



WBWG NEWS

Volume 8, Number 2

Fall 2013



Attic bat roost (Wade Alcock photo)



WESTERN BAT WORKING GROUP NEWSLETTER

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The Western Bat Working Group (WBWG) is a partner in the Coalition of North American Bat Working Groups. The WBWG is comprised of agencies, organizations and individuals interested in bat research, management, and conservation from 13 western States, the Provinces of British Columbia and Alberta, and Northern Mexico.

Membership in the WBWG is open to anyone who is interested in participating in bat conservation. There are no membership fees or dues. Funding for bat conservation work accomplished by the WBWG is generated by State and Federal land management agencies, non-governmental organizations, and by donations from individual members.

Visit our web page <http://wbwg.org> to contact us, find information on bat conservation and upcoming meetings, become a member, link to state or provincial bat working groups, or download previous issues of this newsletter.

President	Angie McIntire
Vice President	Laura Ellison
Treasurer	Brad Phillips
Secretary	Becky Abel
At-large representatives:	Amie Shovlain, Roger Rodriguez
Presidential appointees:	Rob Schorr, Dave Johnston

Newsletter Editors: Lorraine Andrusiak, Bronwyn Hogan

NOTE: Generally common names are used for bat species in the newsletter. Corresponding scientific names are listed below.

Common Name	Scientific Name
Arizona myotis	<i>Myotis occultus</i>
Big brown bat	<i>Eptesicus fuscus</i>
Cave myotis	<i>Myotis velifer</i>
Eastern red bat	<i>Lasiurus borealis</i>
Fringed myotis	<i>Myotis thysanodes</i>
Hoary bat	<i>Lasiurus cinereus</i>
Little brown myotis	<i>Myotis lucifugus</i>
Long-eared myotis	<i>Myotis evotis</i>
Long-legged myotis	<i>Myotis volans</i>
Brazilian free-tailed bat	<i>Tadarida brasiliensis</i>
Northern myotis	<i>Myotis septentrionalis</i>
Pallid bat	<i>Antrozous pallidus</i>
Pocketed free-tailed bat	<i>Nyctinomops femorosaccus</i>
Silver-haired bat	<i>Lasionycterus noctivagans</i>
Southwestern myotis	<i>Myotis auriculus</i>
Townsend's big-eared bat	<i>Corynorhinus townsendii</i>
Western small-footed myotis	<i>Myotis ciliolabrum</i>
Yuma myotis	<i>Myotis yumanensis</i>



NORTH AMERICAN BAT MONITORING PROGRAM (NABAT) – PARTICIPATION IN 2014 PILOT STUDIES BEING SOUGHT

The last of 4 workshops for the planning of the North American bat monitoring program took place in Fort Collins, Colorado 4 – 7 Nov 2013. Fifteen biologists/statisticians from diverse agencies gathered for the final think tank session to establish framework and design. Over the course of the 4 days, the group worked on writing a technical document, including protocols for gathering acoustics (stationary passive stations and driving transects) and colony count data, which will be released in spring 2014.

The goal of this program is continent-wide monitoring of bats at local to range-wide scales. Data will be collected in a continental 'Bat Population Data (BPD) Project' and analyzed for trends in relative population abundance and species distributions. This program will provide to biologists and managers "State of North American Bats" reports, trend analyses to facilitate assessment of impacts of threats such as white-nose syndrome, climate change, and wind energy development.

The program is designed with the best knowledge to date, although there is much that will be learned in pilot studies to refine the design, and thus it is expected this program will evolve over time. Currently, the base unit of the program is 10 km x 10 km grid cells overlaid across Canada, US and Mexico. A weighted random draw will provide a list of grid cells for monitoring. It will be up to agencies such as state wildlife programs, Heritage Programs, National Parks, USFWS refuges, biologists, provincial governments, NGO's, Community Bat programs, etc. to 'adopt a grid cell' for long term monitoring. The NABat committee is looking for interested parties to

pilot this program in their area(s) during the summer of 2014. The design now (pending peer review) is that 2 – 4 bat detectors would be deployed passively for 4 – 7 nights within one 10 km x 10 km grid cell, and a road within this grid would be driven on 2 nights during this same deployment period.

The road could be as long as 30 km and extend into neighboring grid cell(s), and would be driven at 25-30 km/hr with a bat detector/microphone on the roof of the vehicle. Colonies of bats that can be counted should also be included in the BPD data and may be valuable in the overall statistical analyses over time. "Legacy data" for counts of bats done in past years are currently being incorporated into the BPD, and locating new summer and winter colonies for future monitoring is encouraged. If you are interested in participating in a pilot study in 2014, or would like more details, contact Laura Ellison ellisonl@usgs.gov, Cori Lausen clausen@wcs.org, or Susan Loeb sloeb@clemson.edu.





BOB BERRY FUND SCHOLARSHIP 2013 AWARDS

The impetus behind the generous donations to this fund is to perpetuate Bob's legacy of



assisting others. Bob utilized his engineering and computer skills to refine the tools used for bat-related field work, and to help people to understand the different and changing technologies. Bob offered his expertise to many students and agency biologists from 1980 until his death in 2008. The goal of these awards is to facilitate research by providing current technology and training from the developers of the technology. Pat Brown-Berry will again match cash donations up to \$1,000 in 2014 for the Bob Berry Fund. The hope is to make an award every other year at the biennial meeting of WBWG.

Some excellent proposals were received and awards presented at the biennial meeting of the WBWG in Santa Fe in April 2013. The WBWG scientific research advisory committee reviewed the proposals. The recipients will be presenting the results of their research via posters at the 2015 meeting. The following awards were given:

The Bob Berry Holohil Award: Devaughn Fraser (UCLA) ('**How chronic exposure to cholinesterase inhibiting insecticides**

(ChEIs) affects health, diet, foraging activity and demography of bats in California's Central Valley') received six transmitters donated by Holohil and a \$1,000 cash award from the Bob Berry Fund for receiver purchase or to cover research expenses.

The Bob Berry Titley Electronics Award: Christian Engelstoft (Habitat Acquisition Trust) ('**Developing a Community Bat Project in southern Vancouver Island, B.C., Canada')** received an AnaBat SD2 receiver and a free spot in one of the AnaBat training classes donated by Titley Electronics.

The Bob Berry Binary Acoustic Technology Award: Juliet Craig (Kootenay Community Bat Project) ('**Community Outreach, Roost Identification, and Population Monitoring through Community Bat Projects in British Columbia')** received an AR125 Ultrasonic Receiver, SPECT'R software and an FR125 field recorder donated by Mark and Kim Jensen.

The Bob Berry SonoBat Award: Nancy Buschhaus (University of Tennessee at Martin) ('**Pre-restoration bat species richness at Kimball Creek in De Beque, Colorado')** received a SonoBat full software suite and \$500 donated by Joe Szewczak and an additional \$500 from the Bob Berry Fund to cover training or equipment expenses.

