Western Bat Working Group

WBWG NEWS

Volume 7, Number 1 Fall 2011

Canyon bat at 2011 Nevada Bat Blitz, Kristin Szabo.

WESTERN BAT WORKING GROUP
NEWSLETTER

Fall 2011 Volume 7, Number 1

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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 15 western U.S. States, five Canadian provinces and territories, 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 webpage http://www.wbwg.org/ to contact us, find bat conservation information, upcoming meetings, become a member, link to state or provincial bat working groups, or download previous issues of this newsletter.

OFFICERS

President	Angie McIntire
Vice President	Dave Johnston
Treasurer	Brad Phillips
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Newsletter Editors: Lorraine Andrusiak, Julie York

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

Common Name	Scientific Name
Allen's lappet-browed bat	*Idionycteris phyllotis*
Big brown bat	*Eptesicus fuscus*
Big free-tailed bat	*Nyctinomops macrotis*
Californian myotis	*Myotis californicus*
California leaf-nosed bat	*Macrotus californicus*
Cave myotis	*Myotis velifer*
Eastern pipistrelle	*Pipistrellus subflavus*
Eastern red bat	*Lasiurus borealis*
Fringed myotis	*Myotis thysanodes*
Hoary bat	*Lasiurus cinereus*
Keen's myotis	*Myotis keenii*
Little brown myotis	*Myotis lucifugus*
Long-eared myotis	*Myotis evotis*
Long-legged myotis	*Myotis volans*
Brazilian (Mexican) free-tailed bat	*Tadarida brasilensis*
Northern myotis	*Myotis septentrionalis*
Pallid bat	*Antrozous pallidus*
Pocketed free-tailed bat	*Nyctinomops femorosaccus*
Silver-haired bat	*Lasionycteris noctivagans*
Townsend's big-eared bat	*Corynorhinus townsendii*
Western mastiff bat	*Eumops perotis*
Western red bat	*Lasiurus blossevillii*
Western small-footed myotis	*Myotis ciliolabrum*
Yuma myotis	*Myotis yumanensis*

STATE/PROVINCIAL UPDATES

USA

Arizona

High diversity and reproductive use of a desert riparian area in the Southwest: Fossil Creek Bats
by Carol Chambers

Water is special to humans in the arid Southwest. Bats think so too given the species diversity we identified in a 2-night mist-netting effort this summer. Two dozen humans from 7 private, state, and federal agencies converged on Fossil Springs Wilderness, an 11,550-acre area unique for its diversity of plants and birds and for the beauty of its crystal clear turquoise blue waters. Would the bat diversity match the plant and bird diversity? The creek originates at several springs with high levels of calcium that deposit thick layers of travertine over anything falling within its waters. In fact, the system gets the name 'Fossil Creek' because the calcium deposits cover and 'fossilize' materials like logs and roots.

Cecilia Schmidt, John McMullen and Meggan Dugan collect data on a captured bat (Carol Chambers photo).

In late June, to coincide with the reproductive season, we netted 7 locations along Fossil Creek at the canyon bottom and on the rim 1600 feet above the creek. Two teams hiked into Fossil Springs the first night (a 9-mile round trip on top of the night of netting) while 3 teams using triple-high nets captured bats over the creek. The second night we netted livestock ponds. Our 266 net-hours yielded 157 bats (probably surprised by the interruption of their nightly activities) representing 15 of the 28 species found in Arizona. The dominant species captured were Mexican free-tailed bat (32% of captures), pallid bat (23%), and Californian myotis (15%). Some of the more unusual species we captured included Allen's lappet-browed bat, Townsend's big-eared bat, cave myotis, and big free-tailed bat. A fascinating finding was the dominance of reproductive females; 90% of the 105 females we captured were pregnant, lactating, or post-lactating.

Fossil Creek bat crew (Carol Chambers photo)

Fossil Creek has gone through a restoration in the past decade with decommissioning of 2 hydroelectric facilities originally built in the early 1900s. The 20,000-gallons-per-minute stream flow was diverted by a dam that affected native fish populations. With restoration, the stream flows again as it did prior to dam building. If you want to visit, this wilderness area is just below the Mogollon Rim and on the borders of the Coconino and Tonto National Forests in

Arizona. This desert oasis has great swimming holes and waterfalls equivalent to Hawaii. It also appears to be a significant reproductive site for bats, with high bat diversity.

California

Impacts Affecting Mine-Roosting Bats
By Patricia Brown

Some states have many more abandoned mines than others that can shelter important bat colonies. Many of these mines have not been surveyed for bats and other wildlife. The first issue concerns mine closures when mine claimants or owners get letters from BLM or the state Abandoned Mine Land (AML) office requesting them to make mines safe for people (hazard abatement). As depicted in the below photos, this is not always done in the most bat friendly way. These mines were important California leaf-nosed bat maternity and winter roosts. The bats are now using the only mine opening that was fenced rather than receiving a gate or grate with the improper bar orientation. The worst case scenario would be hard closures at the wrong time of year without exclusion. It would be helpful if the agencies sending out notices would attach some guidelines as to wildlife issues in mines, survey protocol and appropriate closure measures.

The seasonal timing of hard closures either with polyurethane foam (PUF) or backfill is also critical. Mines should be surveyed immediately prior to closure, and any animals excluded. The preferred time to perform exclusions is in the late summer or early fall after summer bat maternity season and before winter hibernation. In the early spring, birds can be nesting inside mines and should not be disturbed. Bats and birds (such as owls) are mobile, and can occupy mines at different seasons or years other than the time of the initial survey. During exclusion, the mine is watched with night vision equipment, and a temporary one inch chicken wire barrier placed over the mine after the observer feels that all the animals have exited (Brown *et al.* 2001). A small “awning” is created so that bats trapped in the mine detect an exit, and bats and birds approaching from above sense a barrier.

A third issue is the renewed mining of bat roosts as the price of gold and other metals soar, even sometimes destroying mines that were set aside as mitigation sites for the destruction abandoned mines in the mining of a higher grade ore body in the recent past. I am involved with a mine in California where the gated maternity roost of Townsend’s big-eared bats that was the mitigation for previous mining will be mined. In Nevada an important hibernation site set aside as mitigation is now also scheduled for closure due to renewed mining. A maternity and winter roost of California leaf-nosed bats in a copper mine in Arizona, located on private land, was gated through cooperative efforts of BCI and AGFD. With the high price of copper, the owner is now seeking a mining company to purchase the land.

Colorado

Laura Ellison, USGS

Roger Rodriguez (Zotz Ecological Solutions, LLC) conducted a bat survey (summer-fall) of proposed Solar Energy Zones within the San Luis Valley of Colorado for the Bureau of Land Management. This study was intended to document the occurrence of BLM sensitive species to help the BLM determine the direction of solar energy developments in the region.

Laura Ellison (USGS) is on a detail with Headquarters in Reston, VA, for 3 months (Sept-Nov). She is working with the U.S. Fish and Wildlife Service on bats and wind energy development issues.

Idaho

compiled and edited by Rita Dixon, Idaho Department of Fish and Game

Bat Mortality in Ramon Cave

By Martha Wackenhut and Mark Drew, Idaho Department of Fish and Game

In August 2011, a local caver contacted US Forest Service (USFS) personnel to report that he had found dead bats in Ramon Cave, a remote and high-elevation cave in Bear Lake County, Idaho. Devon Green and Dennis Duehren (USFS), and Blake Phillips and Martha Wackenhut (Idaho Department of Fish and Game [IDFG]), subsequently visited the cave to assess the report. They found >50 bat carcasses and collected 25-30 for submission to IDFG's Wildlife Health Laboratory. Carcasses were fairly advanced in decomposition and some near the entrance were mostly bones with little fur or flesh, perhaps because of exposure to the elements.

Bat carcass, Ramon Cave 8/24/2011

Martha and others also observed 8-10 live bats in the cave, which all appeared to be *Myotis* spp. The live bats appeared healthy and behaved normally. The caver who reported the dead bats indicated that he had been in the cave last summer and did not observe any dead bats. He also reported that when he snow-machined past the cave this past winter, the entrance was snowed in. This past winter had above average snow pack, a cold spring, and snow drifts blocked the road to the trailhead below the ridge where the cave is located until after 4 July.

Necropsies revealed that the bats, collectively, were too far advanced in decomposition for meaningful analysis. The three bats in the best condition appeared thin with no fat deposits. Given the circumstances of the long winter and snowed in cave entrance, it is likely that these animals starved from prolonged confinement to the cave. Plans were made to revisit the cave to look for any fresh mortality and to observe the behavior of live bats.

Eastern Idaho Bat Monitoring Collaborative

By Rob Cavallaro and Bill Bosworth, Idaho Department of Fish and Game

In September 2011, the Idaho Department of Fish and Game (IDFG) hosted a bat acoustic monitoring workshop in Idaho Falls. The workshop provided participants with training on acoustic monitoring techniques, with particular emphasis on bat call identification. It was also an opportunity for regional biologists to share perspectives and concerns on bat conservation issues and prioritize future action.

