Results of Bat Survey for Proposed Bureau of Engraving and Printing Site

On Beltsville Agricultural Research Center

Prince Georges County, Maryland

Prepared for:

Bureau of Engraving and Printing
Washington, D.C.

Prepared by:

Eric Britzke, Ph.D.
Research Wildlife Biologist
U.S. Army Engineer Research and Development Center
Building 3270, Room 1218
3909 Halls Ferry Road
Vicksburg, MS 39180

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Introduction

Bat conservation and management has become a major concern on state, federal, and private lands throughout the United States. Bats represent an important component of many ecosystems and contribute significantly to an area's biodiversity. A greater proportion of bat species are considered rare, sensitive, threatened or endangered than any other group of mammals in North America within some regulatory or assessment frameworks. Reasons for these listings include loss of roosting and/or foraging habitat, pesticides, persecution, and disturbance of hibernacula (Racey and Entwistle 2003).

Recently, wind energy development (Johnson et al. 2003, Fiedler 2004, Arnett et al. 2008) and White-nose Syndrome (WNS) have emerged as additional threats (USGS 2008). WNS is an emerging disease that is responsible for the death of over 6 million hibernating bats. These declines has resulted in the once common northern long-eared bat (*Myotis septentrionalis*) being listed as federally threatened in 2015. Mortality rates observed at wind energy production facilities have been variable, but at one facility in West Virginia, > 40 bats per turbine per year were killed including the Lasurine or "tree" species not believed to be impacted by WNS (Arnett et al. 2008). As bat populations continue to experience stress from these sources, understanding bat distributions becomes more important.

Bats in the eastern United States use echolocation to orient to their surroundings and to locate prey. Ultrasonic detectors are now widely available and allows researchers to detect echolocation calls to assist in studies of bat ecology. Research has shown that many species can be identified using their echolocation calls and thereby establish presence or absence at a site (Krusic and Neefus 1996, Britzke et al. 2011). Ultrasonic detectors have many advantages over mist netting, including detection of more species at a site than mist nets (Murray et al. 1999,

O'Farrell and Gannon 1999), sampling multiple sites without a researcher present, and sampling habitats that lack a constricted flyway necessary for traditional capture techniques. Use of ultrasonic detectors has the potential to increase detectability of some species, thereby improving the efficiency of bat surveys. This has prompted the U.S. Fish and Wildlife Service to incorporate acoustic surveys into the survey guidance for federally listed bats species in the eastern United States.

Methods

Data Collection

The proposed Bureau of Engraving and Printing (BEP) site, located on the Beltsville Agricultural Research Center (BARC), covers approximately 104 acres in Prince George's County, Maryland (Fig 1). Sampling was conducted for listed bat species following the USFWS 2019 Bat Survey guidance. Bat activity was recorded using the Anabat SD2 bat detector system (Titley Scientific; www.titley-scientific.com) connected to a directional microphone set at 45 degree angle. Settings for the detector were as follows: sensitivity at 6.5, audio division at 16, data division at 8, and zero crossing files. Prior to initial deployment, units were calibrated using an ultrasonic pest repeller following Larson and Hayes (2000). The units were housed inside waterproof boxes and mounted on top of a tripod (Fig 2). The stationary units were placed at suitable locations within the forested habitats approximately 1m above ground level and approximately 10 m from vegetation directly in front of the microphone by Dr. Eric Britzke (Appendix A, B). Sampling was only conducted on nights when temperatures were high enough to maintain bat activity, there was no precipitation, and wind speed was minimal (Appendix C). Recording was set to begin 30 minutes before sunset and stop 30 minutes after sunrise.