The Bob Berry Wildlife Acoustics Award (new in 2013) was split: Elissa Olimpi (University of California, Santa Cruz) ('**Bat conservation in agroecosystems, Central Coast, CA')** received an Echo Meter EM3 detector and Nicholas Goforth (Texas Tech University) ('**Wildfires and prescribed burns on bat activity levels and prey abundance in northern New Mexico')** attended the Wildlife Acoustics class in Santa Fe after the conference, donated by Wildlife Acoustics.

Donations to the fund are always welcome!
-Pat Brown-Berry



STATE/PROVINCIAL UPDATES

USA

Alaska

Autumn Acoustic Surveys For Little Brown Bats Along Turnagain Arm in South-central Alaska

Biologists David Tessler and Marian Snively (Alaska Department of Fish and Game) and Jessica Ilse (Chugach National Forest) partnered with students at University of Alaska Anchorage to investigate the seasonal disappearance of little brown bats in South-central Alaska. Three students in the undergraduate/graduate course "Exploration Ecology," taught by Doug Causey, worked together with the biologists to deploy AnaBat and Wildlife Acoustics ultrasonic detectors at eight sites along Turnagain Arm, stretching from south Anchorage to Portage Valley. Tessler, Ilse, and Snively taught the students the basics of bat ecology and how to use the equipment to gather and process echolocation data. The detectors were deployed from 26 September through 24 November 2012 to quantify the time, number, and frequency of the bat calls. Students organized themselves to retrieve and replace recording cards and renew instrument batteries on a weekly basis. The last week of September had little bat activity at any of the sites, likely due to a strong early season winter storm that left 10cm of snow. Calling was detected at seven of the eight sites with most activity occurring in early October. Activity ranged from 19:00 to 07:00 with most calls recorded between 23:00 and 04:00. The last date calls were detected was 12 October. University of Alaska Anchorage, Alaska Department of Fish and Game, and Chugach National Forest plan to continue this collaboration in applied research education in 2013.

Contact: David F. Tessler, Alaska Department of Fish and Game, Wildlife Diversity Program, 333 Raspberry Road,

Anchorage, AK 99518. Phone: (907) 267-2332; Email: david.tessler@alaska.gov

-David F. Tessler, Marian L. Snively, Jessica K Ilse, Doug Causey, Matthew O'Dell, Misty Dzierzynski, Brittany Hansen

The Alaska Bat Monitoring Project Reports Results From its First Nine Years

We have submitted a manuscript to *Northwestern Naturalist* detailing the results of the first nine years of the Alaska Bat Monitoring Program. The manuscript is currently under review and what follows is the abstract. We initiated the citizen science-based Alaska Bat Monitoring Project in 2004 to investigate the distribution, habitat use, and seasonal ecology of the little brown bat in south-central, interior, and western Alaska. As of 2012, we received reports of bats from 252 unique locations across the focus area, including Kotzebue, White Mountain, Saint Michael, and the Semidi Islands, which represent significant range extensions for this species.

Ninety-seven percent of 111 roosts were located in human structures. Maternity colonies were identified in 48 locations, all in human structures. The majority of observations were reported in late July, August, and September, but we received observations every month of the year. We received reports of bats in 25 unique locations during the winter period from October – April. Winter bats were all associated with buildings unless observed flying outdoors; no hibernacula in natural substrates were documented.

Timing and locations of winter observations imply that bats in the most northerly areas are likely non-migratory and overwinter in human structures, while winter observations in south-central Alaska suggest both migratory and non-migratory behavior. Despite the bias inherent in the dataset, these reports represent a significant contribution to our understanding of the distribution and ecology of the Little Brown



Bat in Alaska, and provide a basis for future directed research efforts.

Contact: David F. Tessler, Alaska Department of Fish and Game, Wildlife Diversity Program, 333 Raspberry Road, Anchorage, AK 99518. Phone: (907) 267-2332; Email: david.tessler@alaska.gov

-David F. Tessler, Marian L. Snively, Tracey A. Gotthardt

Southeast Alaska Bat Project

ADF&G's Wildlife Diversity Program is continuing its acoustic monitoring project in Southeast Alaska. We have 12 detectors deployed year-round along the Juneau road and trail. Beginning in winter of 2011, we partnered with USFS, NPS, UAS, ADF&G fishery biologists, and local community organizations to expand the acoustic monitoring to 9 other communities and 3 transboundary river sites. We are also continuing our active surveys of Juneau trails. This summer we are also monitoring local maternity roosts in the Juneau area using emergence counts and bat detectors.

In addition, we have been trapping and radiotagging female little brown bats in Juneau at regular intervals since early April. We are tracking the bats to their day roosts, monitoring roost attendance with telemetry dataloggers, and collecting information on foraging movements. Last fall we successfully tracked 2 radiotagged little brown bats in real time as they began their fall migration, losing signals on both of them over Admiralty Island, due west of Juneau. We plan to repeat that effort this fall in hopes of tracking the bats all the way to their overwintering grounds.

-Karen Blejwas, Dylan Rhea-Fournier, Michael Kohan, Laura Beard, Grey Pendleton, and Jennifer McGrath

Other Alaska Bat News

Wrangell-St. Elias National Park & Preserve continues its collaboration with Drs. Gary McCracken and Justin Boyles of the University of Tennessee for a second year of field work investigating bat populations.

This year the focus will be primarily on the northern part of this 13 million acre Alaskan National Park. Bats will be captured, measured, wing biopsies taken, and calls recorded for the statewide call library. We are still trying to determine the species in the park and determine basic life history including the foraging habits at such a high latitude.

- Miranda Terwiliger, NPS

USFS staff on the Tongass and Chugach National Forests are currently responding to a FOIA request from Wildlife Acoustics for acoustic reference calls.

- Cheryl Carrothers, USFS

Colorado

Bat Education and Outreach at the Hudson Gardens & Event Center and in the Denver Metro Area

This past summer we conducted a couple of outreach initiatives at a private residence with a local birding group and at The Hudson Gardens & Event Center. At Hudson Gardens, we developed a family program entitled "Let's Get Batty" focused on educating the public about bats, current conservation issues, techniques for studying



Bat house installed on Garden barn.

bats, and Colorado and local bat natural history.

Thirty-seven people attended the evening program and had the opportunity to view specimens of local species, observe mist netting in action, and listen to live echolocation calls using acoustic detectors.

The Gardens' habitat serves as a great place to view bats. The Gardens are located immediately adjacent to the South Platte River and provide rich roosting and foraging



habitat such as numerous large cottonwood trees, a diversity of vegetation, and various pools of water. A number of regional Colorado resources helped make the program possible. Ron Kerbo, a Littleton local and former National Cave and Karst Program Coordinator for the National Park Service, brought his decades' experience working with bats in their natural habitat to help teach the program. A large bat house was donated by Paul Cryan of the U.S. Geological Survey and was installed on a barn within the Gardens.