A by-product of the workshop was creation of a bat monitoring collaborative that seeks to establish passive bat monitoring stations at key locations throughout eastern Idaho. Long-term, large-scale acoustic monitoring will allow partners to address knowledge gaps in regional bat ecology, particularly as it relates to mitigating impacts from wind energy development. Partners include the Southeast and Upper Snake Regions of IDFG, East Idaho Field Office of the US Fish and Wildlife Service, Caribou-Targhee National Forest, Bureau of Land Management, Department of Energy Idaho National Laboratory, Wildlife Conservation Society and Gonzales-Stoller Surveillance LLC.

Montana

Documenting baseline winter activity levels of bats in Montana with acoustic monitoring

Nathan A. Schwab (ABR, Inc.) and Kristi DuBois (Montana Fish, Wildlife and Parks)

We deployed acoustic monitoring stations at three locations (Lewis & Clark Caverns, Toeckes Cave, and McDonald Mine) in Montana from January through mid-May, 2011. The goal of this monitoring effort was to document winter base-line activity data to potentially use acoustic monitoring as a surveillance tool for WNS. Each monitoring station was equipped with an Anabat detector, temperature data logger, and solar panel array to allow long-term, remote monitoring. The monitoring stations recorded bat activity (bat passes) and temperature outside of hibernacula.

External monitoring minimizes potential human disturbance to the hibernating bats or any potential spread of *Geomyces destructans*, the fungus responsible for WNS. Studies conducted by Bat Conservation International at WNS-affected hibernacula in the eastern U.S., have shown dramatic increases in activity levels at WNS vs. non-infected WNS sites during the hibernation period. If this pattern also holds true in the western U.S., documenting pre-WNS baseline activity levels may allow for acoustic monitoring as a surveillance tool for potential spread of WNS. Data analysis is currently ongoing and will be finished in winter 2011.

Nevada

Nevada Bat Working Group 2011 Bat Blitz

Christy Klinger, Nevada Department of Wildlife

The 2011 Nevada Bat Working Group Bat Blitz took place August 29-Sept 2 in Lincoln County, NV, and focused on habitat associated with the ecotone between the Mojave and Great Basin deserts. Individuals from seven agencies (Nevada Department of Wildlife, Nevada Natural Heritage Program, US Fish & Wildlife Service, Bureau of Land Management, Bureau of Reclamation, Department of Energy, and National Park Service) and volunteers participated in the four night event during which 936 bats representing 14 different species, were captured with mist nets at stock tanks and springs.

Sam Skalak removing a hoary bat from a net (K. Szabo photo)

Acoustic (Anabat) and infrared/video data were collected at several survey locations, and a triple-high mist net setup was deployed and demonstrated courtesy of BOR. This project served as a training opportunity for some participants, and the data collected will help reduce our knowledge gap relating to bat assemblages and habitat use in the region, and will also assist in meeting objectives for several Habitat Conservation Guilds in our Nevada Bat Conservation Plan. In addition, we installed expanded-metal wildlife escape ramps in numerous range stock tanks in order to reduce unnecessary wildlife mortalities at these vital water sources.

Multi-state State Wildlife Grant for a Coordinated Effort to Monitor White-nose Syndrome in Bats in the West

By Angie McIntire

Arizona, California, Idaho, Nevada, Montana, Oregon and Bat Conservation International are partners on a project to begin conducting surveillance for white-nose syndrome in the west. Major focal areas of this project will be: Oversight, Surveillance, Outreach, and Research. The 6 states intend to develop response plans, purchase equipment, conduct surveillance and monitoring of hibernacula, as well as other outreach and research activities. Total award amount: $445, 715; Grant period through April 30, 2014.

New Mexico

Jennifer Foote, Ken Harrington, Quentin Hayes, James Stuart, Valerie Williams

In August the Lincoln National Forest sponsored a condensed BCI Acoustic monitoring class in Carlsbad for agency personnel and volunteers. They also demonstrated bat netting at Black River Recreational area and captured eastern pipistrelle, little browns, Mexican (Brazilian) freetails, Yuma myotis and cave myotis.

BLM volunteers Ken Harrington and Dave Belski conducted a summer exit bat count at a BLM cave in August and the count was 6176. While this number is down about 25% from last year it is consistent with what was observed in other roosts. The drought and the fires have affected many of the bat colonies in the area. Of interest was a new roost outside of the gate in which was not there in June. We believe these bats relocated from another area due to a fire in the area of their home roost. In mid-September we started noticing migrating bats in several caves where we normally do not see bats. The bats would be there for one or two nights only and then they were gone.

In central New Mexico, BLM has been inventorying the San Pedro Mountains, near the Sandia Mountains east of Albuquerque, on BLM lands for abandoned mines and bat habitat. Nothing significant to report so far, but it sure is beautiful and rough in there. We will be going back for more extensive surveys, including external bat surveys, in the future.

Bi-annual monitoring of cave hibernacula continued in several BLM caves. The Department of Defense has begun a multiple year program to survey potential bat roosts on their lands in New Mexico. The Department of Game and Fish continues to work with Department of

Transportation in identifying bridges that are bat maternity sites and are also scheduled for replacement. NMDGF and DOT are coordinating on the use of bat-exclusion netting when demolition is slated for the bat breeding season and on the installation of bat boxes on some new bridge spans which are otherwise unsuitable as bat roosts.

The Department of Game and Fish Share With Wildlife Program (SWW) and Non-game Mammal Program have funded recent WNS surveillance and hibernacula microclimate monitoring at caves in NM (by Buecher Biological Consulting) and a program that addresses water-sources for bats (by BCI). In addition, SWW will be funding a survey project by D. Northup for cave micro-flora, including fungi, in support of WNS monitoring.

In southern New Mexico, biologists on the Lincoln National Forest (LNF), in conjunction with Bat Conservation International (BCI) and Bosque Wildlife & Habitat (BWH) are continuing inventory, monitoring and restoration work begun in 2009. The work, aimed at identifying, categorizing and restoring wildlife waters accessible by bats, led to a Wings Across the Americas award for outstanding efforts in bat conservation for 2011. Award recipients include LNF Biologist Rhonda Stewart, Wildlife Biologists Larry Cordova, Jack Williams and Larry Paul, as well as the director of the Water for Wildlife program at BCI Daniel Taylor and the head of Bosque Wildlife & Habitat Quentin Hays. Led by Tom Biebighauser, Daniel Boone National Forest Wildlife Biologist and director of the Center for Wetlands and Stream Restoration, the group completed another comprehensive bat-accessible wetland restoration on the LNF in September of this year.

Range Extension for Lesser Long-Nosed Bat in New Mexico

Marikay Ramsey, Bureau of Land Management, Santa Fe, NM, marikayr@blm.gov
Kathy Whiteman, Gila Conservation Education Center, Silver City, NM
director@gcecnm.org

Three species of nectar- and pollen-feeding bats (*Leptonycteris yerbabuenae*, *L. nivalis* and *Choeronycteris mexicana*) occur seasonally in the boot-heel of New Mexico following the flowering phenology of *Agave*. Between the late 1990s and early 2000s, we searched for these bats in the Big Burro Mountains. We examined abandoned mines, conducted nocturnal observations among stands of blooming *Agave palmeri*, and erected hummingbird feeders among one *A. palmeri* population to confirm the presence of nectar feeding bats in this area. In spite of these efforts, we were unable to document either the occupation of abandoned mines or foraging within *A. palmeri* stands by nectar-feeding bats. Recently, while mist-netting for insectivorous bats on private property in the Big Burro Mountains, we captured six male *Leptonycteris yerbabuenae,* both juveniles and adults. This species was differentiated from *L. nivalis* on the basis of forearm length, length of the terminal phalanx of the third finger, and pelage. These captures, made in juniper-oak woodland habitat, represent a range extension for *L. yerbabuenae* of approximately 120 km from known summer roosts in southern NM. We contacted other area residents who confirmed the use of domestic hummingbird feeders by nectar-feeding bats in the late summer of 2010 and 2011. Throughout the remainder of the 2011 season, we will attempt to document foraging by *L. yerbabuenae* on the *A. palmeri* populations within the Big Burro Mountains.

Oregon

Michelle Caviness, Bureau of Land Management, Vale, Oregon

As part of Tom Rodhouse's (NPS) doctorate, he partnered with Pat Ormsbee (USFS), Lew Cousineau (Central Oregon Community College), and Joe Szewczak (Humboldt State University) to analyze Bat Grid monitoring data from 2006-2009 looking at the distribution and status of *Myotis lucifugus* in the PNW. Tom built unique and robust hierarchical occupancy models using Bayesian statistics. The initial focus on *M. lucifugus* was because of the potential threat to this species from WNS. Modeling for other species and years of data is in progress.

