri, Tennessee, and West Virginia.

3.3 Regional Species Occurrence

The Indiana bat is known from the region. Dickenson County has known hibernacula and non-reproductive summer records. Wise County, bordering Dickenson to the southwest, also has both hibernacula and non-reproductive summer records. Letcher County, Kentucky, to the west, has known maternity and hibernacula records. (Figure 2).

3.4 Ecology

The Indiana bat is a "tree bat" in summer and a "cave bat" in winter. There are four ecologically distinct components of the annual life cycle: winter hibernation, spring staging and autumn swarming, spring and autumn migration, and the summer season of reproduction. The U.S. Fish & Wildlife Service Recovery Plan (2007) provides a description of the life history. Figure 3 provides an annual chronology of seasonal activities.



STATES WITH RECORDS OF INDIANA BAT OCCURRENCE



 County with Record of Indiana Bat Hibernacula Occurrence
 County with Record of Indiana Bat Summer Maternity Occurrence

 County with Record of Indiana Bat Other Summer (Non-reproductive) Occurrence
 County with Record of Indiana Bat Hibernacula and Other Summer (Non-reproductive) Occurrences

 Project Location
 State Boundary
 County Boundary

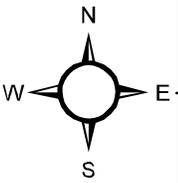


Figure 2. Counties near the Project area with hibernacula, summer maternity, and other summer (non-reproductive) records for the Indiana bat (*Myotis sodalis*).

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Sources: USFWS, Indiana Bat Revised Recovery Plan, Agency Draft, 2007.
Updated: November 2011



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3.4.1 Summer Roosting Ecology

The summer range of the Indiana bat is large and includes much of the eastern deciduous forestlands between the Appalachian Mountains and Midwest prairies (Figure 4). Distribution throughout the range is not uniform and summer occurrences are more frequent in southern Iowa and Michigan, northern Missouri, Illinois, and Indiana. Greater tree densities do not equate to more bats (Brack et al. 2002). Cooler summer temperatures associated with latitude or altitude likely affect reproductive success and the summer distribution of the species (Brack et al. 2002).

3.4.1.1 Males

Some males remain near hibernacula throughout summer while others migrate varying distances (Whitaker and Brack 2002). Males can be caught at hibernacula on most nights during summer (Brack 1983, Brack and LaVal 1985), although there may be a large turnover of individuals between nights (Brack 1983).

Structurally, woodland roosts used by males are similar to those used by maternity colonies (Kiser and Elliott 1996, Schultes and Elliott 2002, Brack and Whitaker 2004, Brack et al. 2004). These trees are smaller (Kurta 2004), perhaps because males are often solitary or form small groups and thus need less space or because males may have different thermal requirements than females. Males appear somewhat nomadic; over time, the number of roosts and the size of an area used increases. Activity areas encompass roads of all sizes, from trails to interstate highways. Roosts have also been located near roads of all sizes (Kiser and Elliott 1996, Schultes and Elliott 2002, Brack et al. 2004), including adjacent to an interstate highway (Sparks et al. 1998, Brack et al. 2004, Whitaker and Sparks 2008, Sparks et al. 2009).

3.4.1.2 Females and Maternity Colonies

When female Indiana bats emerge from hibernation, they migrate to maternity colonies that may be located up to several hundred miles away (Kurta and Murray 2002). Females form nursery colonies under exfoliating bark of dead, dying, and living trees in a variety of habitat types, including uplands and riparian habitats. A wide variety of tree species, including occasional pines (Britzke et al. 2003) are used as nursery colonies indicating that it is tree form, not species that is important for roosts. Since many roosts are in dead or dying trees, they are often ephemeral. Roost trees may be habitable for one to several years, depending on the species and condition of the tree (Callahan et al. 1997) Indiana bats exhibit strong site fidelity to summer roosting and foraging areas (Kurta and Murray 2002, Kurta et al. 2002).