John Demboski, Curator of Vertebrate Zoology, and Jeff Stephenson, Collection Manager, of the Denver Museum of Nature & Science provided specimens for program participants to view. Lastly, Kirk Navo, formerly of the Colorado Parks and Wildlife (CPW), and Tina Jackson of the CPW donated copies of the CPW publication, "The Bats of Colorado: Shadows in the Night," for program participants to take home. During the program and a prior survey, we documented calls by big brown/silver-haired bats, eastern red bats and *Myotis* species. Additionally, a dead eastern red bat was found by Gardens staff on the property during the summer. We plan to conduct more public bat walks and monitoring of bat activity within the Gardens next year.

*-Roger Rodriguez, Zotz Ecological Solutions, LLC, Denver, CO
Amanda Accamando, The Hudson Gardens & Event Center, Littleton, CO*

Idaho

-submitted by Rita Dixon, Idaho Department of Fish and Game

Idaho Hosts 6th Annual White-nose Syndrome Workshop

The Idaho Department of Fish and Game served as local host for the 6th Annual White-nose Syndrome Workshop, held September 3–6, 2013, in Boise, and which included ~146 participants from the US, Canada, and Europe. In addition to the formal sessions, one of the highlights of the week was a field trip to Dr. Jesse Barber's Sensory Ecology Lab at Boise State

University to observe his acoustic experiments with bats.

Owyhee Air Research Applies Thermal Imagery at Abandoned Mine in Silver City

In August 2013, Rita Dixon (Idaho Department of Fish and Game), Bill Doering (POWER Engineers, Inc.), Bruce Greenhalgh (Owyhee Air Research), CT Seaberg (Bureau of Land Management [BLM] Idaho), Carrie Wontorcik (BLM), and Albert Crawshaw (Idaho Department of Environmental Quality) visited an abandoned mine in Silver City, ID to explore the feasibility of using thermal imagery to detect and count bats emerging from or returning to a roost in an abandoned mine. Owyhee Air Research donated their time and thermal IR camera and equipment. We positioned the camera near the portal of the mine and just around the end of civil twilight, the first bat flew into the mine. We are excited about the potential applications of this technology for bat work. Owyhee Air Research used a FLIR SC7650 cooled thermal IR camera with 640x512 resolution, a spectral range of 3–5mm, and sensitivity of ± 1 °C.

Montana

Montana's Collaborative Approach to the Looming Threat of White Nose Syndrome; An Unlikely Partnership

-Lauri Hanauska-Brown, Bryce Maxell, Hans Bodenhamer

The discovery of White Nose Syndrome (WNS) in a New York state cave in 2006 spurred a chain reaction of cave closures across Eastern states. The reaction eventually spread to the Rocky Mountain states with Region 2 of the Forest Service closing public access to caves in 2010, in essence closing caves in the states of Colorado, South Dakota, Wyoming and Kansas. While no one knows when or if WNS will ever impact bats in western states, it is known that improperly decontaminated boots, ropes and other caving equipment can transport the fungus (*Geomyces destructans*) that is responsible for WNS. Excluding or limiting entry of



cavers with caving equipment from infected sites to uninfected sites makes a lot of sense. Total exclusion, on the other hand, does little to build relationships between recreationists and land management agencies nor does it advance a collective understanding of caves and cave biota, encourage data sharing, or open communications.

The state and federal agencies in Montana recognized that critical cave and bat presence information is most likely to be gathered by cavers working in partnership with the agencies. In 2010, members of the Northern Rocky Mountain Grotto (NRMG), Bigfork High School Caving Club, Forest Service (USFS), Bureau of Land Management, National Park Service, Montana Department of Environmental Quality, Montana Natural Heritage Program (MNHP), and Montana Fish, Wildlife and Parks met in Missoula to start a conversation. The intent of the meeting was to share information about WNS and to build relationships between the caving community and agency staff. The topic of cave closure was the elephant in the room. Through a facilitated process the group of more than 30 individuals produced two lists: the best possible outcomes of working together to prevent WNS and the worst possible outcomes of working together to prevent WNS. Have we realized all of our best possible outcomes of working together? Not exactly, but a surprising amount of progress has been made and we're not done yet.

Some of the notable successes:

Good working relationships based on successful communication: Since the first partner meeting in 2010 we have had 1-2 meetings per year to share information, discuss the latest concerns of both agency personnel and cavers, and coordinate work goals.

Better understanding of bat species diversity, abundance, and habitat use: We have nearly 50 SM2 ultrasonic acoustic detectors out across the state that are

passively recording bat activity year-round, several of which are being maintained by volunteers. Additionally, cavers have reported bats they have observed, have noted temperatures of bat roosts, and have deployed over 30 HOBO data loggers in caves across Montana to document the year-round temperature and humidity of our western caves.



Volunteer Mike McEachern documenting cave formations with a 3-D camera in the Scapegoat Wilderness (Bob Bastasz photo)

Set a good example for new cavers: The positive, cooperative relationship that exists now between the caving community and agency staff sets the stage for working relationships into the future.

Better appreciation of the seriousness of WNS: Cavers and agency staff have presented information on WNS and our cooperative efforts to audiences across the state.

Ability to be proactive: The intense data collection that has occurred since 2010 has resulted in a more thorough understanding of bat roost habitats in Montana, including documentation of 8 new bat hibernacula.

Widespread introduction to clean caving: Members of the Northern Rocky Mountain Grotto have committed to follow the latest decontamination protocols for caving gear. The USFS and the NRMG are discussing implementation of a program that would rent



'clean' gear to out-of-state cavers while visiting Montana.

Increased data sharing and research: Montana, along with 5 other states, was awarded a competitive State Wildlife Grant to collect information that can be used to respond to the threat of WNS. Both the Caves of Montana project and the NRMG signed on as cooperators to this funding proposal.

Further educational opportunities regarding bats: A poster of Montana's bat species was produced by the MNHP that includes photos, species accounts, and range maps for all 15 of Montana's known bat species. A manuscript on 'Winter Records of Montana Bats' was also produced.

Continuity and consistency in management decision making, across multiple agencies with support by stakeholders: Land management agency staff meets with wildlife management agency staff at least twice a year to partner on efforts to engage the caving community, secure funding, and explore cooperative approaches to disease prevention.

Nevada

-*Nevada Bat Working Group, edited and compiled by Jenni Jeffers, Nevada Department of Wildlife*

Nevada Bat Blitz

The 2013 Nevada Bat Working Group Bat Blitz was held August 12-16 along the Upper Mary's River in Elko County, NV. The sites were on the southern edge of the Jarbidge Wilderness, which is an area that has been rested from grazing for almost 20 years and is showing evidence of restoration to a more healthy and productive state (particularly the cottonwoods). The goal of the blitz was to provide a species inventory of the site and to determine specifically if red bats are present in the area. Red bats were a focus because the 2006 Nevada Bat Conservation Plan highlighted a need for more information on

red bat seasonal movement patterns, habitat use, roosting locations and characteristics, and status and distribution within the state, and there is only one record of red bat occurrence for all of Elko County.