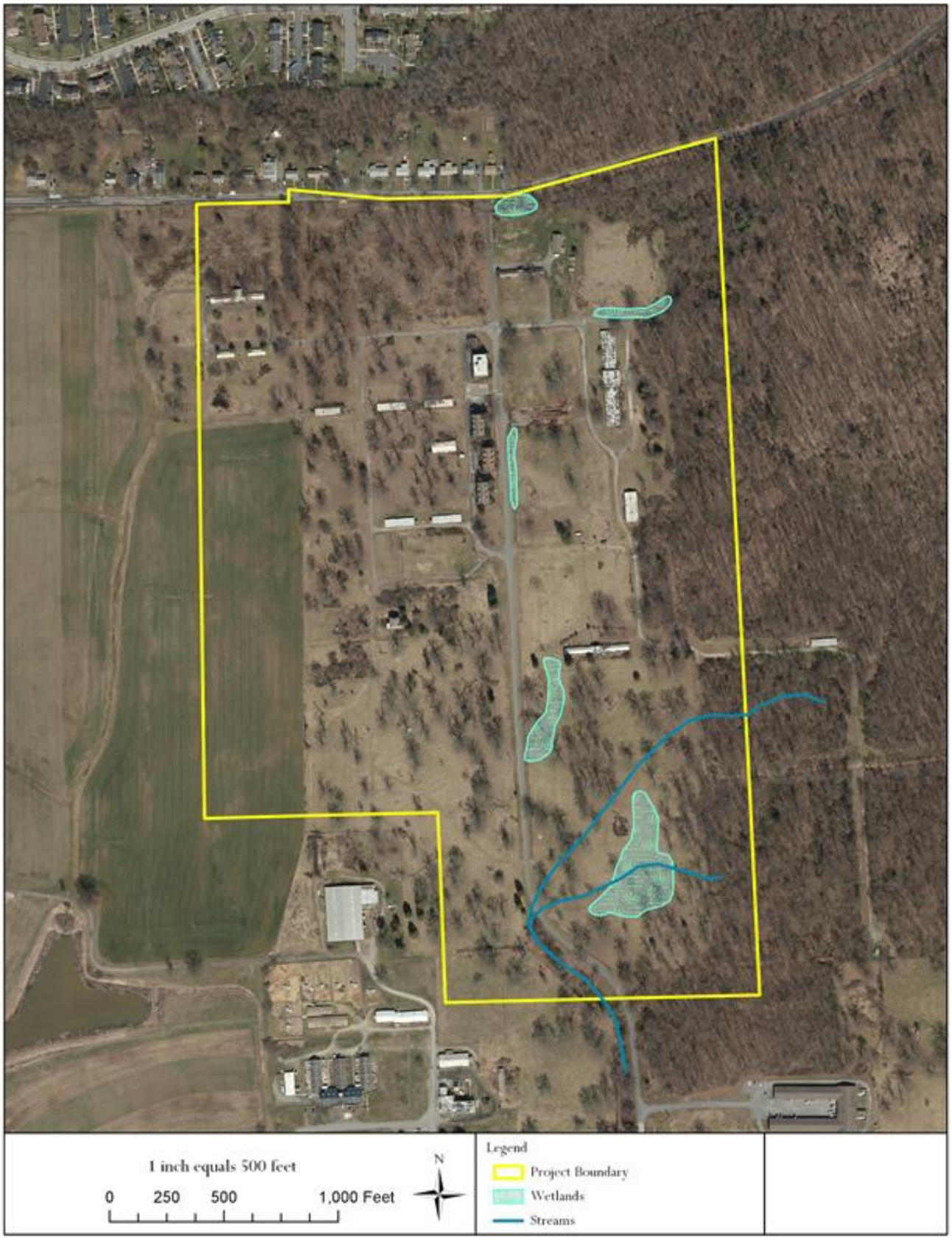

Figure 1 – Map of BEP site being sampled in June 2019.

Figure 2 – Example of Anabat bat detector setup for recording at US. Department of Agriculture, Maryland during June 2019.

Data analysis

Upon completion of 4 nights with suitable weather conditions, equipment was picked up and the CF card was removed. The CFCRead program was used to download the data on a laptop computer using the settings found in Appendix D. Downloaded files were organized by date within site and analyzed using the Kaleidoscope Pro version 5.1.9g (Wildlife Acoustics, Inc., Maynard, MA). The program filters files, extracts parameters, and classifies files based on statistical comparison to a known call library. The Bats of North America 5.1.0 classifier which is built into Kaleidoscope Pro was selected and the following were specified as candidate species: hoary (*Aeorestes cinereus*), big brown (*Eptesicus fuscus*), eastern red (*Lasiurus borealis*), silver-haired (*Lasionycteris noctivagans*), little brown (*M. lucifugus*), northern long-

eared (*Myotis septentrionalis*), Indiana (*Myotis sodalist*), evening (*Nycticeius humeralis*), and tri-colored bats (*Perimyotis subflavus*). An output file is created that summarizes the bat activity at the site as well as determines species presence using a maximum likelihood estimator (Britzke et al. 2002) (Appendix E). Results from Kaleidoscope Pro were manually verified by Dr. Eric Britzke based on expert knowledge of bat species call characteristics.