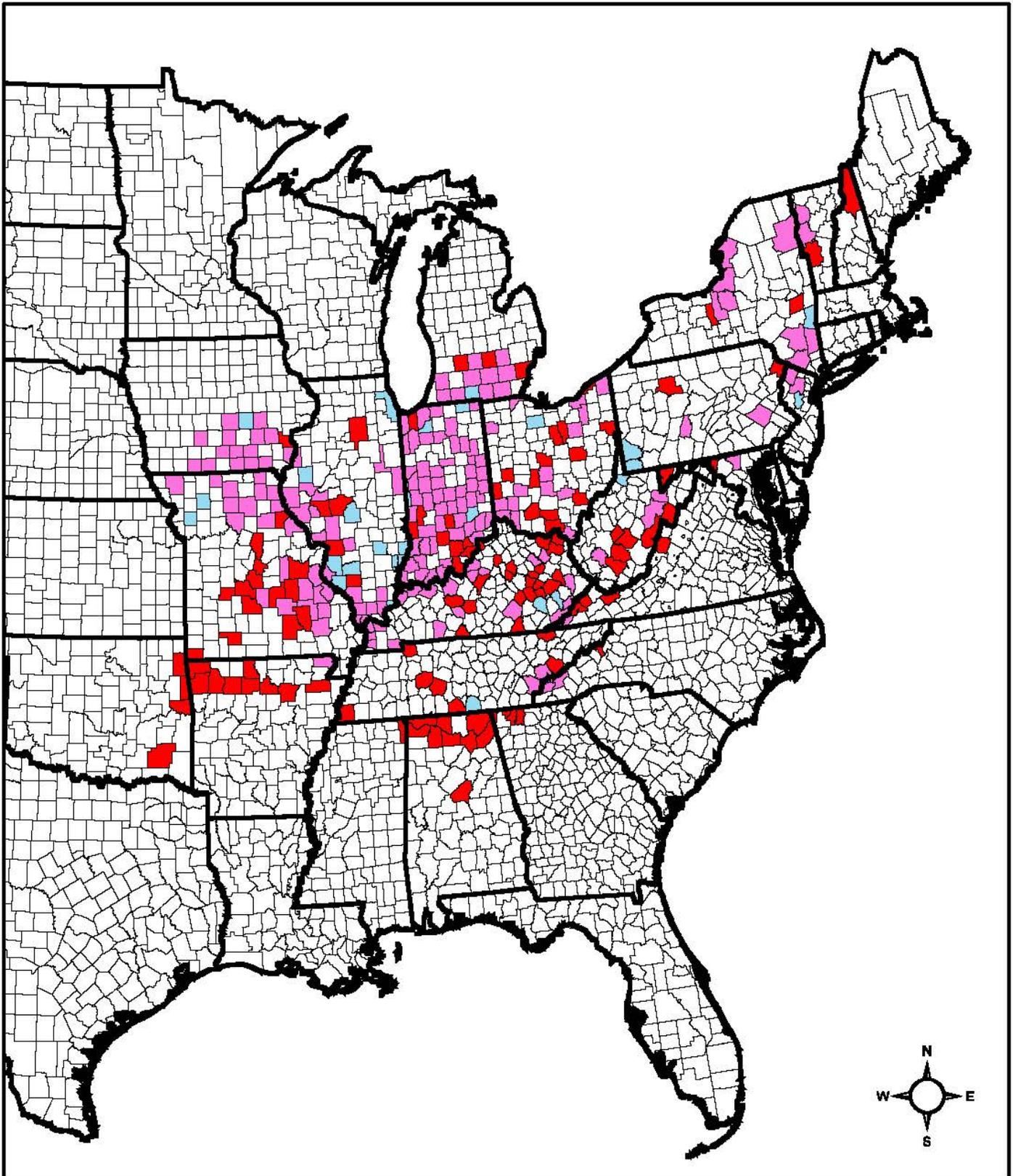


Figure 4. Rangewide distribution of the Indiana bat during summer, showing counties with reproductive (adult female and/or young-of-the-year) and non-reproductive records.

- | | | |
|--|---|---|
|  County with Record of Indiana Bat Reproductive Occurrence |  County with Record of Indiana Bat Summer Non-Reproductive Occurrence |  County with Record of Indiana Bat Reproductive and Summer Non-Reproductive Occurrence |
|--|---|---|

Females are pregnant when they arrive at maternity roosts. Parturition typically occurs between late June and early July. A maternity colony typically consists of 25 to 325 adult females. Nursery colonies often use several roost trees (Kurta et al. 1993, Foster and Kurta 1999, Kurta and Murray 2002), moving among roosts within a season. Most members of a colony coalesce into a single roost tree about the time of parturition, which begins to break up again as soon as young are volant.



Roosts that contain large numbers of bats (more than 20 bats) are often called primary roosts, while secondary roosts hold fewer bats. Primary roost trees are often greater than 46 centimeters (18 in) dbh and secondary roost trees are often greater than 23 centimeters (9 in) dbh (Gardner et al. 1991, Callahan et al. 1997, Kurta et al. 2002, Miller et al. 2002, Carter 2003). Numerous suitable roosts may be required to support a single nursery colony, possibly about 45 stems per hectare (20/acre) (Gardner et al. 1991, Miller et al. 2002, Carter 2003). Roost trees are often located where they have solar exposure, with 20 to 80 percent canopy closure (Humphrey et al. 1977, Gardner et al. 1991, Kurta et al. 1993, Kurta et al. 1996, Kurta et al. 2002, Carter 2003). They are often exposed to 10 or more hours of solar radiation per day (Kurta et al. 2002). The need for solar exposure may vary with latitude.