Washington

Compiled by Ella Rowan, WDFW Wildlife Biologist, Washington WBWG co-chair

North Puget Sound Bat Grid Efforts

By: Chris Anderson, WDFW Wildlife Biologist

Myotis ciliolabrum

We had a few bat-related field efforts this summer in the Seattle to Bellingham area. Most notable was continuation of USFS Bat Grid efforts in the Puget Sound area. Lead efforts were conducted by Bats Northwest members, assisted by WDFW area field biologists when available. Sites included those around Mt. Baker, down around Bellingham, and just over Snoqualmie Pass. One highlight night was at Cornwall City Park in Bellingham where Yuma, western small-footed, and little brown bats were captured. Hand-release recordings were taken for confirmation of these little brown jobbies.

Winter Bat Surveys on USFWS National Wildlife Refuges

By: Jenny Barnett, Zone Inventory and Monitoring Biologist, USFWS

With the discovery of White-nose Syndrome in bats in the eastern part of the country, and the alarming mortality rates experienced in infected caves, bats have made the news recently. On National Wildlife Refuges in the northwest, little is known about the bat populations. While a few refuges have caves or mines, nothing is known about the wintering bat populations in these sites. Through a grant from the Quick Response Program, USFW, and USGS scientists are teaming up to conduct a study of wintering bats on select refuges in Oregon, Washington, and Nevada. One known mine and 4 known caves will be surveyed for bat use in late fall using long-term acoustic equipment.

Hanford/Saddle Mountain, McNary, and Columbia National Wildlife Refuges support cliff habitat that could host small populations of wintering bats. This habitat will be surveyed using walking transects to search for swarming bats in late fall. Acoustic detectors will be deployed at various sites to record what species are active during the winter. This information will be used by managers to determine if wintering bat populations exist on the refuges, and to identify hibernacula.

International Bat Night at Conboy Lake National Wildlife Refuge
By: Lisa Wilson, Biological technician/AmeriCorps intern at Conboy Lake NWR

On August 27, in honor of international bat night, we held an event at Conboy Lake National Wildlife Refuge near Glenwood. Jon Lucas, USFWS volunteer biologist, provided an introduction to bats, spoke about White-Nose Syndrome and had a demonstration mist-net set up to explain how bats are captured. As dusk settled, Jon used a bat detector connected to a PDA to let people visualize the bat calls and spotlighted some bats to help folks see them.

Jon had come to visit the refuge several times over the summer to find out what bats are present on the refuge and whether they occupy a small pre-1900 cabin that sits near the refuge headquarters. On the night of the public event, the bats provided the best show of the summer. We picked up several species, including big brown, canyon, silver-haired, and hoary bats. All in all it was a successful event, especially being the first of its kind at Conboy. Thank you to Jordene Lucas for taking great photos of the event! And thank you to Jon Lucas for being so excited about bats that he volunteered to come and do the event!

Lower Snoqualmie River Valley Bat Blitz Trial

A few intrepid *Bats Northwest* volunteers assisted WDFW with a trial acoustic “Bat Blitz” at the Stillwater Wildlife Management Unit near Carnation in late August. The team checked a few area bridges along the lower Snoqualmie from Duvall to Carnation; then headed to the management unit to orient and divide the area for acoustic survey coverage. Overall, the effort went quite well for a post-maternity, pre-swarm period. Areas of high bat activity were identified on the management unit with an initial list of species now started. Future efforts will assist in providing a better understanding of species occurrence on the unit seasonally. It is hoped to continue repeated blitz efforts in 2012 at Stillwater WMU, Cherry Valley WMU, and possibly a few other area parks throughout the lower Snoqualmie region.

Washington Department of Fish and Wildlife White-nose Syndrome grants

WDFW applied for two WNS grants, which were approved. The grant money will help WDFW conduct surveillance for WNS, produce more education materials and collect baseline data on Washington bat populations.

CANADA

British Columbia

Large-scale Winter Monitoring to Begin Across Southern B.C.

By Cori Lausen, Birchdale Ecological Ltd., Kaslo, BC info@batsRus.ca

As part of my upcoming NSERC Industrial Postdoc with Wildlife Conservation Society Canada, I'll be looking at hibernation behaviour and locating hibernacula in BC. Work will begin this fall. Project funding from Fish and Wildlife Compensation Program will facilitate mistnetting, radiotracking and intensive acoustic monitoring in the Kootenay region. The Habitat Conservation Trust Fund will fund the bulk of the monitoring in the other parts of the province: the Okanagan, Boundary, Coastal and Vancouver Island regions. Acoustic monitoring will take place in these regions, with the long term goal of locating hotspots of activity and potential hibernacula for more intense capture and radiotracking efforts in subsequent years. This will be a large scale collaborative effort with BC Ministry of Forests, Lands and Natural Resource Operations and several independent bat biologists across the province.

EVENTS

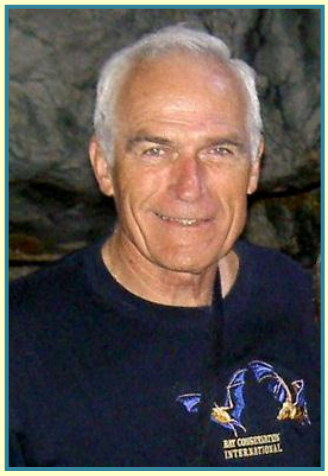
Year of the Bat
http://www.yearofthebat.org/

2012 National Bat Conference
University of York, 14-16 September.
http://www.bats.org.uk/pages/national_bat_conference.html

Midwest Fish and Wildlife Conference
Des Moines, December 4-7, 2011
http://www.midwest2011.org/

61st Annual Conference of the Wildlife Disease Association
Lyon (France), 22-27 July 2012
http://wda2012.vetagro-sup.fr/

BOB BERRY FUND DONATIONS REQUESTED

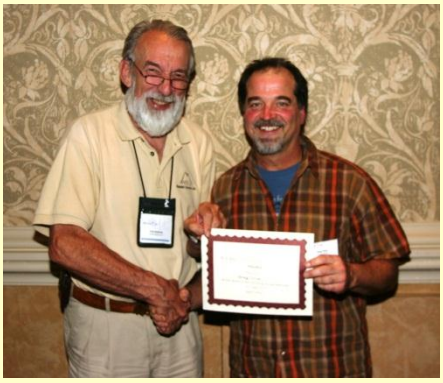


Pat Brown-Berry will again match donations up to $1,000 in 2011 for the Bob Berry Fund. The hope is to make an award every other year at the biennial meeting of WBWG.

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 worked best one-on-one and offered his expertise to many students and agency biologists. The goal is to facilitate research by providing current technology and training from the developers of the technology. Some excellent proposals were received and reviewed by the WBWG scientific research advisory committee.

The following awards were presented at the annual meeting of the WBWG in Las Vegas in April 2011:

The Bob Berry Holohil Award: Greg Falxa of Cascadia Research (*Telemetry to locate a hibernation colony of Townsend's big–eared bats in Southwestern Washington)* 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.



Fred Anderka (Holohil) congratulates Greg Falxa.

The Bob Berry Titley Electronics Award: Marc-Andre Beaucher, Creston Valley Wildlife Management Area (*Beginning a long term bat research and monitoring program at Creston Valley Wildlife Management Area in* southeastern *BC, Canada*) received an AnaBat SD2 receiver and a free spot in one of the AnaBat trainings donated by Titley Electronics.

The Bob Berry Binary Acoustic Technology Award: Barb Johnston, Park Ecologist, Parks Canada (*Inventory of Bat Fauna of Waterton* Lakes *National Park, Alberta)* received an AR125 Ultrasonic Receiver, SPECT'R software and an FR125 field recorder donated by Mark Jensen.

The Bob Berry SonoBat Award: Dr. Purnima Govindarajulu, British Columbia Ministry of Resource Operations (*Identifying and securing hibernation habitat for bats in British Columbia)* 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 criteria for the awards were:

- Demonstrates financial need (project could be compromised without this award)
- Demonstrates urgency for project/research to be conducted
- It is a relevant conservation issue for bats
- Demonstrates urgency for project/research to be conducted
- Demonstrates a sound scientific approach
- Demonstrates requirement for the equipment for which he/she has applied
- Applicant has outlined a clear plan for how the equipment/money will be used (i.e. the level of funding and/or requested equipment is appropriate for this study)
- It is clear that results from this work will be distributed or made publicly available through publication/report
- Applicant conveys project clearly, demonstrating a sound understanding of his/her proposed project background and objectives
- Demonstrates long-term benefits

BOB BERRY EQUIPMENT LIBRARY

Donations are now being accepted by the WBWG for the Bob Berry Equipment Library with the goal of "recycling" equipment and research supplies. When projects end, sometimes equipment is left "on the shelves" and could still be used to further bat research and conservation. Outright donations by private individuals and companies would be tax-deductible. Loans for specified periods are also encouraged, especially for government agencies. Examples of possible equipment (in usable condition) include bat detectors, radio tracking equipment and

transmitters, mist nets and poles, harp traps and night vision equipment. Fred Anderka has offered to refurbish any donated Holohil transmitters for free.