Results

A total of 3 points were sampled in for 5 nights each yielding 15 detector nights (Fig 3). Recording resulted in sampling of 969 files (mean = 53.833; range 0-336 files / night). A total of 4 bat species were detected: big brown, eastern red, hoary, and tri-colored. Red bats were detected at sites 1 and 2, big browns at sites 1 and 2, hoary bats at site 1, and tri-colored bats at site 1 (Table 1).

Figure 3. Map showing location of 3 sites sampled with Anabat detectors on proposed BEP site, Prince Geroges County, Maryland in June 2019.

Table 1. Results of the Anabat bat survey conducted at U.S. Department of Agriculture, Maryland in June 2019.

Site	Date	Total # of Files	Bat Species Detected
1	6/4/2019	15	Eastern red, hoary
	6/5/2019	41	Big brown, eastern red, hoary
	6/6/2019	30	Hoary
	6/7/2019	22	Big brown, eastern red, tri-colored
	6/8/2019	37	Big brown, eastern red
2	6/4/2019	173	Big brown, eastern red
	6/5/2019	105	Big brown, eastern red
	6/6/2019	58	Big brown, eastern red
	6/7/2019	144	Big brown, eastern red
	6/8/2019	336	Big brown, eastern red
3	6/4/2019	4	None
	6/5/2019	0	None
	6/6/2019	1	None
	6/7/2019	1	None
	6/8/2019	2	None

Discussion

Bat activity levels at site 3 were much lower compared to sites 1 and 2. This was likely due to site 3 sampling a smaller canopy gap in relatively thick forest. Overall the area included in the project was dense vegetation which makes it more difficult for bats to forage. In addition, there were a lack of suitable snags observed in the project area. Red bats and big brown bats were commonly encountered during this survey. This was expected as these 2 species are the most common in the area. Red bats will roost in foliage and there were numerous buildings that could serve as roost sites for big brown bats.

Acknowledgements

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Appendix

Appendix A – GPS coordinates and habitat type for sites sampled at U.S. Department of Agriculture, MD in June 2019. GPS coordinates are accurate to within 30 m.

Site	County	Latitude	Longitude	Habitat
1	Prince Georges	39.03914	-76.88449	Forest Edge
2	Prince Georges	39.04161	-76.88111	Canopy Opening
3	Prince Georges	39.0382	-76.88042	Canopy Opening

Appendix B – Photos of sites where Anabat SD2 detectors were deployed taken from the back and side of the detector at U.S. Department of Agriculture, MD in June 2019.

Site 1

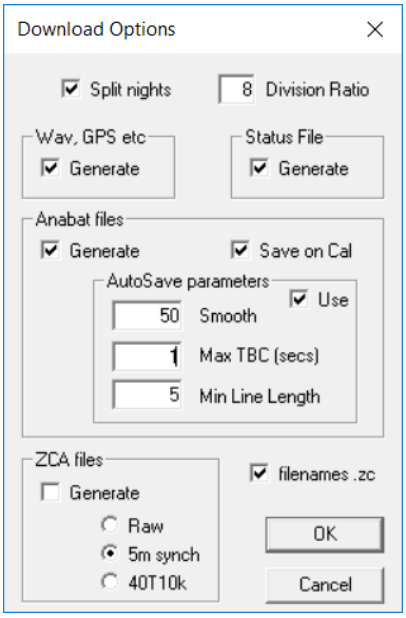
Site 2

Site 3

Appendix C – Weather data for U.S. Department of Agriculture, MD in June 2019.