Indiana bats live on anthropogenic landscapes and recent research indicates females do include roads in their active area. Although bats do cross roads, the studies that document this behavior were not designed to gauge a graded response (Gardner et al. 1991, Brown et al. 2001, Kiser et al. 2002, Kurta et al. 2002, Brack and Whitaker 2006).

3.4.2 Food Habits and Foraging Ecology

Like many other species of microchiropterans, the Indiana bat often uses travel corridors that consist of open flyways such as streams, woodland trails, small infrequently used roads, and possibly utility corridors, regardless of suitability for foraging or roosting (Brown and Brack 2003). Members of maternity colonies forage in a variety of woodland settings, including upland and floodplain forest (Humphrey et al. 1977, Brack 1983, Gardner et al. 1991). Foraging activity is concentrated above and around foliage surfaces, such as over the canopy in upland and riparian woods, around crowns of individual or widely spaced trees, and along edges. They forage less frequently over old fields, and occasionally over bushes in open pastures. Forest edges, small openings, and woodlands with patchy trees provide more foraging opportunities than dense woodlands. Most species of woodland bats forage prominently along edges, less in openings, and least within forests (Grindal 1996).

Openings also provide a better supply of insects than do wooded areas (Tibbels and Kurta 2003).

4.0 Methods

Efforts to survey for endangered bats are difficult to standardize because of the large amount of variability that exists at an individual survey site or between survey sites in the same Project area. However, a number of practices used for summer surveys for Indiana bats have provided structure for implementation of netting guidelines provided by the USFWS (2007) in the most recent Draft of the Indiana Bat Recovery Plan (First Revision) (Table 1).

In response to the current White Nose Syndrome issue, ESI biologists followed the most current USFWS Disinfection Protocol for Bat Field Studies and the Virginia Summer Bat Research Guidelines. ESI biologists also categorize wing damage using the “Wing-Damage Index Used for Characterizing Wing Condition of Bats Affected by White-nose Syndrome” established by Jon Reichard in 2008.

4.1 Level of Effort and Net Placement

Following the USFWS 2007 Draft Indiana Bat Recovery Plan (First Revision) mist netting guidelines (Table 1) for field surveys at all net sites, ESI conducted surveys from 2 to 5 June 2012 at two net sites to provide adequate survey coverage of the 27.5-hectare (68-ac) Project area (Figure 5). Site selection was based upon expectation of bat activity and maximizing coverage of the proposed Project.

Mist net site selection also included consideration of habitat characterization described in current literature and ESI personnel’s experience with the species. Habitat with the following characteristics was selected to the degree feasible:

- Large trees (>40 centimeters [16 in] dbh) frequently used for maternity roosts
- An open canopy, apparently important for warming roost sites
- An open, uncluttered understory, used for traveling and foraging

Exact net placement was based upon canopy cover, presence of a flight corridor, water, and habitat conditions near the site. Nets were set to maximize coverage of flight paths that could be used by bats along suitable corridors. Riparian corridors often provide successful mist net sites however, terrestrial corridors (e.g., trails or logging roads) also provide suitable sites (Brown and Brack 2003). GPS coordinates were recorded for each net site (Table 2). Appendix A provides mist net site and habitat descriptions.



Table 1. USFWS Indiana Bat Mist Net Survey Guidelines (modified for Virginia)

| NETTING GUIDELINES | |
|--|---|
| 1. | Netting Season: 1 June to 15 August, when Indiana bats occupy summer habitat. |
| 2. | Equipment (Mist Nets): constructed of the finest, lowest visibility mesh commercially available – monofilament or black nylon – with the mesh size approximately 1½ inch (1¼ – 1¾) (38 mm). |
| 3. | Net Placement: mist nets extend approximately from water or ground level to tree canopy and are bounded by foliage on the sides. Net width and height are adjusted for the fullest coverage of the flight corridor at each site. A “typical” net set consists of three (or more) nets “stacked” on top of one another; width may vary up to 60 feet (20 m). |
| 4. | Net Site Spacing: <ul style="list-style-type: none"> ➤ Streams – one net site per 0.6 mile (1 km) ➤ Land Tracts – two net sites per 246 acres (1 square km) |
| 5. | Minimum Level of Effort Per Net Site: <ul style="list-style-type: none"> ➤ Two net locations (sets) per net site, with locations (sets) at least 100 feet (30 m) apart ➤ Two (calendar) nights of netting ➤ At least four net–nights (1 net–night = 1 net set deployed for 1 night); typically, two net sets are deployed at one site for two nights, resulting in four net-nights ➤ Sample Period: begin at dusk and net for 5 hours (approximately 0200h) ➤ Nets are monitored at approximately 10-minute intervals ➤ No disturbance near the nets between checks |
| 6. | Weather Conditions: net only if the following weather conditions are met: <ul style="list-style-type: none"> ➤ No precipitation ➤ Temperature ≥ 10°C (50°F) ➤ No strong winds |
| Source: U.S. Fish and Wildlife Service, 2007 | |