A loan application and agreement will be required for "checking out" equipment. Oversight will be provided by the WBWG scientific advisory committee. The assumption is that the equipment be returned in the condition that it is received, although transmitter loss may be inevitable. The borrower would be responsible for replacing or repairing equipment that is lost or damaged and for shipping costs. Greg Falxa has agreed to be the first Librarian with responsibilities of receiving and sending equipment and making sure equipment is functional when it's borrowed and that it's returned in good condition. Equipment donations/loans should be sent directly to him at Greg Falxa, 5230 Cushman Rd NE, Olympia, WA 98506 or if delivery confirmation signature is needed, to his (part-time) office: Greg Falxa, Cascadia Research, 218 1/2 W. Fourth Ave, Olympia, WA 98501, Greg's cell & message phone is: 360.870.8243. Transmitters should be sent to Holohil directly, earmarked for the Bob Berry Fund: Holohil Systems Ltd., 112 John Cavanaugh Drive, Carp, Ontario K0A 1L0, CANADA.

When sending donations or loans, please also notify Pat Brown (patbobbat@aol.com) or treasurer Brad Phillips (bjphillips@fs.fed.us) so that your contribution or loan can be acknowledged, and a central list be maintained. A list of equipment and supplies available for check out will be listed on the WBWG website.

Bat researcher and author Dr. Thomas Kunz was struck by a car during the NASBR conference in October and suffered critical brain injuries. Tom and his family are in our thoughts at this difficult time and we wish them all the best.

Tom's Caring Bridge website can be accessed at http://www.caringbridge.org/visit/tomkunz and provides updates on his condition.

WHITE-NOSE SYNDROME UPDATES

Long-eared myotis (L. Andrusiak photo)

Multi-state State Wildlife Grant for a Coordinated Effort to Monitor White-nose Syndrome in Bats in the West

Arizona, California, Idaho, Nevada, Montana, Oregon and Bat Conservation International are partners on a project to begin conducting surveillance for white-nose syndrome in the west. Major focal areas of this project will be: Oversight, Surveillance, Outreach, and Research. The 6 states intend to develop response plans, purchase equipment, conduct surveillance and monitoring of hibernacula, as well as other outreach and research activities. Total award amount: $445,715; Grant period through April 30, 2014.

Interagency Oregon/Washington White-nose Syndrome Plan

The Pacific Northwest Interagency WNS Team has completed a final draft of their WNS Response Plan that is out for internal field review by state and federal agencies until the end of October. Participating agencies include the USFS, BLM, USFWS, WDFW, ODFW and the NPS, with continuing requests for representation from other agencies and tribal governments. The Idaho Department of Fish and Game has been involved in discussions as well, due to their state sharing federal region territory with Oregon and Washington. The Plan includes a watershed (HUC 5) risk assessment to help prioritize where WNS response efforts are most needed, and identifies geographic triggers and associated management actions as WNS moves west. The Team is particularly appreciative of the USFS, BLM, Washington, and Oregon field folks and the Cascade, Oregon, Willamette Valley, and Oregon High Desert Grottos for providing valuable input to the plan. The Plan is scheduled for completion by early 2012.

UPCOMING WORKSHOPS

SonoBat Software Training Workshop, January 9-12, 2012, Hotel Carlisle, Carlisle, Pennsylvania
http://www.batmanagement.com/Programs/Carlisle2012/carlisle2012.html

This course highlights current acoustic analysis techniques with a focus on the use of the latest full-spectrum bat recording equipment and echolocation call analysis using the powerful SonoBat 3 software.

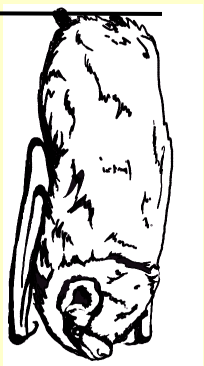
EDUCATION

BatsLive is a free online Distance Leaning Adventure for grades 4-8 and their educators. Webinars, lesson plans, and more. It can also be translated online into 13 languages online--check it out! http://batslive.pwnet.org/

2012 Bat Conservational International Student Research Scholarship Program
http://www.batcon.org/index.php/what-we-do/grants/student-research-scholarships.html

Each year, BCI awards scholarships to help students at universities around the world conduct conservation-relevant research. The goal of this program is to support exceptionally talented students in research initiatives that will contribute the new knowledge that is essential to conserving bats and the ecosystems they serve worldwide. The maximum one-year award per student is $5,000. Applications are now being accepted for 2012 BCI Scholarships. Only online applications will be considered. The deadline for completed applications is December 15, 2011.

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.

Aaftab, A., R. Jain, R. Koford, A.W. Hancock and G.G. Zenner. 2011. Bat mortality and activity at a northern Iowa Wind Resource Area. The American Midland Naturalist 165:185-200.
http://www.cfwru.iastate.edu/unit_scientists/koford/Koford2011.pdf

Blehert, D.S., J.M. Lorch, A.E. Ballmann, P.M. Cryan, and C.U. Meteyer. 2011. Bat white-nose syndrome in North America. Microbe Magazine. June 2011. http://www.microbemagazine.org/index.php/06-2011-home/3462-bat-white-nose-syndrome-in-north-america

Coleman, J.L., and R.M.R. Barclay. 2011. Influence of urbanization on demography of little brown bats (*Myotis lucifugus*) in the prairies of North America. PLoS ONE 6(5): e20483. doi:10.1371/journal.pone.0020483 http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0020483

Hagen, E.M. and J.L. Sabo. 2011. A landscape perspective on bat foraging ecology along rivers: does channel confinement and insect availability influence the response of bats to aquatic resources in riverine landscapes? Oecologia DOI: 10.1007/s00442-011-1913-4. http://www.public.asu.edu/~jlsabo/pubs/Hagen%20&%20Sabo%202011.pdf

Johnson, G.D. and W.P. Erickson. 2011. Avian, Bat and Habitat Cumulative Impacts Associated with Wind Energy Development in the Columbia Plateau Ecoregion of Eastern Washington and Oregon. Prepared for: Klickitat County Planning Department. http://www.klickitatcounty.org/Planning/filesHtml/200408-EOZ-EIS/cummulative2.pdf

Osborne C, P.M. Cryan, T.J. O'Shea, L.M. Oko, C. Ndaluka, C.H. Calisher, A.D. Berglund, M.L.Klavetter, R.A. Bowen, K.V. Holmes, and S.R. Dominguez. 2011. Alphacoronaviruses in New World Bats: Prevalence, Persistence, Phylogeny, and Potential for Interaction with Humans. PLoS ONE 6(5): e19156. doi:10.1371/journal.pone.0019156 http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0019156

O'Shea, T.J., P.M. Cryan, E.A. Snider, E.W. Valdez, L.E. Ellison, and D.J. Neubaum. 2011. Bats of Mesa Verde National Park, Colorado: composition, reproduction, and roosting habits. Monographs of the Western North American Naturalist 5(2011): 1-19. https://ojs.lib.byu.edu/wnan/index.php/wnanmonos/article/view/3772/4074

Pallid bat (L. Andrusiak photo)

Perry, R.W. 2011. Fidelity of bats to forest sites revealed from mist-netting recaptures. Journal of Fish and Wildlife Management 2(1):112-116. http://www.fwspubs.org/doi/pdf/10.3996/082010-JFWM-030

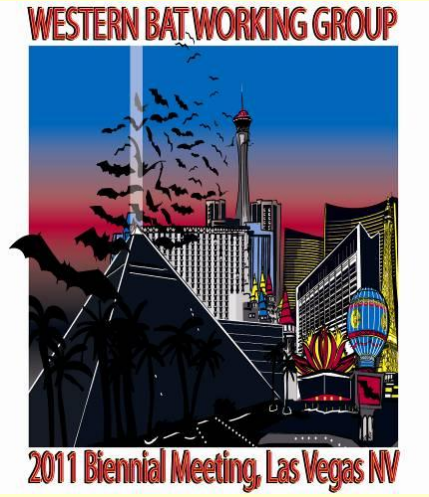
Puechmaille, S.J., G. Wibbelt, V. Korn, H. Fuller, F. Forget, K. Mühldorfer, A. Kurth, W. Bogdanowicz, C. Borel, T. Bosch, T. Cherezy, M. Drebet, T. Görföl, A. Haarsma, F. Herhaus, G. Hallart, M. Hammer, C. Jungmann, Y. Le Bris, L. Lutsar, M. Masing, B. Mulkens, K. Passior, M. Starrach, A. Wojtaszewski, U. Zöphel, and E.C. Teeling. 2011. Pan-European distribution of White-Nose Syndrome fungus (*Geomyces destructans*) not associated with mass mortality. http://edoc.rki.de/oa/articles/reldwoXKK0nFY/PDF/215LQXPGdPkrA.pdf

