

### PROJECT DESCRIPTION

Baseline surveys for bat diversity on National Wildlife Refuges are lacking. This taxa has been identified in many Comprehensive Conservation Plans and Habitat Management Plans as species warranting special consideration for management. These small, nocturnal, aerial, and sometimes migratory mammals are difficult to survey via traditional wildlife techniques. Little is known about forest dwelling bat population abundance and many species are thought to be declining. In most cases, no data is available on occurrence, distribution, or population estimates for a refuge or at the landscape scale.

This project is designed to provide a baseline inventory of bat species occurring on at least 37 refuges in Region 4. This information will also provide a reference population index to assess changes in species population through annual monitoring of roadside transects. The long-term monitoring will provide a means to evaluate local, regional, and landscape level changes in 13 bat species. In the future, more bat species are likely to undergo status reviews in light of the western and southerly expansion of White-nosed Syndrome, which warrants improvements in population monitoring.

Acoustical detection equipment and automated software for species identification in conjunction with a mobile sampling methodology provides a relatively unbiased measure of species abundance. Fundamental to this abundance measure is that data collection protocol be standardized among sampling areas and be spatially and temporally repeated across the population of interest. Population trend analysis can be evaluated on a landscape scale using this protocol.

The use of acoustical bat detectors and advances in echo classification software provides a robust approach to passively collect occurrence data

across large geographic areas for both inventory and monitoring of bats. This new approach when applied across a repetitively surveyed transect provides a population index on a species by species basis. A standardized protocol for acoustical population monitoring has been developed to facilitate refuge level data to be directly integrated with other bat monitoring initiatives occurring by state and federal partners at regional and national levels.

### OBJECTIVES AND ALTERNATIVES

1. Determine baseline occurrence of bat species on 30+ refuges in Region 4 during the breeding season.
2. Index bat populations on a species by species basis to monitor population trends at the refuge, landscape and regional level using standardized protocol with acoustical detection data loggers.
3. Examine bat species occurrence based on habitat type classification.
4. Integrate indices of bat species abundance with other agencies to support Strategic Habitat Conservation initiatives for these species on a broader geographic area.

### METHODS AND PROTOCOLS

Anabat SD2 detectors are utilized to inventory and monitor bats on refuges. A 20-30 mile transect is driven through the refuge with a microphone attached to the roof of the vehicle. Calls are subsequently identified to individual species using automated acoustical bat classification software under development. A standardized protocol proposed for use in the Northeast US has been widely adopted for larger application. A refined protocol specific to implementation of this project has been developed: **Mobile Acoustical Bat Survey Protocol, U. S. Fish and Wildlife Service, Region 4, Division of Refuges (May 5, 2012)**. A standardized process to conduct data analysis and management has also been developed: **Mobile Acoustical Bat Monitoring Data Management**

**Guidelines, U.S. Fish and Wildlife Service, Region 4, Inventory and Monitoring Network (Sept. 5, 2012).**

## DATA MANAGEMENT

Centralized data storage has been established on the Region 4 Inventory and Monitoring SharePoint Site (<https://fishnet.fws.doi.net/regions/4/nwrs/IM/bats/default.aspx>). An Info form file has been created to upload survey metadata for each survey period. Acoustical bat calls are being archived as raw call files under a hierarchy folder system for each refuge or ES/transect/year to insure long-term data integrity. Opportunities to establish a national multi-agency data storage site for various types of acoustical bat data sets is being pursued.

## DATA ANALYSIS / MODELS

Data analysis has initially been restricted to determination of the number of bat calls along each transect and geo-referencing these positions. Models to auto-classify the calls to specific bat species include the software programs BCID and EchoClass which are undergoing additional beta testing for verification and validation of their accuracy. Future modeling will include long-term trend comparisons across each refuge against the baseline information collected. Eventually, the contributions of other agencies using the same protocol will be synthesized and examined to explore regional and national bat population trends.

## ACCOMPLISHMENTS AND MANAGEMENT IMPLICATIONS

The inventory and monitoring project was funded in late FY 2011. Nineteen Anabat SD2 detectors and accessories were obtained and distributed to individual wildlife refuges and three ecological services offices that had agreed to participate in the project. These 19 detectors supplemented the distribution of 10 detectors provided to other refuges in the region in FY 2010 to gather similar

inventory and monitoring bat data following the same protocol.

The first full year of the project was undertaken in 2012. Two acoustical bat monitoring workshops were held in Vicksburg, MS and Carolina Sandhills NWR. These workshops were attended by 33 FWS employees, a state biologist from Mississippi and a USGS Scientist. The workshop at Carolina Sandhills was conducted under contract with Jane Tyburec (Bat Conservation International) and Sybil Amelon (USDA Forest Service) to provide instruction on the use of Anabat SD2 detectors and visual classification of the calls. The workshop at Tara Wildlife in MS was led by Dr. Eric Britzke (USACE, Engineer and Research Development Center).

Refuges and ES Offices were able to collect acoustical bat calls along 50+ roadside transects between June 1 and July 20. Most refuges were able to conduct repeated sampling of the same route 2 or 3 times to assist in evaluation of sampling variability and probability of detection.

The I & M Terrestrial Ecologist and Assistant Database Manager are supporting all aspects of the field work, data storage, and initial summary. Most data from the 2012 survey period has been uploaded to the regional SharePoint site. The project will be conducted annually for a minimum of 5 years and is expected to expand within Region 4 and Region 3. Additional participation may occur within Regions 5 and 2.

## PARTNERS

A partnership exists with Dr. Eric Britzke (Army COE ERDAC) for the development of an automated acoustical bat classification software program and eventual regional analysis of the mobile acoustical bat data. Other important partners include the I & M Network staff, GCPO LCC Science Coordinator, 3 Ecological Service offices and 37 NWRs. Moreover, six refuges in Region 3 and one in Region 2 have initiated the same monitoring protocol and contributing data to the Region 4 site. The Asheville Ecological Services

# Bat Species Occurrence And Long-Term Bat Population Monitoring on Refuges Using Acoustical Detection

**FY 2011**

Office has been provided 2 bat detectors and expanded bat monitoring in western North Carolina through collaboration with the North Carolina Wildlife Commission using a citizen science base program to collect data. Region 5 provided initial support towards a centralized database to store data from a pilot study in 2010.

## **SOURCES OF SUPPORT**

This project has been supported through Region 4 FY 2011 funding distributed by the RFP of Inventory and Monitoring to purchase equipment and host training workshops. Previously FY 2010 funding was utilized to purchase supplies. In kind support has been provided by numerous staff on Refuges and ES Offices for time and vehicles to collect field data. The I & M Network has worked closely on the project to facilitate implementation across the region and promote the work within the GCPO LCC to Regions 2, 3, and 5. The science coordinator for the GCPO LCC provided support for the project proposal and administration of funds through an existing CESU agreement.

## **MORE INFORMATION**

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