Table 2. Mist net site GPS coordinates on the Dickenson County Schools Consolidated Campus Project in Dickenson County, Virginia.

| Site# | Latitude | Longitude |
|-------|----------------|----------------|
| DS-1 | 37° 08' 04.9"N | 82° 23' 22.4"W |
| DS-2 | 37° 08' 11.4"N | 82° 23' 28.7"W |





Project Location
 ▲ Net Site

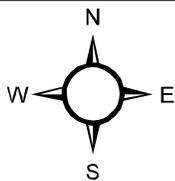
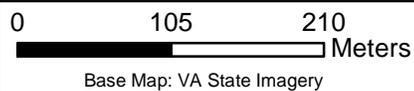


Figure 5. Mist net sites on the Dickenson County Schools Consolidated Campus Project in Dickenson County, Virginia.

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4.2 Bat Capture

The netting setup allows bats to be caught live and released unharmed near the point of capture. Bats were identified to species using a combination of morphological characteristics (e.g., ear and tragus, calcar, pelage, size/weight, length of right forearm, and overall appearance of the animal). The species, sex, reproductive condition, age, weight, length of right forearm, and time and location/net site of capture were recorded for all bats captured. Age (adult or juvenile) of bats is determined by examining ephiphyseal-diaphyseal fusion (calcification) of long bones in the wing. Weight was measured to 0.1 gram using a Pesola spring scale. Length of the right forearm of each bat was measured to at least the nearest 1.0 mm using either dial calipers or metric ruler. The reproductive condition of captured bats was classified as descended male (reproductive), non-descended male, non-reproductive female, pregnant female (based on gentle abdominal palpation), lactating female, or post-lactating female. Bat processing and data collection was completed within 30 minutes of the time that each bat was removed from a net. Data sheets containing all bat capture data are provided in Appendix A.

4.3 Habitat Assessment

Concurrent with mist netting, habitat was described for each net site. The emphasis of this description is habitat form: size and relative abundance of large trees and snags that potentially serve as roost trees, canopy closure, understory clutter/openness, water availability, and flight corridors. Habitat form is emphasized because the Indiana bat roosts in a great many species of trees. Tree species composition is included in the assessment.

ESI's habitat characterization does more than emphasize species of large trees near the net. It identifies components of the canopy and subcanopy layers. All trees that reach into the canopy are canopy trees, regardless of their diameter/size. As defined in the Indiana Bat Habitat Suitability Index Model, dominant trees are the large trees in the canopy (>40 centimeters [16 in] diameter at breast height [dbh]) that have the greatest likelihood of being used by maternity colonies of Indiana bats. Many smaller trees are often also found in the canopy, and in some situations, the canopy can be entirely composed of smaller diameter trees. ESI's habitat characterization identifies dominant and subdominant elements of the canopy.

The subcanopy, or understory, vegetation layer is well defined in classical ecological literature. It is that portion of the forest structure between the ground vegetation (to approximately 0.6 meter [2 ft]) and the canopy layers, usually beginning at about 7.6 meters (24.9 ft). Vegetation in the understory may come from:

- Lower branches of overstory trees
- Small trees that will grow into the overstory
- Small trees and shrubs that are confined to the understory

The amount of understory, or clutter, is also recorded, as many bat species, including the Indiana bat, tend to avoid areas of high clutter.

Each net site was documented with a sketch on the Net Site Habitat Description data sheet (Appendix A).

4.4 Weather and Temperature

Weather conditions were monitored during mist netting to ensure compliance with USFWS mist netting guidelines (Table 1). Conditions recorded include temperature, wind speed and direction, percent cloud cover, and moon phase (if visible). A standard digital thermometer was used to record temperature, wind speed was determined by use of the Beaufort wind scale, and cloud cover was estimated. Appendix A contains completed weather data.

Temperatures in the study area were within acceptable limits, according to USFWS guidelines. Survey temperatures ranged from 11.9° to 17.5° Celsius (53.4° to 63.5° F) during mist netting activities conducted 2 through 5 June 2012.