Russell, A.L., M.P. Cox, V.A. Brown, and G.F. McCracken. 2011. Population growth of Mexican free-tailed bats (*Tadarida brasiliensis mexicana*) predates human agricultural activity. BMC Evolutionary Biology 11:88. http://www.biomedcentral.com/content/pdf/1471-2148-11-88.pdf

Sarell, M., T. Hill and J. Hobbs. 2011. Bridge River Bat Assessment 2010. Report to British Columbia Hydro Bridge Coastal Fish and Wildlife Restoration Program and Lillooet Tribal Council.
http://www.lillooetnaturalistsociety.org/documents/BCRP_Bat_Report_March_30%20FINAL%20PUBLIC.pdf

Silvis, A. 2011. The Response of Bats to Shelterwood Harvest and Prescribed Fire. M. Sc. Thesis, Ohio State University, Environment and Natural Resources.
http://etd.ohiolink.edu/send-pdf.cgi/Silvis%20Alexander.pdf?osu1299601292

ABSTRACTS: 2011 WBWG BIENNIAL MEETING, LAS VEGAS, NEVADA



Silver-haired Bat Maternity Roosting and Foraging Ecology in Northern Nevada

Pete Bradley, Nevada Department of Wildlife, Elko, NV*

In an effort to understand roosting and foraging ecology of one of Nevada's most rare forest dwelling species, one male and eight female silver-haired bats (*Lasionycteris noctivagans*) (LANOs) were equipped with 0.53-gram VHF radio transmitters. All subjects were captured at the same communal watering hole. Six LANO maternity roosts were documented in subalpine forest habitat. Without exception, roosts were located in dead, standing, broken-top, large-diameter (38-130 cm DBH, avg 78 cm), quaking aspen trees riddled with woodpecker cavities. Without exception, maternity roosts were surrounded by vast acreages of mixed subalpine deciduous/coniferous forest. With one exception, LANO maternity roosts were located within 15 m of perennial waters, although because of dense bank vegetation, some appeared to be unsuitable for in-flight drinking.

The six known LANO maternity roosts were located mostly within the McDonald Creek watershed basin and were 0.8 -3.7 km (1.6 avg) from their communal water source. Silver-haired bats emerged from larger woodpecker holes (>10 cm diameter) that were generally 6-10 m up trees and in a southern aspect. The largest emergence from a single cavity was documented on 30 July 2009 when 26 animals flew out on a clear, warm (15 C), windless, 1/2 moon evening. Bats returned to maternity tree roosts from 2100-0425 hr and appeared to emerge only once or twice per night in late July and August. Several bats exhibited knowledge of multiple (2-3) alternative maternity roost sites. Multiple flying/foraging records indicated that higher elevation (2,000-2,520 m) subalpine fir, limber pine and quaking aspen old-growth forest stands were preferred foraging habitats for LANOs in late July and August. LANOs travelled as far as 4.4 km from their maternity roosts during foraging/watering bouts Based on data from 537 telemetry observations over the course of 21 days, the average home range estimate for

LANOs on their summer range in northern Nevada was 12.6 km^2, but individual animal home ranges varied widely from a low of 2 km^2 to a high of 61 km^2.

Habitat use and activity patterns of evening bats, *Nycticeius humeralis*, and eastern red bats, *Lasiurus borealis*, in a pecan agroecosystem in central Texas

Elizabeth Braun de Torrez and Thomas H. Kunz, Boston University, Center for Ecology and Conservation Biology, Boston MA*

Insectivorous bats have been postulated to play vital, yet largely unexplored, roles in ecosystem function by suppressing certain agricultural pests. Knowledge of activity patterns in agricultural landscapes is crucial for understanding the temporal and spatial overlap of bats and insect pests. Pecan agriculture spans 14 U.S. states and is economically important both for local farmers and international exports. Our research investigates the services that bats provide through suppression of the pecan nut casebearer moth, *Acrobasis nuxvorella*, a devastating pest of pecans. In this study, we used radiotelemetry to evaluate activity patterns and habitat use of *Nycticeius humeralis*, and *Lasiurus borealis* within and surrounding the pecan agroecosystem in central Texas. In 2009 and 2010, we documented roosting and foraging habitat for twenty-five *N. humeralis* and seven *L. borealis*. We found *N. humeralis* individuals to roost in woodpecker holes and under loose bark of old pecan trees. *L. borealis* predominantly roosted in the leaves of pecan trees. Both species foraged extensively in pecan orchards; however, *L. borealis* was active for more hours than *N. humeralis*. Interestingly, *L. borealis* visited multiple orchards each night and spent considerable time in highly sprayed conventional orchards. These are preliminary data and much more analysis remains to be done; however our results suggest that pecan orchards serve as important habitat for bats. Factors influencing habitat selection by bats in an agricultural landscape and the evaluation of ecosystem services are key components to a comprehensive conservation plan where involvement of private landowners is not only encouraged, but inevitable.

Bat activity in riparian corridors (FWS refuges) and agricultural landscapes in North Dakota: implications for conservation and development

Caitlin Coberly (1), Michael J. O'Farrell (2), David Walsh (3); 1: Merlin Ecological, Halsey, OR, 2: O'Farrell Biological Consulting, Las Vegas, NV, 3: Minot, ND*

Little is known about bat migration. In particular, little is known about the habitats used or the patterns of migration across the landscape. Recent mortality data from some wind farms suggest that bats migrate along geographic features such as ridgelines. Like much of the central US, North Dakota has few ridgelines, but has the potential for substantial numbers of migrating bats. In this preliminary survey, we monitor bat activity along three major north-south running riparian corridors and adjacent agricultural areas (controlled, as much as possible, for water presence, tree cover, and lighting) to assess whether bats preferentially use the riparian corridors during migration or breeding seasons. We find evidence of 6 of the 10 bat species known to occur in North Dakota. Bat activity is approximately 3 times higher in the riparian corridors than in the nearby agricultural settings. Riparian areas across all sites showed a large amount of activity during spring migration for *Lasionycteris noctivagans*. Riparian areas were also important during fall migration for *L. noctivagans, Lasiurus borealis, Myotis lucifugus, and M. septentrionalis* at DesLacs Refuge. Agricultural areas had fairly low activity overall during spring migration, but had significant activity for *Lasionycteris noctivagans* at both DesLacs and Upper Souris Refuges during the fall migration.

Development of a passive camera system for the long-term monitoring of bat activity at subterranean bat roosts

Scott Conover, Michelle Slosser, Brendan Redler, and Rick Sherwin, Christopher Newport University, Newport News, VA*

Bat-compatible gates have been installed at mine entrances to keep the public out of these unstable and dangerous places, while protecting valuable habitat. However, the logistical difficulties associated with conducting broad-scale, long-term monitoring of gated mines means that the overall effectiveness of these closure programs is largely unknown. In an effort to facilitate long-term monitoring, we developed and completed preliminary quantitative evaluations of a deployable camera system, triggered by both the movement of animals, and/or the echolocation calls of bats. The system is designed to be weatherproof and long-lasting, with an anticipated deployment life of up to 6 months.

An initial trial was conducted on the Chugach National Forest, after which the system was modified and redeployed for intensive trials in Clark County, NV. Our primary goal in this study was to gain an understanding of the capabilities of the camera system and to develop methods to utilize it effectively. During the Clark County trials, we deployed a single camera system in non-gated mine openings. In the second phase of Clark County trials we deployed trigger systems in gated mines - deploying two camera systems per mine. We monitored the performance of the trigger systems, using either IR video cameras or observation of the mine openings in real-time with Gen 3 night vision scopes. Data collected with video cameras, or with night vision cameras, was used to truth data collected with passive camera systems. While initial trials were successful in recording bat presence at the tested mine entrances over an extended period of time, they were neither precise nor accurate when compared with concurrent data collected to truth the system. Modifications to the trigger system and future trials to develop methods that will yield consistent qualitative data about bat mine use are in development and will be discussed.

Microclimatic Factors Influencing Roost Type Use by Lesser long-nosed bats

*Joel M. Diamond, PhD * and Shawn Lowery, Arizona Game and Fish, Research Branch, 5000 W. Carefree Hwy, Phoenix, AZ*

Southern Arizona provides the required roosting, foraging, and natal development habitat requirements for the Lesser Long-Nosed Bat (*Leptonycteris cursoae yerbabuenea*) (LLNB), a federally endangered migratory bat species. Mines and caves of the southwest provide the necessary habitat for various life stage development periods of the LLNB including parturition, natal development, juvenile dispersal, male summer movements, transient resting areas, and local resting areas. These roosts provide the physiological requirements needed to sustain both large and small roosts. Monitoring of roost sites is essential to the protection and management of this federally listed species. Subsequently, it is necessary to recognize what constitutes a suitable LLNB roost site. We monitored 14 cavern sites across southern Arizona within the range of LLNB. Caverns were categorized as maternity, day and non-roosts. Within each of the 14 roosts we recorded temperature vapor pressure deficit and light. These three variables were then compared across roost type with the use of analysis of variance. Maternity roost insular temperature and vapor pressure deficit differed significantly from day and non-roosts. Day roosts were significantly colder than maternity and non-roosts. Non-roosts and maternity roosts did not differ in mean temperature or vapor pressure deficit. These findings indicate that LLNB are selecting cold, moist day roost habitat. Our findings also indicate that LLNB are selecting maternity roosts that provide a high degree of microclimatic insulation from external temperature and vapor pressure fluctuations.