Some of the 2013 Nevada Bat Blitz crew standing in front of one of the triple-high mist nets.

Sixteen people from five agencies (Nevada Department of Wildlife, Nevada Natural Heritage Program, US Fish & Wildlife Service, Bureau of Land Management and Nevada State Museum) and a volunteer participated in the four-night event during which over 120 bats representing nine different species (six of which are Nevada Species of Conservation Priority) were capture with mist nets. The nine species were (*Nevada Species of Conservation Priority): silver-haired bat (*Lasiurus noctivagans*)*, Hoary bat (*Lasiurus cinereus*)*, western small-footed myotis (*Myotis ciliolabrum*)*, long-eared myotis (*Myotis evotis*)*, long-legged myotis (*Myotis volans*), little brown bat (*Myotis lucifugus*)*, Mexican free-tailed bat (*Tadarida brasiliensis*)*, big brown bat (*Eptesicus fuscus*), Yuma myotis (*Myotis yumanensis*).

Acoustic (Anabat) files were collected and two triple-high mist nets were deployed. The crew followed white-nose syndrome decontamination procedures, including the use of disinfecting wipes to decontaminate gloves and equipment and soaking the nets after each night. Given that many of the captures occurred in the upper tiers, the triple-highs contributed greatly to the capture success. Additionally, a pilot effort



to collect insects via sticky traps served as a precursor to potential further study of relationships between insect availability and bat presence, abundance and richness.

Although no red bats were detected, the event served as a training opportunity for some participants. It also provided extremely valuable information about the bat community in the area and addressed several of the Nevada Bat Conservation Plan strategies and actions, such as providing information on key concentrations of woodland bats by initiating inventory surveys. The blitz allowed biologists to evaluate an area where cottonwoods are being reestablished by protection from overgrazing and demonstrated the importance of the area as tree roosting habitat, water source foraging and watering habitat, and forest and riparian foraging habitat.

Nevada Department of Wildlife Surveys Mines and Caves

In the Eastern Region, Jason Williams organized other agency personnel to survey 63 mines and two caves in three different Counties. Guano and soil samples were collected from some of these features for future WNS testing. Recently Jason has installed data loggers for WNS surveillance inside abandoned mines in the Eastern Region.

In the Western Region, Jenni Jeffers conducted 16 abandoned mine surveys and facilitated the construction of 24 bat compatible closures on mine features in four different Counties. These structures protect important maternity and hibernacula for five bat species. Data loggers are being installed in select mines used as hibernacula in the Western Region to collect data for WNS surveillance. The Bureau of Land Management in Nevada have been very supportive and have cooperated in all the abandoned mine bat compatible and hard closures. Chris Ross retired from his position as Abandoned Mine Program lead and John Callan has stepped into this position. John is doing a great job and we

all look forward to working with him on the AML program.

Forest Service: Ken Maas with the Humboldt-Toiyabe National Forest reported having 48 bat compatible closures constructed on six different abandoned mine complexes in his Region. Twenty-five of these closures were gates on adits including culvert gates and 21 were grates or cupolas on shafts. They also installed two pipes for air flow on the abandoned mine features. Ken furnished a contractor (Rick Sherwin) a list of 125 mine features to survey in 2013 on Forest land.

Nevada Division of Minerals Installs Bat Gates

Since December 2012, the Nevada Division of Minerals (NDOM) continued its contributions to the Nevada Bat Working Group by maintaining its database of over 17,700 abandoned mine land (AML) hazards and supplying information to the Bureau of Land Management (BLM), the United States Forest Service (USFS), the National Park Service (NPS), the Nevada Department of Wildlife (NDOW), and mining claimants to assist with their bat friendly closure projects. In the past year, NDOM staff and contractors erected a total of 335 temporary bat exclusion nets over mines before hard closure in all 17 counties of Nevada. NDOM funded seven bat compatible closures in Douglas and Pershing counties. Six of the closures were part of the Chukar project in Douglas County. The project consisted of two bat gates in adits, two grates on shafts, and two culvert gates in adits. The seventh closure was a culvert gate placed in an adit associated with NDOW's Nevada Quicksilver project. Additionally, NDOM acquired approval from the BLM and assisted NDOW with the funding of six closures, three with gates and three utilizing steel cable mesh netting, at the Long Mine in Pershing County. NDOM has also helped organize and acquire BLM approvals for future closures at four additional NDOW-funded bat compatible closure projects in



Douglas, Lyon, Pershing, and Washoe counties.

The Division of Minerals continues to assist NDOW with above ground, underground and down-hole camera wildlife surveys. NDOM's AML crew acted as both underground participants and outside monitors on multiple underground surveys in Douglas, Lyon, Pershing, and Washoe counties. NDOM has trained two more AML staff members on proper wildlife surveying techniques using the agency's 1,000' and 300' down-hole camera assemblies. A total of 15 shafts in Carson, Douglas, Esmeralda, Pershing, Storey, and Washoe counties have been surveyed this year. The Nevada Division of Minerals will continue to provide significant resources and work with federal and state agencies in order to preserve bat habitat throughout the state of Nevada.

New Mexico

Monitoring and External Bat Surveys at New Mexico Abandoned Mines – First Season.

-Linda S. DeLay. NM Abandoned Mine Land Program, Mining and Minerals Division, NM Energy, Minerals and Natural Resources Department.

Abandoned mines pose safety threats to people but also provide important habitat for wildlife, bats in particular and especially the guild of species that are dependent on subterranean habitat. Though abandoned mines may not provide the stability that caves do, they provide valuable habitat for bat species that use the underground environment of mines as roosts (maternity, hibernation, bachelor, rest /migration). Bats also use abandoned mines as food/water sites and swarming sites (meet and mate). Townsend's Big-eared Bat (*Corynorhinus townsendii*) is a species of concern throughout the western U.S. and frequently occupies abandoned mines (Harvey et al. 2011).

The NM Abandoned Mine Land Program (NMAMLP) constructs bat-compatible closures on mine features that show

evidence of bat use based on internal mine surveys. These structures keep people out but allow bats and other wildlife continued access. Monitoring bat numbers over time at abandoned mine sites would add to our knowledge of population trends and the effectiveness of bat conservation efforts. Observations would document evidence of how bats are responding to bat-closures and may help us improve future designs. Monitoring data would also be a valuable contribution to the watch for a possible spread of the fungus associated with White-nose Syndrome, which is causing devastating bat mortality in the Eastern U.S., to Western regions.

In May through October 2013, NMAMLP began its first season of bat exit surveys and efforts to establish a bat roost monitoring project that tracks changes in numbers and species composition of bats that we know are using or have used abandoned mines based on internal survey or evaluation. We selected abandoned mine openings for external bat exit surveys where previous internal surveys had found significant bat use (J. Scott Altenbach, pers. comm. 2013; NMAMLP bat geodatabase query, 2013).