Date	Sunset	Sunrise	Min Temp (°F)	Max Temp (°F)	Average Temp (°F)	Humidity (%)	Precipitation (in.)	Time	Wind Direction	Wind Speed (mph)	Moon Phase	Moon %
6/4/2019	20:29	5:43	62	65	63.44	75	0.00		S	8.44	Waxing	1.5
6/5/2019	20:30	5:43	70	74	71.84	98	0.02		SSW	9.05	Waxing	5.55
6/6/2019	20:30	5:43	70	77	72.44	92	0.00		NNE	3.33	Waxing	12.01
6/7/2019	20:31	5:42	65	72	68.33	90	0.00		NE	4.33	Waxing	20.55
6/8/2019	20:31	5:42	65	71	67.20	85	0.00		NE	7.50	Waxing	30.65
6/9/2019	20:32	5:42	63	64	63.38	100	0.04	1.33	NE	9.06	Waxing	41.73

Appendix D – Settings used in CFCRead to download data from Anabat SD2 detectors



Append E – Maximum likelihood estimator (MLE) results for each site and survey date at U.S. Department of Agriculture, MD in 2019

Site	Date	EPFU	LABO	LACI	LANO	MYLU	MYSE	MYSO	NYHU	PESU
1	6/4/2019	0.8788	0.0003	0.0000	0.9129	1.0000	1.0000	1.0000	1.0000	0.2089
	6/5/2019	0.0000	0.0041	0.0000	0.2812	0.0460	1.0000	1.0000	1.0000	1.0000
	6/6/2019	0.7996	0.2431	0.0000	0.8889	0.4484	1.0000	1.0000	0.6523	0.1679
	6/7/2019	0.0005	0.0012	0.7119	0.2909	1.0000	1.0000	1.0000	0.9503	0.0232
	6/8/2019	0.0001	0.0000	0.2293	0.4734	0.7256	1.0000	1.0000	0.9897	0.5268
	6/9/2019	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
2	6/4/2019	0.0000	0.0172	1.0000	1.0000	0.0000	1.0000	1.0000	0.9971	1.0000
	6/5/2019	0.0000	0.0204	1.0000	1.0000	0.0001	1.0000	0.1760	0.9751	0.0001
	6/6/2019	0.0000	0.0000	0.7491	1.0000	0.0002	1.0000	0.7340	1.0000	1.0000
	6/7/2019	0.0000	0.0014	1.0000	1.0000	0.0030	1.0000	0.5443	1.0000	1.0000
	6/8/2019	0.0000	0.0003	1.0000	1.0000	0.0000	1.0000	0.6658	0.9724	1.0000
	6/9/2019	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
3	6/4/2019	1.0000	1.0000	0.0626	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
	6/5/2019	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
	6/6/2019	1.0000	1.0000	0.0626	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
	6/7/2019	1.0000	1.0000	0.0626	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
	6/8/2019	1.0000	1.0000	1.0000	1.0000	1.0000	0.0233	1.0000	1.0000	1.0000
	6/9/2019	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Appendix E – Resume for Eric Britzke

Education

Ph.D., Environmental Sciences with Concentration in Biology, Tennessee Technological University, 2003.
M.S., Biology, Missouri State University, 1998.
B.S., Biology, Missouri State University, 1994.

Work Experience

United States Army Engineer Research and Development Center, 11/08 – Present. Research Wildlife Biologist.
Independent Consultant, 6/05 – 11/08. Biologist.
East Arkansas Community College, 9/04 – 6/05. Environmental Science Specialist.
Clemson University, 9/03 – 8/04. Post Doctoral Fellow.
Tennessee Technological University, 1/01 – 5/01. Instructor.
Tennessee Technological University, 5/99 – 5/03. Graduate Research Assistant.
United States Forest Service, 10/98 – 11/98; 5/99- 8/99. Biological Aid.
Missouri State University, 8/95 – 5/98. Graduate Teaching Assistant
Missouri State University, 2/95–10/95; 1/97 – 12/97; 2/98–10/98. Graduate Research Assistant.

Organizations, Panels, Committees, and Awards

Conservation Research Award, National Military Fish and Wildlife Association, 2014
Achievement Medal for Civilian Service, 2013
DoD representative, WNS National Plan Steering committee
WNS Coordination Team, WNS National Plan
Chair, WNS Disease Surveillance Working Group
National Military Fish and Wildlife Association, 2009- Present
Central Regional Director, 2011-2013
Chair, Bat Working Group, 2012-2014
Southeastern Bat Diversity Network, 1999 – Present.
Member of the Board of Directors 2003-2007
American Society of Mammalogists, 1995 - 2012
Wildlife Society, 2004 – 2012
Student Presentation Award Sigma XI, 1995, 1st place.
Golden Key National Honor Society
Wings Across the Americas Bat Conservation Award, 2008
Wings Across the Americas Bat Conservation Award, 2010

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