Wing damage in *Myotis volans* from Pierce County, Washington

Greg Falxa, Washington Department of Fish and Wildlife, Olympia, WA

While conducting routine field work collecting hair samples from bats during July 2010, 10 long-legged myotis (*Myotis volans*) were captured while night roosting under a bridge. Five of these bats exhibited moderate to severe damage on the wings and uropatagium, primarily in the form of holes and receded membrane edges with necrotized tissue. Specimens submitted to the National Wildlife Health Center did not test positive for any known disease. Photographs and collection information are presented.

New Mexico Cave Hibernacula

Jennifer Foote, National Speleological Society

Increasing attention is now being paid towards the attributes of the environment where bats are hibernating. Historical data on hibernation temperatures and humidity has been collected in New Mexico caves since at least the late 90's. Information to be presented in this poster will include historical data, and a brief analysis of some of the hibernacula characteristics of New Mexico caves. The caves are located in lava, gypsum, and limestone. One cave is only about 150' long, and one hibernaculum is located in part of a 13- mile-long cave. The most common bat species hibernating in these caves include *Myotis velifer, Myotis ciliolabrum*, and *Corynorhinus townsendii*. The most populous cave hibernacula roosts in New Mexico vary between 30 and 48° F and 29-59% humidity. In general, the temperature and humidity range vary significantly between roosts and from year to year.

Maternal Roost Ecology of the Western Red Bat (*Lasiurus blossevillii*) in Northern Nevada

Jenni Jeffers, Nevada Department of Wildlife, Fallon, NV

The first confirmation of red bat reproduction in Nevada was on July 2009 from a private orchard in Fallon, Nevada. Prior to this occurrence, records only consisted of non-reproductive specimens collected during the summer in the Fallon and Dyer areas. The ensuing behavioral study by the Nevada Department of Wildlife of two females and four pups provided valuable roost characteristics and reproductive biology of this species. Using a video recorder with an IR light, this small maternity colony was recorded during 43 nights (over 200 hours of video) beginning at sunset. Fledging of one set of pups was captured on video along with grooming, nursing, and pup activity in the roost. Data was also collected on roost trees, foraging habitat and activities, owls frequenting the area, and weather. Some of the more interesting video portions were selected for viewing at the 2011 Western Bat Working Group Conference. This may have been a rare opportunity to capture these maternal activities of Western red bats in Nevada, as they did not return to the orchard the preceding summer.

Comparison of Airspace Sampled by Ground and Raised Anabat Detectors at Wind-Energy Facilities

Andy Krause, Christina C. Roderick, Donald I. Solick, and Christopher S. Nations, Western EcoSystems Technology Inc., Cheyenne, WY*

Assessment of habitat use with ultrasound detectors to determine the potential risk to bats is an important stage of risk assessment for potential wind-energy projects. Detector height is a topic that has not received much attention, but could affect the true determination of habitat use by bats. Current guidance recommends placing ground-based detectors 1.5 m off the ground or above dominant vegetation. However, the airspace sampled by ground and raised detectors

may overlap to where the same individual is being detected by both detectors therefore increasing the true bat pass count. The goal of this study was to determine the degree of overlap in detection between ground-based detectors and those mounted at 30 and 45 meters. Data were collected using Anabat™ SD1 bat detectors at several wind-energy projects in southern California. Because the Anabat is capable of detecting bat calls approximately 30 meters from the microphone, we predicted a greater overlap in call detection between ground-based and 30 m detectors paired at the same tower than between ground-based and 45 m pairs. We also predicted a greater overlap for calls by low-frequency species (i.e., <35kHz) than by high frequency species, because low-frequency sounds travel further in the atmosphere and should be detected at a greater distance. The results from this study will be useful in determining an adequate height for raised detector microphones.

Virgin River Habitat Association Study

Vona Kuczynska* and Amanda Stenman, Riparian Invasive Research Laboratory, University of California, Santa Barbara CA

Tamarisk (*Tamarix spp*) has altered riparian ecosystems in the desert southwest by outcompeting native cottonwood-willow vegetation. Its dominance on western rivers is associated with substantial ecological and economic impacts to wildlife associations and water resources. Tamarisk has naturalized in the absence of major herbivores, so a biocontrol program led to the introduction of tamarisk leaf beetles (*Diorhabda spp*) in 2001. Since the release of this specialist herbivore, few studies have been conducted to determine how their presence affects riparian ecosystems and wildlife use. A UCSB/USGS research team has been monitoring the effectiveness of the beetle after its release near Saint George, Utah as it moves southward along the Virgin River. In the summer of 2010, we conducted passive Anabat surveys to determine landscape-level vegetation associations exhibited by bats in five major habitat types: cottonwood (*Populus fremontii*)/willow (*Salix spp*), marsh, burned tamarisk, tamarisk, and mesquite (*Prosopis spp*) stands. Prior to the survey period, three of the five sites had fully established populations of tamarisk beetles. We collected data on bat activity before and after beetle establishment at tamarisk sites (~22 miles apart). Although this study did not have a guano sampling component, the passive acoustic data may help determine if bats are attracted to or avoid swarms of beetles at dusk. This study detected 15 species of bats and the preliminary results indicate non-random associations with different vegetation types.

Urban Movement patterns of Lesser Long-nosed bats (*Leptonycteris curasoae*)

*Shawn Lowery and Joel M. Diamond, PhD *, Arizona Game and Fish, Research Branch, 5000 W. Carefree Hwy, Phoenix, AZ*

The lesser long-nosed bat (*Leptonycteris curasoae*) is a federally listed endangered species in the U.S. and Mexico. The northern U.S. distribution of lesser long-nosed bats occurs in Arizona and extends from the Picacho Mountains, southwest to the Agua Dulce Mountains and southeast to the Chiricahua Mountains. This nectivorous species is evidently migratory only in the northern populations (near 30° N latitude) where there exists a concurrent seasonality of floral resources. Our study area can be generalized as the greater Tucson Basin which lies in northeastern Pima County, Arizona. We trapped lesser long-nosed bats from August – October at trap sites utilizing one mist net erected in front of hummingbird feeders and oriented to take advantage of flyway directions. We mounted radio transmitters (Holohil models LB-2N and BD-2) weighing approximately 0.42 g on the back of each bat using medical skin glue (Skin Bond™). We tracked individual bats for a maximum of 14 days. We used the resulting tracking data to locate day and night roosts and to define foraging and traveling corridors. This study indicates that lesser long-nosed bats utilize habitats in the Tucson Basin beginning in August and ending in October. This species actively forages in, travels through and roosts in the Tucson Basin. Foraging habitat and travel corridors were related to intensity of development,

ambient light and distance to large washes. Night roosting sites were related to vegetative structure and development architecture. Day roosting sites were associated with the presence of cavern habitat.

An Inventory of Bat Species Composition and Reproductive Status in Northeastern Nevada Forests

Katie Erin G. Miller and Pete Bradley, Nevada Department of Wildlife, Elko, NV*

A recent analysis of work conducted in Nevada, under the guidance of the Nevada Bat Conservation Plan, identified a dearth of efforts to meet the objectives under several Habitat Conservation Guilds, including Tree Roosting Habitat and Forest and Woodland Habitat. The Nevada Bat Working Group decided to focus the 2009 Bat Blitz on these two Habitat Conservation Guilds. Using standard mist-netting techniques, we sought to determine 1) which species were summering in forest and woodland habitats in northeastern Nevada, and 2) which species were reproducing in these habitats. A total of 133 individual bats were captured from 8 species and we were able to identify several reproductive individuals. This effort provided important species occurrence data, as well as improved our understanding of bat reproduction in this region of Nevada.

Milford Wind Corridor Pre-Construction Acoustic Bat Surveys

Katy Reagan, CH2M HILL, Denver, CO

First Wind's Milford Wind Corridor Project in southwestern Utah is the first large scale commercial wind facility in Utah, and the first Environmental Assessment wind project approved and constructed under the Bureau of Land Management's Programmatic Environmental Impact Statement for Wind Energy Development. Pre-construction passive acoustic bat surveys for different phases of the project were conducted in 2007, 2008, and 2010. From the surveys, 13 of the 18 bat species known to occur in Utah have been found in the Milford Valley. Survey methods and results will be displayed.