5.0 Results

5.1 Total Bat Capture

Twenty bats representing two species were captured over 8 complete net nights (Table 3). The sample included 16 big brown bats (*Eptesicus fuscus*) and 4 northern bats (*Myotis septentrionalis*). Bat capture data from all nights of netting are included in Appendix A.

Table 3. Bat capture by sex, reproductive condition, and age during the mist net survey on the Dickenson County Schools Consolidated Campus Project in Dickenson County, Virginia.

| Species | Adult Male | Adult Female ¹ | | | | Juvenile | | Escape ² | Total |
|---------------|------------|---------------------------|----------|----|----|----------|--------|---------------------|-----------|
| | | PG | L | PL | NR | Male | Female | | |
| Big brown bat | 7 | 2 | 5 | | | | | 2 | 16 |
| Northern bat | | 1 | 3 | | | | | | 4 |
| Total | 7 | 3 | 8 | | | | | 2 | 20 |

¹ PG= pregnant; L = lactating; PL = Post lactating; NR = non-reproductive

² Escape = escaped from net or hand before processing was complete

5.2 Habitat Characterization of Net Sites

Mist net sites were placed in association with forested corridors, based upon their suitability for Indiana bat use. Table 4 summarizes habitat characteristics at each net



Table 4. Habitat characteristics of mist net survey sites on the Dickenson County Schools Consolidated Campus Project in Dickenson County, Virginia.

| Site | Water Source | | Tree Species | | | Canopy Closure | Clutter | | Roost Tree | | Habitat Type | Herb. Cover |
|------|--------------|--------------|---|---|--|----------------|---------|-----------------------------|------------|-----------------------|--------------------|-------------|
| | Name | Distance (m) | Dominant Canopy | Subdominant Canopy | Subcanopy | | Rating | Composition | Potential | Composition | | |
| DS-1 | Unk | 325 | Quercus alba, Quercus stellata, Liriodendron tulipifera | Nyssa sylvatica, Acer rubrum, Liriodendron tulipifera | Liriodendron tulipifera, Acer rubrum, Nyssa sylvatica | M | O | Branches & Saplings | H | Snags and Large trees | YU, RLF, FE, W, OF | M |
| DS-2 | Unk | 485 | Acer rubrum, Acer saccharinum, Nyssa sylvatica | Acer saccharinum, Acer rubrum, Quercus alba | Rhododendron sp., Acer rubrum, Liriodendron tulipifera | M | M | Branches, Saplings & Shrubs | H | Snags and Large Trees | YU, RLF, FE | M |

Tree Species: red maple (*Acer rubrum*), silver maple (*Acer saccharinum*), tulip tree (*Liriodendron tulipifera*), blackgum (*Nyssa sylvatica*), white oak (*Quercus alba*) (*Quercus stellata*), rhododendron (*Rhododendron* sp.)

Canopy/Subcanopy Closure/Clutter: C = Closed; M = Moderate; O = Open

Roost Potential Rating: H = High

Habitat Type: YU = Young Upland Forest; OF = Old Field; RLF = Recently Logged Forest; W=Woodlot, FE=Forest Edge

Herb (Herbaceous) Cover: M = Moderate



site. Both net sites were placed in young upland forest. Habitat at both sites was determined to be of high Indiana bat roost potential based on the high quantity and quality of large live trees and snags that may serve as potential roosts. Dominant canopy species, where present, varied and canopy closure was characterized as moderate across both sites. Appendix A provides habitat description data sheets, and Appendix B provides representative photographs.

6.0 Conclusions

Mist netting efforts completed for this Project complied with guidelines set by the USFWS and the Indiana Bat Recovery Team to survey summer habitat for the presence/absence of the federally endangered Indiana bat. In response to White Nose Syndrome, ESI biologists followed the most current USFWS Disinfection Protocol for Bat Field Studies and the Virginia Summer Bat Research Guidelines.

While both net sites exhibited high roost potential, netting provided no evidence that federally endangered bats use the Project area during summer months. Twenty bats representing two species were captured over 8 complete net nights. The species represented in the survey sample are common members of the regional chiropterafauna.

Due to the lack of endangered bat captures during mist netting, ESI and its clients respectfully request concurrence that tree clearing activities associated with this Project are not likely to adversely affect federally endangered bats. Therefore, trees within the proposed areas of the Project may be removed at any time, regardless of season.