Subsequent years of monitoring will place added emphasis on maternity colonies at a time before pups are born (generally late May-June) when colony size is most stable (Sherwin, et al. 2009). Included in the plan is a subset of sites that are slated for several annual visits to include pup, post-pup and swarming season. When the opportunity arises at suitable sites, we perform an exit survey before and after bat-compatible closures. NMAMLP sites that have been safeguarded with bat-compatible structures or have planned construction are the focus of our external bat surveys which involve bat counts and behavioral observations using video cameras and bat identification using acoustic recorders. These sites may include state, private, and federal lands (e.g. BLM) where NMAMLP has worked on bat-compatible structures. It is an opportunity to supplement the internal

evaluations of bat use of abandoned mines typically performed by AMLP Environmental Coordinators and contractors before bat-compatible structures are constructed.

The DOI Office of Surface Mining Reclamation and Enforcement (OSMRE) and Technical Innovation and Professional Services (TIPS) responded to our request for equipment so that we could begin our pilot project. TIPS provided an Anabat SD2 CF Bat Acoustic Detector (Figure 1). Many bat species use calls to locate prey and other objects (echolocation) at frequencies often above what we can hear (i.e. ultrasonic frequencies). Bat-detectors translate these calls to frequencies that we can hear.

Figure 1. AnaBat SD CF Acoustic Bat Detector used to record bat calls.

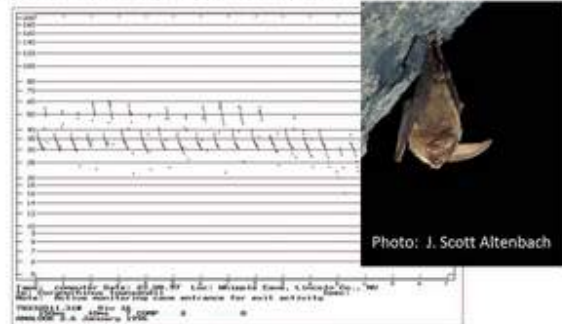


The software also produces sonograms (graphs of the calls) of bat calls and allows a comparison of frequency range and pattern to reference sonograms in order to determine probable bat guilds and species that may be using habitat or emerging from mine openings during the surveys. Figure 2 is an example of a sonogram of a Townsend's Big-eared bat.



Figure 2. Sonogram of Townsend's Big-eared bat.

Corynorhinus townsendii (Townsend's Big-eared Bat)



Screen capture credit: M.J. O'Farrell.

We needed to use a video camera capable of recording bat emergence and behaviors during dusk and into the night. TIPS checked out a FLIR 600 video camera for our use during May-October 2013. This type of camera is capable of using the far-infrared wavelengths to detect thermal radiation emitted from objects, allowing us to see in the dark.

Figure 3 illustrates a recording session at a culvert-bat gate closure picturing both the FLIR Camera and Anabat Detector, which was set closer to the opening. A near-infrared (NIR) camera system is perched above an open entrance to a mine chamber (Figure 4). This is a pre-construction NMAMP site observed for bat activity, one of many openings into the same underground mine workings. The surveillance camera (AXIS P1343) sensitive to NIR and two NIR lamps (dual IRLamp6, BCM Inc. Distributors) are powered by an external battery. The system was left to record while the investigator checked other openings with the FLIR for bat activity.



Figure 3. Video recording session using a FLIR video camera.



nearby openings, the investigator would spend approximately 30 minutes to record activity at additional openings. Bat activity (e.g. circling time within entrance before exiting the structure) was quantified with aid of the video timer. Average count of bats in frame was also sampled from the recording session.

Our next season goals include continued monitoring and research into the use of additional monitoring tools such as bat roost loggers.

Citations:

BCM Inc. Bat Conservation and Management, Inc.
<http://www.batmanagement.com/Ordering/irlight/irlight.html>

Harvey, M. J., J. S. Altenbach and T.L. Best. 2011. Bats of the United States and Canada. The John Hopkins University Press. 202 pp.

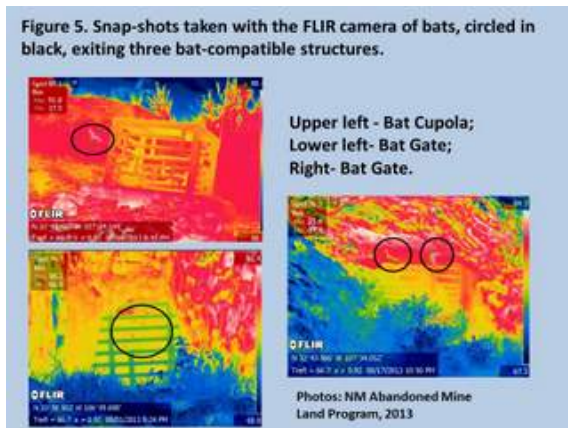
Sherwin, R.E., J.S. Altenbach and D.L. Waldien. 2009. Managing Abandoned Mines for Bats. Bat Conservation International. 103 pp.

Figure 4. Video recording session using a NIR lamp-video camera.



Figure 5 presents a series of snap-shots of video taken by the FLIR camera showing bats exiting several different bat-compatible closures.

Figure 5. Snap-shots taken with the FLIR camera of bats, circled in black, exiting three bat-compatible structures.



Bat exit counts using video were typically a sample runtime of 30 minutes before sunset and 1.5 hours afterward. The observer tallied numbers of bats exiting and numbers entering over that time period. Bat activity and behaviors at the closures were also quantified later by review of the video on Adobe Premiere Pro. If there were other

Texas

-Submitted by Roger Rodriguez, Co-Chair, Texas Bat Working Group and At-Large Representative, Western Bat Working Group

Maymester Course in Big Bend National Park

Loren Ammerman, Krysta Demere, Roger Rodriguez and 17 Angelo State University students spent a week in May sampling the bat community in Big Bend National Park. From 16-22 May 2013 we captured bats at 7 sites around the park using mist nets and harp traps, and also collected acoustic data.



We captured 331 bats of 15 species, including a noteworthy capture of a western yellow bat (*Lasiurus xanthinus*). For many students this was their first introduction to bat capture techniques (and for some it was their first camping trip!). Students' favorites were the ten Mormoops, one *Lasiurus cinereus*, and one *Nyctinomops macrotis* captured during the week. This is the 18th year of netting at the same sites throughout the park. Dr. Ammerman is currently working with Erin Adams to compile a summary of the changes in the bat community in the park over almost 2 decades.

