

Resampling Bat Activity at Marsh-Billings-Rockefeller National Historical Park Using Passive Acoustic Monitoring After the Regional Introduction of White Nose Syndrome

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Introduction

We resampled bat activity at Marsh-Billings-Rockefeller National Historical Park (MBRNHP) in 2011 to compare results with similar sampling conducted in 2001 (Reynolds and McFarland 2001). We used an Anabat bioacoustics monitoring system to document the changes in bat activity and diversity that may have occurred in the park due to the region-wide spread of white-nose syndrome (WNS) and to archive acoustic monitoring for future comparisons.

A general bat inventory was conducted at Marsh-Billings-Rockefeller National Historical Park (MBRNHP) in July-August 2001 (Reynolds and McFarland 2001). Acoustic monitoring resulted in 1,336 recorded call files from at least seven species. The forty (40) non-Myotis calls belonged to *Eptesicus fuscus* (n=16), *Pipistrellus subflavus* (n=15), *Lasiurus cinereus*, (n=5), *Lasionycteris noctivigans* (n=3), and *Lasiurus borealis* (n=1). Most of the acoustic activity for the non-Myotis spp was concentrated in fields, although several calls from *P. subflavus* were recorded along a roadway within the MBRNHP. The site with the highest level of activity (calls/hour) was Pogue East; particularly at the detector set out over the water near the northern edge of the pond. Most feeding 'buzzes' were detected over water, confirming that water sources are primarily attracting feeding and drinking bats whereas trails are being used as travel corridors. The Pogue was found to be critical habitat for bats in the park.

Each detection system consisted of an ANABAT ultrasonic detector attached to a zero-crossing analysis interface module (ZCAIM). 'Real-time' monitoring of the echolocation calls was achieved by attaching the ZCAIM to an IBM-compatible laptop. All calls were saved to the laptop computer in site-specific directories for analysis. The system was operated on remote mode (automatic data collection) using a weatherproof enclosure. In order to sample continuously throughout the evening, the detector, ZCAIM, and

computer were connected to a DC-AC transformer and powered by a 12V battery.

In February 2006 near Albany, New York, a caver photographed hibernating bats with an unusual white substance on their muzzles. He noticed several dead bats. The following winter, New York Department of Environmental Conservation biologists documented what they called white nose syndrome after seeing bats behaving erratically, bats with white noses and a few hundred dead bats in several caves. More than a million hibernating bats have died since then, making WNS the worst wildlife health crisis in recent history.

Methods

An ANABAT SD2 compact flash bat detector from Titley Scientific was placed on the northeast shoreline of the Pogue for 5 nights (August 8, 10-12, 16). Bat calls were passively recorded each night from sunset to sunrise. Recorded call files were downloaded each day for later analysis. We examined all recorded files using Bat Call ID 10 (BCID 10, Allen 2011) with potential species set to the 9 known for Vermont (Appendix).

Results and Discussion

We passively monitored bat calls on the Pogue during 5 nights for a total of 45 hours of monitoring during early August 2011 (Table 1). BCID software identified 100 call files (2.2 / hour). Similar passive recordings made in 2001 on the Pogue for just 19.5 hours over 3 nights at the end of July to August 1 recorded 1,247 calls (63.9 calls/hour). In 2001 most of the detections (1,171) were *Myotis* species, which likely consisted mainly of Little Brown myotis (*M. lucifugus*), while in 2011 we detected just 63 *M. lucifugus* despite over twice as much sampling time.

In 2001 *Myotis* calls were identified as *Myotis* species or Northern Long-eared Bat (*M. septentrionalis*). BCID software attempts to identify *Myotis* to species level, but it is designed to give priority assignment of similar calls to Indiana Bat (*M. sodalis*) because of its endangered species status. Indeed, in examining the identified *Myotis* species from 2011 we found that BCID software identified 8 call files as potential Indiana Bat (Table 2). These are likely Little Brown myotis calls, but further examination by an acoustic bat specialist should be completed for final verification.

As expected, we found a drastic drop in *Myotis* activity on the Pogue. Several bat species found in Vermont are affected by WNS: Big brown bat (*Eptesicus fuscus*), Eastern small-footed myotis (*Myotis leibii*), Indiana bat, Little brown myotis and Northern long-eared myotis. The National Plan for Assisting States, Federal Agencies, and Tribes in Managing White-Nose Syndrome in Bats outlines the actions necessary for state, federal and tribal coordination, and provides an overall strategy for investigating the cause of WNS and finding ways to manage it (for more information, see <http://www.fws.gov/WhiteNoseSyndrome/planning.html>).

Table 1. Summary of acoustic monitoring results from 2001 and 2011 at the Pogue pond.

	Pogue West 07/24/2001	Pogue East 07/25/2001	Pogue West 08/01/2001	Total 2001		Pogue East 08/08/2011	Pogue East 08/10/2011	Pogue East 08/11/2011	Pogue East 08/12/2011	Pogue East 08/16/2011	Total 2011
First Activity:	20:55	20:32	20:14			21:11	20:49	23:34	20:39	20:28	
Last Activity:	22:54	1:02	1:30			4:29	4:02	5:18	2:51	4:49	
Total Hours Sampled:	2.5	9	8	19.5		9	9	9	9	9	45
Myotis spp.	190	859	122	1171		13	16	19	3	12	63
Myotis septentrionalis	9	44	14	67		1	0	0	0	0	1
Perimyotis subflavus	0	0	1	1		0	1	0	0	0	1
Eptesicus fuscus	0	0	2	2		1	0	0	0	0	1
Lasiurus cinereus	0	2	3	5		3	2	0	0	2	7
Lasiurus borealis	0	1	0	1		1	7	5	1	2	16
Lasionycteris vespertilionis	0	0	0	0		6	1	0	1	1	9
unknown call						2	0	0	0	0	2
Total Anabat Calls:	199	906	142	1247		27	27	24	5	17	100
Anabat Calls/Hour	79.6	100.7	17.8	63.9		3.0	3.0	2.7	0.6	1.9	2.2

Table 2. Summary of Myotis species preliminarily identified by BCID 10 software from call recordings captured at the Pogue in 2011.

	August 8	August 10	August 11	August 12	August 16	Total
M. sodalis ¹	4	1	2	0	1	8
M. lucifigus	9	14	17	3	10	53
M. leibii	0	1	0	0	0	1
M. septentrionalis	1	0	0	0	0	1

¹Identification of recorded calls to M. sodalis by BCID 10 software produces higher than normal false positives so that researchers will not miss any potential registrations of this endangered species. M. sodalis calls should be considered “potential” or “possible” M. sodalis only until verified by an acoustic expert.

Literature Cited

Allen, C.R. 2011. BCID 10 Manual 2011 (7/8/2011). Bat Call Identification, Inc. 18pp.

Reynolds, D.S. and K.P. McFarland. 2001. Bat Biodiversity Survey Marsh-Billings-Rockefeller National Historic Park: July 24 – August 02, 2001. Vermont Institute of Natural Science. 17pp.

Appendix. Vermont bat fauna common and scientific names.

Common Name

1. Little brown myotis
2. Eastern small-footed myotis
3. Northern long-eared myotis
4. Indiana bat
5. Big brown bat
6. Tri-colored bat
7. Eastern red bat
8. Hoary bat
9. Silver-haired bat

Scientific Name

Myotis lucifugus
Myotis leibii
Myotis septentrionalis
Myotis sodalis
Eptesicus fuscus
Perimyotis subflavus
Lasiurus borealis
Lasiurus cinereus
Lasionycteris noctivagans