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APPENDIX A
COMPLETED MIST NET SURVEY DATA SHEETS





NET SITE HABITAT DESCRIPTION

Project #: 393.02 Date: 3 Jun 2012 Biologists: C. Hauser, M. Flynn
 Project Name: Dickenson School Site Name/ #: DS-1
 State: VA County: Dickenson USGS Quad: Clintwood

| Net/Trap/ or AnaBat | Net/Trap/ AnaBat Serial # | Net 1 Latitude | Net 2 Longitude | Picture # | Waypoint # |
|------------------------|------------------------------|------------------|------------------|-------------------------|------------|
| Net | 1 | 37° 08 ' 04.9 "N | 82° 23 ' 05.9 "W | Photo Jun 02 8:41 PM | 12 DS-1 |
| Net | 2 | 37° 08 ' 22.4 "N | 82° 23 ' 20.9 "W | Photo Jun 02 4:23 PM | 12 DS-2 |
| | | ° ' "N | ° ' "W | | |
| | | ° ' "N | ° ' "W | | |

Distance to closest water source (meters): 325 m Type of water source: pond
 Water source name: unknown

ESTIMATED WATER SOURCE CHARACTERISTICS (IF UNDER NETS):

Bank Height: _____ meters Channel Width: _____ meters Stream Width: _____ meters
 Substratum: ___ Bedrock ___ Boulder ___ Cobble ___ Gravel ___ Sand ___ Silt/Clay
 Still Water Present (Y/N): _____ Average Water Depth: _____ m or cm Clarity (H,M,L): _____

VEGETATION:

Dominant Canopy Species (> 40 cm/16" dbh) Subdominant Canopy Species (< 40 cm/16" dbh)
Quercus alba Nissa sylvatica
Quercus stellata Acer Rubrum
Liriodendron tulipifera Liriodendron tulipifera
 Estimated dbh range: Lg: 30 Sm: 16 Estimated dbh range: Lg: 15 Sm: 2

Relative abundance of dominant vs. subdominant (ratio): 1:1

Estimated canopy closure: ___ Closed Moderate ___ Open
 Roost tree potential consists of: Large Trees Snags ___ Neither
 Roost tree potential for the area is: High ___ Moderate ___ Low
 Roost potential comments: large trees and snags, abandoned barn, loose bark, lots of sunlight
 Subcanopy clutter: ___ Closed ___ Moderate Open
 Subcanopy comprised largely of: Lower Branches of Canopy Trees Saplings ___ Shrubs

Common Subcanopy Species: Liriodendron tulipifera Acer rubrum
Nissa sylvatica

Habitat Description: trails through young upland forest recently logged in past 5 yrs.
 AnaBat Habitat: very, very little subcanopy.

Check all that apply:

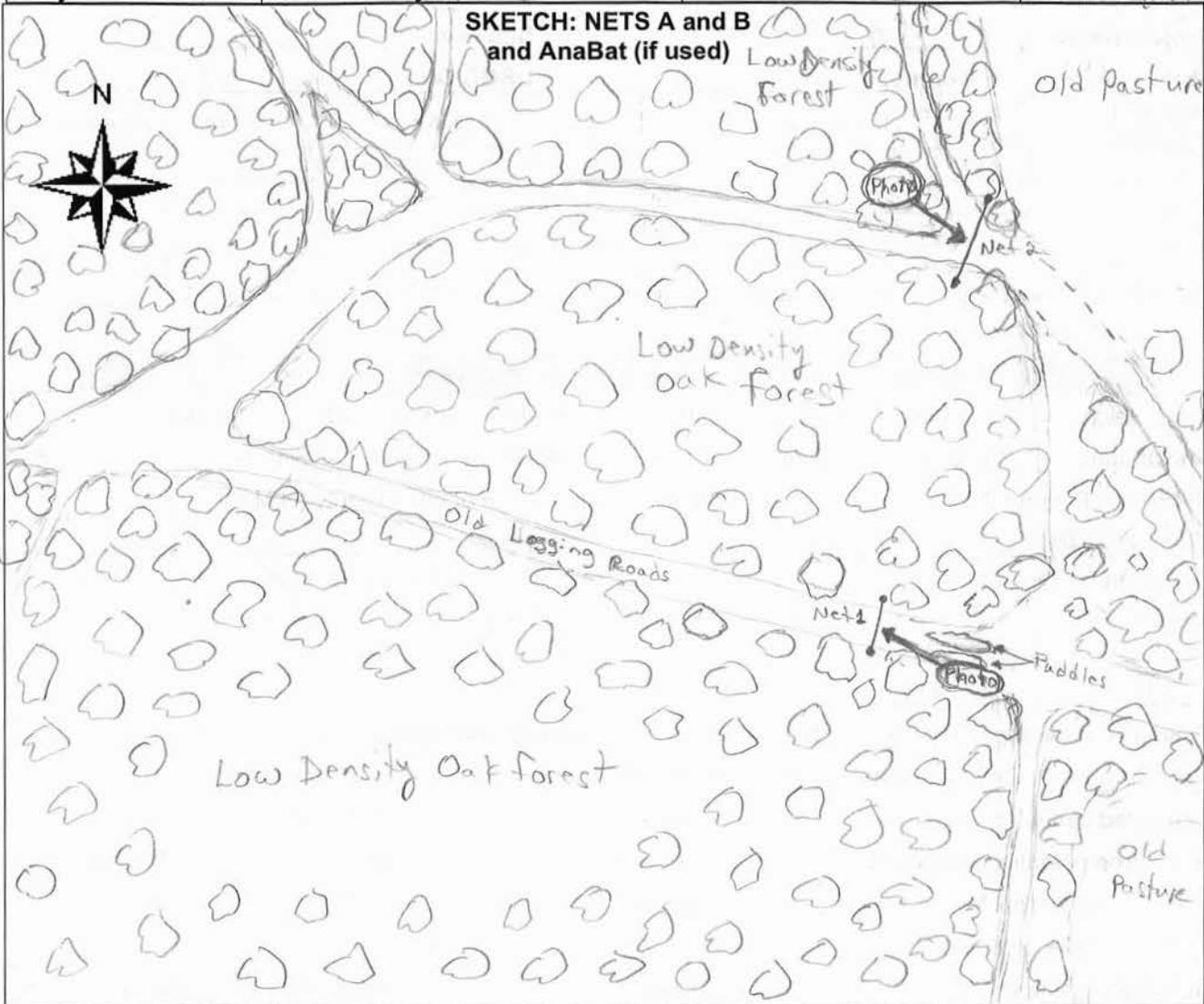
Mature Upland Forest Recently Logged Forest ___ Crop/Pasture Land ___ Other _____
 Young Upland Forest Forest Edge ___ Stream/River _____
 Mature Lowland Forest Woodlot ___ Vernal Pool _____
 Young Lowland Forest Old Field ___ Deepwater Lake/Pond _____