-Loren Ammerman, PhD, Krysta Demere, and Erin Adams, Angelo State University
Roger Rodriguez, Zotz Ecological Solutions, LLC

Census of Mexican Long-nosed Bats

Each July an annual census of Mexican long-nosed bats (MLNB, *Leptonycteris nivalis*) is conducted at Emory Cave in Big Bend National Park. On 14 July 2013, Loren Ammerman and Erin Adams recorded bats emerging from Emory Cave for approximately one and a half hours with a FLIR P660 thermal infrared camera. *Leptonycteris* individuals began emerging from the cave approximately 33 minutes after sunset. Later analysis of the digital recording found the maximum net number emerging (total bats flying out minus total flying in) was 122 bats/minute 47 minutes after sunset. Total colony size was estimated as 2,525 individuals based on this census. The estimated total of vespertilionid bats (*Corynorhinus townsendii* and *Myotis thysanodes*) that emerged was 190;

vespertilionids can be differentiated from *Leptonycteris* by heat signature. The size of the colony has been fairly stable over the last 5 years and has averaged 2,417 MLNB (range of 1,790 to 3,238). A poster of this project was displayed at the 2013 International Bat Research Conference this year in Costa Rica.

- Loren Ammerman, PhD, and Erin Adams, Angelo State University

Status of Yellow Bats in Texas

Bats submitted for rabies testing are a good source of information for refining our knowledge of bat distributions. Krysta Demere was lead author on an article in 2012 that examined known ranges for TX bats against rabies testing submissions (Noteworthy county records for 14 bat species based on specimens submitted to the Texas Department of State Health Services, Occasional Papers, Museum of Texas Tech University 315: 1-14). Some species were easy to identify, but others were difficult to determine identification because the specimen was in poor shape or because the specimen was a juvenile. This summer, Loren Ammerman, Laramie Lindsey, and Richard Amoateng worked with about 70 specimens of yellow bats that had been submitted to the Texas Department of State Health Services for rabies testing. They generated gene sequences from yellow bats with uncertain identifications to determine the species (*Lasiurus xanthinus*, *L. ega* [state threatened], or *L. intermedius*). This information will be used to further refine our understanding of the distributions of these species.

-Loren Ammerman, PhD, Angelo State University

Utah

Several successful outreach events took place in Utah during the summer. At Bryce Canyon National Park 100 visitors were able to view bats emerging from the historic Bryce Lodge. There was a presentation on bat biology and management and a demonstration of triple-high mist-netting and bat handling.



Interest is high at the bat handling demo.

Utah Division of Wildlife Resources (UDWR) held outreach events at several locations including Nash Wash Wildlife Management Areas where 25 visitors participated in capturing and collecting data on 46 bats, mostly pallids, and viewed a beautiful midnight thunderstorm over the Book Cliffs. A reporter attended the event, and a half a page of pictures and text was published in the Sun Advocate, a local newspaper.

A bat blitz was held at Callao at the foot of the Deep Creek Mountains July 10th and 11th, sponsored by the BLM and UDWR. The number and variety of bats captured was modest. A great tour of Crystal Ball Cave was included. Some bats were observed and Keith Day explained the placement of temp/RH loggers in the cave.

UDWR and the Utah Division of Oil Gas and Mining are revising the “Protocol for Conservation and Management of Bats in Abandoned Mines in Utah” in an effort to make the guidelines easier to understand and realistic.

The Manti LaSal National Forest provided funds to UDWR Southeastern Region to do acoustic monitoring of mines in 3 locations during late September/October. Results-to-date suggest several may be used by modest numbers of *Myotis* as hibernacula.

-Sara Haas, Tony Wright

Utah Bat Survey Nets 5 Species

My undergraduate research lab at Brigham Young University – Idaho netted bats in Heber Valley, UT mid-July to the end of August. We were looking for evidence for the cause of a huge midsummer spike in bat activity. To better understand the drivers of bat activity in the study area, we sampled insects with malaise traps and bats with mist nets and Anabat SD1 detectors. We caught 110 bats of 5 different species at about 2600 m elevation. Species included *Myotis evotis*, *M. lucifugus*, *M. volans*, *Lasionycteris noctivagans*, and *Lasiurus cinereus*. Data analysis continues, and the preliminary results will be presented at the BYUI Research and Creative Works conference Thursday, December 12, 2013.

- Thomas W. Pettit, Ph.D., Brigham Young University - Idaho

Washington

-submitted by Greg Falxa

Peregrine Falcon Predation of Yuma *Myotis* & Little Brown Bats

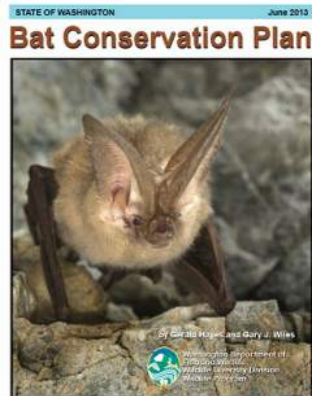
In 2011, a Peregrine Falcon pair in Olympia, Washington established a breeding territory near a maternity colony of Yuma myotis & little brown bats. The proximity of the falcon breeding site and the *Myotis* maternity colony presented a unique opportunity to observe Peregrine Falcon predation of bats. The bats use an abandoned pier over the waters of Puget Sound for their maternity site. The peregrine hunting perches were situated less than 200 meters from the colony location. The pier is no longer connected to shore and the bats must cross open water at emergence and upon return to the colony; it is at emergence that we have observed bats attacked by peregrines. In three seasons of field observations we have documented over 100 over-water hunting flights by peregrines and observed predator avoidance behavior by the bats.



- Lori Salzer, Washington Department of Fish & Wildlife & Joe Buchanan, Cascadia Research Collective

Washington State Bat Conservation Plan

The Washington Department of Fish and Wildlife has published its new *Washington State Bat Conservation Plan*, which was authored by staff



biologists Gerry Hayes and Gary Wiles. The 138-page plan was prepared to guide conservation activities for bats in the state. The plan is divided into three main chapters and provides

Washington-specific information on the state's bats whenever possible. Chapter 1 contains an overview of bat biology, habitat requirements, legal and conservation status, known and potential threats to bats, and relationships to public health. Chapter 2 provides brief accounts for each of the 15 bat species found in Washington, with summary information on historical and current distribution and abundance, identification, taxonomy, habitat, natural history, threats, and conservation measures given for each species. Chapter 3 outlines strategies and tasks needed to implement conservation and protection of bats in the state. Copies of the plan can be downloaded from WDFW's webpage at: <http://wdfw.wa.gov/publications/01504>

- Gary Wiles, Washington Department of Fish & Wildlife

A Spotted Bat in Western Washington?

On the afternoon of September 18, 2013 there was a flurry of phone, text, and email messages between Meg the bat rehabber,

Phil Aponte the high school science teacher, and me. The topic was the bat that Phil had in a box, a bat that the school principal John Seaton had captured earlier that day in a classroom, hanging on a bulletin board. After he scooped it into a container, the principal took it outside to release it, but it didn't fly off as he had hoped. He then took it to Phil, one of the science teachers, who immediately knew that this was not one of the typical bat species for this area. Phil quickly figured out it was a spotted bat, and on the wrong side of the Cascade mountains. In fact, the only record of a spotted bat in western Washington or Oregon states is an individual found in the Seattle area in November of 2008. There are rocky areas of eastern Washington, Oregon and British Columbia -- east of the Cascade mountain range -- where these bats are routinely heard on summer evenings. However, not much is known about their life histories in the Pacific Northwest, and there have been no specimens in the natural history museums of this region. The closest records are acoustic observations approximately 120 miles (190 km) east of Tacoma, near the Columbia River gorge.