Quantifying Drift by Anabat Clocks over Time

Christina C. Roderick, Donald I. Solick, Andy Krause, Chris Fritchman, and Christopher S. Nations, Western EcoSystems Technology Inc., Cheyenne, WY*

The Anabat bat detector comes equipped with an internal clock that can be programmed to track real time, and generates timestamps for bat calls that are recorded. The time that is set on this clock, however, will naturally drift apart from real time during passive monitoring until the clock is reset. Drift by Anabat clocks is poorly understood, and can be an issue for monitoring studies or experiments that rely on precision time-keeping. The goal of this study was to quantify the degree of clock drift by Anabats over time, and determine whether drift can be predicted and accounted for. We programmed ten Anabat SD1 detectors using atomic time as a baseline, and measured the amount of drift that occurred on an hourly basis for three days, and then on a daily basis for an additional four days. Preliminary analyses indicate that drift by Anabat clocks is a linear process, and that Anabats gain or lose an average of 1.2 seconds per day. As well, the direction of drift is consistent: (most) Anabat clocks that start off slow will continue to lose time at a constant rate, while (most) fast clocks will continue to gain time. However, the degree of drift is highly variable among individual detectors, ranging from 0.5 to 30 seconds difference from atomic time after a week. The results from this study will be useful in determining the accuracy of temporal information from Anabat bat detectors.

ABSTRACTS: 2011 WBWG WIND ENERGY WORKSHOP, LAS VEGAS, NEVADA

Bat Fatality at Wind Energy Facilities in North America: Perspectives on Patterns, Challenges, and Opportunities

Edward B. Arnett and Cris D. Hein. Bat Conservation International, Austin, TX, USA

In the US, potentially hundreds of thousands of bats are killed by wind development each year. Information gathered from post-construction fatality monitoring has provided valuable information regarding species composition, spatial and temporal patterns, and specific weather conditions in which fatalities typically occur (i.e., warm nights with low wind speeds). However, challenges remain as to whether bats are attracted to wind turbines or wind energy facilities. Moreover, we still do not understand the population impact of wind development on bats. Despite these data gaps, opportunities exist to minimize or, where possible, prevent fatalities. In this presentation, I discuss our current understanding, provide insight into the challenges we face, and offer potential solutions to resolve this issue.

Effectiveness of Acoustic Deterrents to Reduce Bat Fatalities at Wind Turbines

Edward B. Arnett, Bat Conservation International, Austin, TX, USA, and Joe Szewczak, Humboldt State University, Arcata, CA, USA

Unexpectedly high numbers of bat fatalities reported at wind energy facilities worldwide have heightened the urgency to understand problems and identify solutions. In 2006, Bat Conservation International (BCI) initiated research investigating the use of acoustic deterrents to disorient free-flying bats. Preliminary laboratory and field trials showed that bats were unable to catch insect prey and generally avoided the airspace in and around the acoustic deterrents. In 2009, we deployed the latest generation of deterrents at the Locust Ridge Wind Facility in central Pennsylvania. We positioned 8 deterrents on each of 10 turbines and compared fatality rates with control turbines (i.e., turbines without deterrent devices. We observed a significant reduction in bat fatalities at deterrent-equipped turbines for both years of the study. Despite our success, we experienced numerous technical problems with these devices. We are currently working with engineers to develop and more robust device that is easier to maintain. We plan on having the next generation of deterrents available in 2012 and are developing study designs to improve upon our initial study.

Reducing Bat Fatalities at Wind Energy Facilities by Changing Turbine Cut-in Speed

Edward B. Arnett, John P. Hayes, Manuela M. Huso, and Michael Schirmacher. Bat Conservation International, Austin, TX (EBA, MRS), College of Forestry, University of Florida (JPH), USGS (MMH).

Since 2003, higher than expected bat fatalities have been reported at wind energy facilities in the eastern US. Subsequent studies established relationships suggesting more bats are killed by turbines on low wind nights and that bats do not strike non-moving turbines. Scientists hypothesized that operational curtailment of turbines could potentially reduce bat fatalities. In 2008, we initiated the first US-based experiment of the effectiveness of changing turbine cut-in speed, which reduces operation of turbines during low wind periods, on reducing bat fatality at wind turbines at the Casselman Wind Project, Somerset County, Pennsylvania. Our objectives were to 1) determine the difference in bat fatalities at turbines with different cut-in speeds

relative to fully operational turbines, and 2) determine the economic costs of the experiment and estimated costs for the entire project area under different curtailment prescriptions and timeframes. Total fatalities at fully operation turbines were estimated to be 5.4 and 3.6 times greater on average than at curtailed (non-operating) turbines in 2008 and 2009, respectively. We demonstrated nightly reductions in bat fatality ranging from 44–93% with marginal annual power loss (<1% of total annual output). Given the magnitude and extent of bat fatalities worldwide, the conservation implications of our findings are critically important.

Study Design Issues and Field Sampling Biases in Mortality Estimation at Wind Facilities

Wallace Erickson, Western EcoSystems Technology Inc., Cheyenne, WY, USA

This presentation reviews methods used in design, implementation, and analysis for post-construction mortality studies of wind facilities, focusing on bat mortality. We identify various objectives and goals of these studies, review different study designs used to meet these objectives, and discuss concepts important to evaluating study design and results. We also review field and analysis approaches used to consider and estimate key biases: *observer detection bias, scavenging bias,* (both of which are influenced by habitat and visibility that must be accounted for) and *plot size bias*. Case studies throughout North American in numerous habitats are included in this review, which concludes with recommendations for improving methods and where to focus future research efforts.

Pre-construction Acoustic Studies: Techniques and Lessons Learned

Jeff Gruver, Western EcoSystems Technology, Laramie, WY, USA and Cris D. Hein, Bat Conservation International, Austin, TX, USA

Pre-construction acoustic studies provide valuable information on spatial and temporal activity patterns of bats at proposed wind energy facilities. Activity rates also may provide insight into the overall risk of a potential site as well as under what weather conditions bats may be most vulnerable. Acoustic monitoring typically involves placing an array of detectors, both horizontally and vertically, across the landscape. Although common, differences in study design, equipment and analysis can make comparing results among studies difficult. I discuss the various methods and metrics used to conduct pre-construction acoustic studies, summarize our current state of knowledge, and suggest ideas on future studies.

An Overview of Guidelines and Protocols for Wind Energy Development: Implications for Bats

Bronwyn Hogan, California Department of Fish and Game, Sacramento, CA, USA, and Angela McIntire, Arizona Game and Fish Department, Phoenix, AZ, USA

Concern about climate change has driven a rapid increase in renewable energy development to offset fossil fuel use. Wind energy, generally considered environmentally clean, is an important part of this push. However, there have been widespread cases of bird and bat fatalities at wind facilities and the direct and indirect impact of wind projects on wildlife continues to be an issue.
Many states and the federal government have developed, or are developing, guidelines and protocols aimed at reducing the wildlife impacts of wind projects. State guidelines vary widely, depending on how wind facilities are regulated and what state laws require for wildlife protection. The Federal Draft Voluntary Wind Energy Guidelines, currently out for public review, are meant to provide consistency across the country for projects that are subject to Federal laws and regulations. This talk will focus on how various guidelines and protocols address or pertain to bats. We will give an overview of State guidelines and how they vary; highlighting those that are new or being updated since 2009. We will also discuss how the Federal guidelines may

complement or conflict with State guidelines and talk in more in more detail about four states with varying levels of requirements (Pennsylvania, California, Arizona and Texas).

An Overview of Bat Detectors and Acoustic Analysis

Cori Lausen, Birchdale Ecological Ltd. Kaslo, BC, Canada

Townsend's big-eared bat (C. Lausen photo)

There are many bat detectors on the market these days and if you are new to the field of bat acoustics, it is hard to know which ones do what. I present an overview of the detectors and software packages most used in North America. There are basically 2 types of bat detectors suitable for monitoring passively at wind development areas: full spectrum and zero-crossing. The former method digitizes the ultrasound by sampling at high rates (>190 kHz), retaining all aspects of the sound including multiple harmonics and amplitude. Popular full spectrum detectors currently being used in North America include Pettersson D500x (Pettersson Elektronik), AR125 with FR125/iFR4 (Binary Acoustic Technology), and SM2Bat (Wildlife Acoustics); subsequent visualization and analysis of this digitized sound can be done in software such as Sonobat (Joe Szewczak), Scan'r (Binary Acoustic Technology), BatSoundPro (Pettersson Elektronik), Songscope (Wildlife Acoustics), etc. The three above-listed bat detectors record in real-time; in the not too distant past, full spectrum recordings employed time expansion, a way of slowing down the sound to hear or record, causing periods of 'deafness' during the recording down-time. Technological advancements now allow for real time direct digital recordings, although time expansion units are still available (e.g. Pettersson D240x, D1000x). The main disadvantage of recording full spectrum is that sound files are very large (1-2 megabytes per bat pass). Most full spectrum detectors provide an option for compressing the wave files during recording, but when uncompressed during downloading, memory demand remains high.