Herbaceous Cover: ___ Sparse Moderate ___ Dense



NET SITE HABITAT DESCRIPTION (continued)

Project #: 393,02 State/County: VA-Dickenson Site Name/#: DS-1 Initials: CHH



| LEGEND | |
|--------------------|-------|
| Nets: | ● — ● |
| Photo + direction: | ○ → |
| Roads: | == |
| Forest: | ○ ○ |

COMMENTS

Nets are set across old logging roads leading to unused pasture/ag. fields, in a low density forest of primarily *Quercus*, *Liriodendrum*, and *Nissa* sp. Forest appears to have been logged approx 5 years ago. Net 1 is also set near some puddles on the road.



NET SITE HABITAT DESCRIPTION

Project #: 393.02 Date: 4 Jun 2012 Biologists: C. Hauser, M. Flynn
 Project Name: Dickenson School Site Name/ #: DS-2
 State: VA County: Dickenson USGS Quad: Clintwood

| Net/Trap/ or AnaBat | Net/Trap/ AnaBat Serial # | Latitude | Longitude | Picture # | Waypoint # |
|------------------------|------------------------------|-----------------|-----------------|----------------------------|------------|
| Net | 1 | 37° 08' 11.4 "N | 82° 23' 28.7 "W | Photo Jun 05 2:03:16 PM | 12DS-3 |
| Net | 2 | 37° 08' 11.3 "N | 82° 23' 27.2 "W | Photo Jun 05 2:01:22 PM | 12DS-4 |
| | | "N | "W | | |
| | | "N | "W | | |

Distance to closest water source (meters): 485m Type of water source: pond
 Water source name: unknown

ESTIMATED WATER SOURCE CHARACTERISTICS (IF UNDER NETS):

Bank Height: _____ meters Channel Width: _____ meters Stream Width: _____ meters
 Substratum: ___ Bedrock ___ Boulder ___ Cobble ___ Gravel ___ Sand ___ Silt/Clay
 Still Water Present (Y/N): _____ Average Water Depth: _____ m or cm Clarity (H,M,L): _____

VEGETATION:

Dominant Canopy Species (> 40 cm/16" dbh) Subdominant Canopy Species (< 40 cm/16" dbh)
Acer rubrum Acer saccharinum
Acer saccharinum Acer rubrum
Nyssa sylvatica Quercus alba

Estimated dbh range: Lg: 25 Sm: 16 Estimated dbh range: Lg: 15 Sm: 5

Relative abundance of dominant vs. subdominant (ratio): 1:10

Estimated canopy closure: ___ Closed Moderate ___ Open
 Roost tree potential consists of: Large Trees Snags ___ Neither
 Roost tree potential for the area is: High ___ Moderate ___ Low

Roost potential comments: large trees, snags, loose bark

Subcanopy clutter: ___ Closed Moderate ___ Open
 Subcanopy comprised largely of: Lower Branches of Canopy Trees Saplings Shrubs