Back to the story: Phil had received a bat he realized was special. He contacted Meg Lunnum of Happy Valley Bats, Washington's only state-permitted bat rehabilitation facility. Meg turns away no bats in need, but she was over 100 miles (160 km) away, and I was only 25 miles (40 km) from the bat, so Meg brought me into the loop. I would care for it while arranging transport to Happy Valley Bats, and made arrangements to meet Phil that evening for the hand-off. In a dark parking lot halfway between our homes I took possession of a beautiful male adult *Euderma maculatum*. It looked bony and scruffy, but still had enough energy to try some self-defense moves. I took it home, got it to take some water from a cotton ball, and made plans to take it to our local 'rescue friendly' veterinarian the next morning. But the next morning I found the bat slumped below its perch, and thought it was dead. When I



reached down I was greeted with a hiss, so we headed off to the veterinarian. When I arrived at Tumwater Animal Hospital we found an expired bat, still a little warm. After a few photos I took it back to the lab and weighed it: 10.9 grams. *Bats of British Columbia* lists the mass for 6 spotted bat specimens as ranging between 16.2 - 21.4 g. It appeared that this adult spotted bat was rather emaciated.

I contacted Dr. Gary Shugart, the curator for the Slater Museum of Natural History located at the University of Puget Sound. The museum was not only happy to receive the bat for their collection, but has already featured it in a special display during their public education Bat Night on October 30 (see Bat Night article for details). The museum web page had this to say about this specimen:

The specimen was found recently in a local high school classroom near Tacoma and was eventually passed on to Greg Falxa of Cascadia Research. The bat died despite attempts at rescue and was deposited at the Slater. It was prepared as a standard skin/skull voucher specimen with associated issue for genetic analysis and post cranial skeleton and dried muscle for stable isotope analysis. If feasible, stable isotopes might provide clues to the bat's mysterious appearance in western Washington. Typically this species is confined to drier areas of eastern Washington, however they are difficult to find and study. They are migratory so the specimen we received might have been wandering, lost or disoriented migrant. The species status in Washington has yet to be determined.

Our specimen is the 69th spotted bat specimen housed in the 46 institutions in online VertNet consortium. Including the Slater, 13 of 46 institutions have spotted bats. Most of the specimens are from New Mexico (29), Utah (10) and California (8). The Slater specimen is the northernmost specimen.



Slater Museum collection number:
TSM306333

(From

<https://www.facebook.com/media/set/?set=a.556527481085470.1073741844.124332280971661>)

- Greg Falxa

(editor's note: spotted bat acoustic records have been documented as far north as Williams Lake, British Columbia.)

Bat Night at the Slater Museum

The Slater Museum of Natural History, located in Tacoma, WA, houses more than 29,500 mammal specimens, 23,000 bird specimens, 7,500 reptiles and amphibians, 5,000 insects, and 13,000 plants. Most of the specimens are from Washington, Oregon, and elsewhere in western North America, but many have been acquired from other parts of the world through collecting and exchange.

On the evening of October 30th the museum staff and a team of 22 volunteer docents opened the doors and drawers for a public open house to showcase the several thousand bats in the collection. The event was attended by around 220 people -- including students, community members, families, and Bats Northwest members from the Seattle and Olympia areas.



If you are located nearby and interested in volunteering to help improve and maintain the Slater bat collection send an email to Slatermuseum@pugetsound.edu. Possible volunteer jobs include identifying and cataloguing the museum's alcoholic bat specimens.

Bat Night facebook page:

<https://www.facebook.com/events/341203179349443>

Slater Museum web site:

<http://www.pugetsound.edu/academics/academic-resources/slater-museum>

- Slater Museum staff

Bats in the San Juan Islands

Efforts to evaluate the distribution and status of bats in the San Juan Islands are moving forward on several fronts. KWIAHT has been polling landowners for sightings of bats and bat roosts, and confirming by visual inspection and bat detector recordings. Fifty consistent roosts in buildings have been identified on four islands, including fifteen maternity colonies, one of which is a Townsend's big-eared bat roost with between 120 and 150 individuals in residence in 2012 and 2013.



Townsend's big-eared bat roost.

Ella Rowan visited Lopez in July with a student and a five bat detectors, which we deployed in rotation around the island's woodlands, wetlands, and fields for several nights. Analysis of the recordings will give us the most complete picture thus far of the diversity of bats in the islands and their summer habitats. We hope that Ella will be able to repeat the survey on San Juan or Orcas Island in summer 2014.

With the help of the American Wildlife Conservation Society, KWIAHT will be able to weatherize a bat detector and rotate it around Lopez Island in December to March focusing on isolated woodland areas where Xyleninid moths are visibly active during the islands' mild winters. We suspect that most island bats remain in the archipelago through the winter, widely dispersed and in episodic torpor, feeding in habitats that we previously found serve as winter refuges for small insectivorous birds such as kinglets, siskins, and wrens.

Whether island bats migrate to the mainland or redistribute themselves within the archipelago can also be addressed by measuring gene flow between island and mainland populations. From interviews of over 150 homeowners we estimate that we could obtain at least 25 natural mortalities per year discovered in homes and barns. KWIAHT's genotyping laboratory on Lopez has thus far studied population structure and evidence of isolation in Coastal Cutthroat Trout, sub-species of Pacific Sandlance, and evidence of domestication in the Native American food plant *Camassia leichtlinii*, among other projects.

- Russel Barsh, KWIAHT

Wyoming

Many surveys and projects have been accomplished this year in Wyoming, by members of the Wyoming Bat Working Group. Here are a few that we would like to highlight.



Medicine Bow Route National Forest

The Forest completed the Centennial Bat House, an effort to move a current bat roost in a Centennial lodge to an actual bat house. A building at Centennial, which can house seasonal personnel, contained several bats in the attic. Cracks from the outside allowed bats to move into the attic where there were ideal conditions for roosting. This created an unsafe environment for people staying in the building due to bat droppings in the attic. To correct this problem, a bat house was created to provide the bats with better housing, out of the attic roost. There are plans to patch holes leading to the attic before spring to ensure bats will not continue use of the attic.



The Centennial Bat House.

This was planned by Forest Service personal, Bill Munroe and Kolleen Kralick, with construction expertise and volunteer work from HistoriCorps. Overall the project turned out great and should create a great roost for future bats. (Picture Attached)

The Douglas Ranger District also completed several mist-netting and acoustic monitoring surveys. They presented a talk about the importance of bats and why we monitor them to an Upward Bound class and a WCC class.