Zero-crossing bat detection, specifically the Anabat detector (Titley Electronics), works by counting each time a sound wave passes the *zero point* (imaginary line drawn through the middle of a sound wave); at a preset number of crossings (called Division Ratio, often 8 or 16), a time measurement is made (allowing frequency to be recorded). This provides a time-frequency output of the ultrasound, recording only one frequency, the most intense one. As such, only one harmonic is displayed at any one time, and no amplitude data are retained. The main advantage of this system over full spectrum is that file sizes are significantly smaller (2-5 kilobytes per bat pass), requiring small memory cards in detectors, short download time in the field, and storage of files does not generally require back-up hard-drives; additionally, zero-crossing detectors use less energy during operation than full spectrum units. However, the primary reason to use full spectrum over zero-crossing in some situations is that full spectrum may allow for better species differentiation given that all properties of the original sound are recorded. Unfortunately, there are currently no published studies comparing these two types of detectors' abilities to resolve species, and until this happens, it is difficult to conclude how much detail about of the original ultrasound needs to be recorded to sufficiently meet various monitoring goals.

As passive monitoring of wind development areas continues to generate extremely large datasets of files, automated identification of files (noise vs. bat and file labels indicating bat species or species groups) is being sought. Two popular software packages currently offer auto-ID options: AnalookW (for zero-crossing data) and Sonobat (for full spectrum data). Only

one bat detector, the SM2Bat, produces files that can be analyzed in either software package. Auto-ID is in its infancy and does not come without a set of inherent problems: bats use ultrasound as a functional tool to navigate and find insect prey, and as such, similar sized bats in similar environmental situations (degree of clutter) can produce similar echolocation calls, making differentiation difficult. However, used cautiously, auto-ID software can provide bat biologists with substantial time-savings by not having to view each file. Sonobat uses discriminant function analysis (DFA) and other hierarchical decisions to arrive at labels for files, while AnalookW uses filters that match pulses in files to a set of criteria that describe the shape and frequency of bat pulses. Other auto-ID software packages are on the horizon (e.g. BCID [Bat Call Identification Inc.], SongScope [Wildlife Acoustics]).

Using Marine Radar & Night-vision Optics for Wind Energy Studies: Understanding the Applications & Key Issues

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Marine radar has been used extensively to study bird movements and in recent years has been used for studies of bat movements. Understanding the strengths and weaknesses of this tool is key to determining how to properly design studies, collect the needed information, and to analyze and interpret the results. Strengths of marine radar include portability, ability to discriminate bats from point sources (e.g., mines, caves), effective in fog, high resolution and diverse data products (e.g., flight directions, flight paths, flight altitudes, passage rates, behavioral information, exposure indices). Weaknesses include inability to distinguish birds and bats during migration, the confounding nature of insects, and ineffectiveness in rain. Many of the weaknesses of marine radar can be addressed by supplemental techniques such as night-vision optics, something that is recommended when discrimination of radar targets is difficult. Overall marine radar can be a useful tool when its limitations are understood and when the analytical methods are disclosed so that the results are open to independent review.

Activity Rates and Call Quality by Different Bat Detectors under Controlled Conditions

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Assessing potential risk to bats at proposed wind energy facilities relies primarily on estimates of overall bat activity collected by ultrasonic detectors. To date, the Anabat™ ultrasonic detector has been the industry standard for passive monitoring of bat activity. However, full-spectrum detectors such as the Pettersson D500x, Wildlife Acoustics SM2, and Binary Acoustics AR125 are becoming more prevalent at wind-energy studies, largely due to their increased potential for species identification. Because Anabat and full-spectrum detectors use different types of microphones, utilize different sensitivity settings, and process the data differently, they are unlikely to produce comparable activity rate data and could potentially yield very different risk assessments. The goals of this study were to determine what combinations of settings on the D500x, SM2, and AR125 produce similar activity rates to the Anabat SD1, and which settings produce the best call quality for species identification, under controlled conditions. Setting combinations for each of the detectors were tested by broadcasting a 30-second sequence of echolocation calls, and calculating the number of calls per unit time (i.e., activity rate) recorded by each detector. The quality of the recordings for species identification by the full-spectrum detectors was assessed using the SonoBat 3 automatic species classification algorithm. The results of this study will be useful to ensure consistency in measured levels of activity across studies. The relative strengths and weaknesses of the full-spectrum systems will also be discussed in terms of cost, accessories, data storage, battery capacity, weatherproofing, detection distance, and other considerations.

Post-Construction Fatality Studies Estimators

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Methods for estimating mortality rates of birds and bats due to wind power generation are widely variable. This presentation will summarize the three most commonly used estimators: The Shoenfeld estimator, the Jain estimator, and the Huso estimator. A new design using the empirical estimator will also be addressed. An explanation of each estimator and example calculations will be presented, as well as a discussion on the benefits and drawbacks of each. Field methods necessary to collect data for use in each estimator will be outlined.

Using acoustic broadcasts to deter bats from wind turbines and exclude them from bridges and other structures.

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Bat mortality at wind energy facilities threatens bat populations and has become a complicating factor in wind power development. We previously tested broadcasted ultrasound and found it could deter bats from treated airspace. During seven day study periods at open foraging areas, bat activity declined from 9.8% (±2.3% SE) to 3.3% (±0.0%) of control levels within the effective range of the broadcast, <15 m. These studies demonstrated that ultrasound broadcast can effectively deter bats and also indicate that bats do not habituate or accommodate to continued broadcast of deterring ultrasound. We have further tested acoustic deterrence on complicated bridge structures that would otherwise require extensive physical exclusion. At one previously occupied site, we initiated acoustic broadcasts in late winter prior to the expected seasonal return of bats prior to demolition. The bridge remained free from bats until mid-summer. We continued acoustic broadcasts and the bats abandoned reoccupation of the bridge in a matter of days, presumably from the deterrent, and did not return. This supported the deterring effect of ultrasound broadcast and that it can also exclude bats from bridges and other structures where the treatment area can match the effective broadcast range and provide a viable alternative to physical exclusion, particularly in situations where physical exclusion may be impractical or costly. Although the effective range of this treatment may limit its potential contribution toward reducing impacts of bats randomly flying through the rotor-swept area of wind turbines, learned behavior may improve its effectiveness at turbines, particularly for bats that may seek a roost at the landscape-prominent turbine towers. Continued trials on wind turbines will test the effectiveness of this approach to reduce bat mortality at wind turbines.

Overview and Assessment of Wind Technology

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Introduction

Wind energy is one of the fastest growing electrical energy sources globally. The cumulative installed wind capacity around the world is approaching 150, 000 MW. The United States currently has an installed capacity of more than 35,000 megawatts (MW) of wind energy and experts are forecasting continue growth globally.

The Current Status of Wind Energy Technology

During the past 20 years, average wind turbine ratings have grown almost linearly. Current commercial machines are rated at 1.5 MW to 2.5 MW. With each new generation of wind

turbines, the size has increased along the linear curve and life-cycle cost of energy has decreased.

Wind technology is evolving rapidly and becoming more cost effective compared to conventional generation sources. The siting and operation of the current generation of wind turbines will be explained, and the expected future evolution discussed. The size of the turbines has increased dramatically and this has allowed the current generation of wind turbines to become more efficient and cost effective; however, this size growth is expected to slow and perhaps stop for land based turbines. Finally, progress is being made in understanding avian and bat interactions with wind turbines. The current understanding of wind turbine operation effects that seem to be important to understanding wildlife impacts will be discussed.

In conclusion, world-wide electrical consumption is expected to grow by 75% over the next 20 years. All energy technologies have some environmental impacts. Wind technology is developing rapidly and a modest investment in environmental R&D now could make those impacts negligible. This would give us an environmentally friendly, carbon-free energy generation source that could meet at least 20% of our electricity needs.

Do bat mortality rates correlate to migratory movement rates based on marine radar, enhanced night vision, and acoustic monitoring?

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Few studies on wind turbine bat mortality have been conducted in California and none have included daily carcass searches. We investigated the relationship between the passage rate of bats based on marine radar, enhanced night vision, full-spectrum acoustic monitoring and bat mortality based on daily carcass searches at Montezuma Hills in Central California. The hoary bat mortalities were clumped temporally (Pearson chi-squared in R, (X-squared = 80.6452, df = 2, p-value < 2.2e-16) suggesting this species moved in pulses, but the Brazilian free-tailed bat (Tadarida brasiliensis) mortalities were distributed evenly. A relationship exists between turbine mortality locations and the direction to the nearest clump of Fremont cottonwood (Populus fremontii) (Rayleigh Test, p=0.007) and for eucalyptus (E. globulus and camaldulensis) trees (p=0.013). Bats' movements within the rotor sweep height (<125m) and below showed no directional trend suggesting bats were foraging or looking for a roost site when at risk of collision. Bats' movements above the rotor sweep area (>125m) suggests bats and birds were migrating through the area in the direction of the prevailing wind. Over 90% of the estimated birds and bats occurring on the project site migrated above the sweep area.