Common Subcanopy Species: Rhododendron Acer rubrum
Liriodendron tulipifera

Habitat Description: nets over old logging roads in recently logged forest adjacent to denser forest
 AnaBat Habitat: _____

Check all that apply:

Mature Upland Forest Recently Logged Forest Crop/Pasture Land Other _____
 Young Upland Forest Forest Edge Stream/River _____
 Mature Lowland Forest Woodlot Vernal Pool _____
 Young Lowland Forest Old Field Deepwater Lake/Pond _____

Herbaceous Cover: ___ Sparse Moderate ___ Dense



NET SITE HABITAT DESCRIPTION (continued)

Project #: 393.02 State/County: VA-Dickenson Site Name/ #: DS-2 Initials: G/H



| LEGEND | COMMENTS |
|---|--|
| <p>Nets: ● — ●</p> <p>Net #</p> <p>Photo direction: # →</p> <p>Puddle: [hatched box]</p> <p>tree: ○</p> <p>forest boundary: [wavy line]</p> | <p>Nets are placed over old logging roads in wooded area between a very dense forest w/ a tight fitting, closed canopy, and an open, logged forest.</p> <p>Net 2 is placed at puddle edge.</p> |



BAT CAPTURE DATA

Project #: 393.02 Date: 4 Jun 2012
 Project Name: Dickenson School
 Biologists: C. Hauser, M. Flynn Site name/#: DS-2
 State: VA County: Dickenson
 GPS Unit #: 0050 Camera #: 5676 Canon

WEATHER DATA

| Time (xxxx h) | Temp (°C) | Wind Speed (estimated - see chart)* | % Cloud Cover (estimated) | Comments |
|---------------|-----------|-------------------------------------|---------------------------|---------------|
| 2030 | 16.7 | 0 | 98% | |
| 2100 | 16.4 | 0 | 98% | |
| 2130 | 16.1 | 1-3 | 98% | |
| 2200 | 16.0 | 1-3 | 85% | |
| 2230 | 15.6 | 4-7 | 85% | gusts 8-12mph |
| 2300 | 15.5 | 0 | 100% | |
| 2330 | 15.4 | 0 | 100% | |
| 0000 | 15.3 | 0 | 100% | |
| 0030 | 15.1 | 0 | 100% | |
| 0100 | 15.3 | 0 | 100% | |
| 0130 | 14.6 | 0 | 100% | |

| Net/Trap/ or AnaBat | Net/Trap/ AnaBat Serial # | Latitude | Longitude | Length (m) | Height (m) | Time Up (xxxx h) | Time Down (xxxx h) | Picture # | Waypoint # |
|---------------------|---------------------------|-----------------|-----------------|------------|------------|------------------|--------------------|---------------------------|------------|
| Net | 1 | 37° 08' 11.4 "N | 82° 23' 28.7 "W | 9 | 7.8 | 2045 | 0145 | Photo June 4 2012 1:18 PM | 12 DS-3 |
| Net | 2 | 37° 08' 11.3 "N | 82° 23' 27.2 "W | 6 | 7.8 | 2045 | 0145 | Photo June 4 2012 1:22 PM | 12 DS-4 |
| | | "N | "W | | | | | | |
| | | "N | "W | | | | | | |

Net Placement/Site Description: nets over old logging road near denser forest

| Capt # | Net/ Trap | Species | Time | Age (Ad/Jv) | Sex (M/F) | Repro. ² | Wt (g) | RFA (mm) | Belly (F/M/E) | Wing Index* (0-3) | Comments Picture # /Guano/Hair Sample |
|--------|-----------|-------------------------------|------|-------------|-----------|---------------------|--------|----------|---------------|-------------------|---------------------------------------|
| 1 | 2 | <i>Eptesicus fuscus</i> | 2130 | Ad | M | ↑ | 17 | 46 | F | 0 | |
| 2 | 2 | <i>E. fuscus</i> | 2130 | Ad | F | L | 18 | 46 | F | 0 | |
| 3 | 2 | <i>E. fuscus</i> | 2135 | Ad | F | PG | 20.5 | 50 | M | 0 | |
| 4 | 2 | <i>E. fuscus</i> | 0015 | Ad | M | ↓ | 16 | 48 | F | 1 | |
| 5 | 1 | <i>Myotis septentrionalis</i> | 0140 | Ad | F | L | 7.5 | 38 | M | 0 | VDGIF A51019 |

¹ Reproductive Condition: Female = NR/PG/L/PL; Male = ↑/↓ * Refer to table on the back

APPENDIX B
MIST NET SITE PHOTOGRAPHS





Site DS-1, Net A



Site DS-1, Net B



Site DS-2, Net A



Site DS-2, Net B