BLM, Buffalo Field Office Update

Recent activities include:

- Gave a public presentation in Buffalo, Wyoming for the local Audubon of the Rockies Bio Blitz. We had approximately 30 participants of all ages attend a night presentation that covered bat natural history in conjunction with acoustic monitoring basics and mist netting activities.
- Also gave a presentation covering similar topics referenced above at the YMCA of the Bighorns to 16 Buffalo, Wyoming 5th and 6th graders for the local science camp.
- Assisted the Wyoming Natural Diversity Database (WYNDD) group from the University of Wyoming in assessing first ever baseline inventories for bats in the Gardner Mountain Wilderness Study Area. We sampled various areas over many nights via mist netting and acoustic monitoring. The effort collectively identified eight species; Townsend's big-eared bat, big brown bat, hoary bat, western small-footed myotis, long-eared myotis, little brown myotis, long-legged myotis, and the silver-haired bat. All species that were classified by this effort were mist-netted and also sampled by passive and/or active acoustic monitors except the silver-haired bat which was only sampled passively.

Wyoming Game and Fish (WYGF) Update

WYGF finished the second field season of monitoring of cliff and canyon habitats in the Western part of the state. This included mist-netting and acoustic field surveys. This year's results were consistent with those of 2012. The highlight of the summer was capturing of spotted bats near Yellowtail reservoir. For the next two years WYGF will be looking at the cliff and canyons habitat in the eastern part of the state.

Wyoming Natural Diversity Database (WYNDD)

In 2013, WYNDD conducted mist-net and acoustic surveys in southern Wyoming. This project has been conducted in coordination with BLM Wyoming over the past three years. Primary objectives of this study are to



inventory bats occurring in and near areas with potential for wind-energy development, develop and validate summer distribution models, migration stop-over and roosting habitat models, and identify potential zones of conflict between areas of high wind-energy potential and areas of bat use. Many of our models have validated quite well, suggesting that they are valuable tools for managers to use when planning potential wind-energy development in southern Wyoming.

Please visit:

<http://www.uwyo.edu/wyndd/files/docs/reports/wynddreports/u12abe01wyus.pdf> for more information regarding this project.





PDF CORNER

The PDF Corner lists recent open-access publications that may be of interest to WBWG members. If you come across a full-text on-line publication that you think should be listed here, please send the link to lorraine.Andrusiak@keystonewildlife.com.

Agranat, I. 2013. Bat species identification from zero crossing and full spectrum echolocation calls using Hidden Markov Models, Fisher scores, unsupervised clustering and balanced winnow pairwise classifiers. *Acoustical Society of America, Proceedings of Meetings on Acoustics* 19(1). POMA 19, 010016 (2013) <http://dx.doi.org/10.1121/1.479940>.

Ben-Hamo, M., A. Muñoz-Garcia, J.B. Williams, C. Korine, and B. Pinshow. 2013. Waking to drink: rates of evaporative water loss determine arousal frequency in hibernating bats. *J. Exp. Biol.* 216, 573–577. <http://jeb.biologists.org/content/216/4/573.full.pdf+html>

Buchalski MR, Fontaine JB, Heady PA III, Hayes JP, Frick WF (2013) Bat Response to Differing Fire Severity in Mixed-Conifer Forest California, USA. *PLoS ONE* 8(3): e57884. doi:10.1371/journal.pone.0057884 <http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0057884>

Cryan, P., C.U. Meteyer, J.G. Boyles, D.S. Blehert. 2013. White-nose syndrome in bats: illuminating the darkness. *BMC Biology* 11: 47. Published online 2013 April 15. doi: 10.1186/1741-7007-11-47 <http://www.biomedcentral.com/1741-7007/11/47>

Dixon M.D., K. Heist, K. Tinsley. 2013. The state of bats in conservation planning for the National Wildlife Refuge System, with recommendations for improvement. *Journal of Fish and Wildlife Management* 4(2):xx-xx. e1944-687X. doi: 10.3996/122012-JFWM-106.

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Emerson G.L., R. Nordhausen, M.M. Garner, J.R. Huckabee, S. Johnson, R.D. Wohrle, W.B. Davidson, K. Wilkins, Y. Li, J. B. Doty, N. F. Gallardo-Romero, M.G. Metcalfe, K. L. Karem, I.K. Damon, D.S. Carroll. 2013. Novel poxvirus in big brown bats, northwestern United States. *Emerg Infect Dis.* 2013 Jun; 19(6):1002-4. doi: 10.3201/eid1906.121713.

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Kaleigh, J.O.N., F. Martinez-Nuñez, J.E. Dubois, K.M. Monson, and C.K.R. Willis. 2013. Long-distance movements of little brown bats (*Myotis lucifugus*). *Journal of Mammalogy*: April 2013, Vol. 94, No. 2, pp. 506-515. http://www.willisbatlab.org/uploads/8/0/0/6/8006753/norquay_et_al._2013_-_long-distance_movements.pdf



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<http://jeb.biologists.org/content/216/5/i.1.full.pdf+html>

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http://theses.ucalgary.ca/bitstream/11023/978/4/ucalgary_2013_reimer_jesika.pdf

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<http://jeb.biologists.org/content/216/8/1516.full>

Washington Species Management Guidelines (several bat species)
<http://dnr.wi.gov/topic/EndangeredResources/guidance.asp>

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www.life.umd.edu/faculty/wilkinson/Wilk_South02.pdf



UPCOMING EVENTS

Canada

Canadian Wind Energy Association (CANWEA). CanWEA's Annual Conference 2014 is being held October 27-29, 2014 in Montreal, Quebec

Annual Conference 2015 is being held October 5-8, 2015 in Toronto, Ontario

http://www.canwea.ca/events/index_e.php

USA

American Wind Energy Association. WINDPOWER 2014. Las Vegas, NV, May 5 - 8, 2014.

<http://www.windpowerexpo.org/registration/>

94th Annual Meeting of the American Society of Mammalogists, Jun 6, 2014 - Jun 10, 2014, Oklahoma City, Oklahoma.

<http://www.mammalsociety.org/meetings>

The Wildlife Society 21st Annual Conference, Pittsburgh, Pennsylvania, October 25-30, 2014

<http://www.wildlife.org/conferences>

AWEA Offshore WINDPOWER Conference & Exhibition, October 7 - 8, 2014, Atlantic City, NJ

<http://www.offshorewindexpo.org/>

North American Symposium for Bat Research Annual Meeting, October 22-25, 2014, Albany, NY

http://www.nasbr.org/pdfs/Albany_NASBR_2014.pdf

Elsewhere

International Conference on Wildlife Ecology, Rehabilitation and Conservation. Istanbul, Turkey

December 05-06, 2013.

<http://www.waset.org/conferences/2013/istanbul/icwerc/>

National Bat Conference

University of Warwick, 5-7 September 2014.

http://www.bats.org.uk/pages/national_bat_conference.html



THE VINTAGE BAT

