

WBWG NEWS

Volume 5, Number 1

Spring 2009

2009 WBWG Biennial Conference and Bats/Wind Energy Workshop Summaries



Mexican free-tailed bats.

(Kristi DuBois Photo)



Bracken Cave field trip.

(Kristi DuBois Photo)



Congress Avenue Bridge.

(Kristi DuBois Photo)

Austin was Awesome!



Western Bat Working Group

WESTERN BAT WORKING GROUP NEWSLETTER

Spring 2009

Volume 5, 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 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'S CORNER

In reading a recent interview with the writer Cynthia Ozick, I was struck by her statement “A review is a job of probity: of honest and honorable responsibility to a fellow writer’s craft and thought.” Although spoken in the context of writing reviews of other writers’ work, I drew a parallel between Ozick’s work and ours. We both have a “job of probity.” In our case, our honesty and responsibility necessarily extend not only to each other, but to our conservation partners and to the bats we represent. Finding solutions to the challenges we face, such as wind energy and white-nose syndrome (WNS), among others, will require our greatest efforts in this regard.

So as I begin my tenure as president, I reflect on my role and responsibility and how best to serve this group. I benefit from the legacy created by others as well as the collective and institutional knowledge of the group. Joining me in office—some familiar and some new—are Vice President Cori Lausen, Secretary Heather Johnson, Treasurer Brad Phillips, elected at-large representatives Martin Grenier and Dave Johnston, and presidentially appointed at-large representatives Angie McIntire and Tim Snow. As we transition, we acknowledge our gratitude to outgoing officers Pat Ormsbee, Toni Piaggio, Michelle Caviness, Jason Williams, and Pat Brown, all who continue to serve the Western Bat Working Group in many capacities.

At the recent Bats and Wind Energy Workshop and Western Bat Working Group 2009 Biennial Meeting in Austin, Texas, we heard from a coterie of speakers on diverse topics including an introduction to wind energy and bat issues; study design and estimators of fatality; pre-construction tools for assessing bat activity; post-construction studies and considerations; strategies for mitigating bat fatalities at wind facilities; roosting and population ecology; inventory, monitoring, and habitat use; and bat conservation strategies. In addition, we spent half a day strategizing a collaborative approach to raising awareness of and preventing the spread of WNS in the West.

Bats face unprecedented threats as evidenced by the alarming spread of WNS and its potential to cause regional extirpations or at worst extinctions of several bat species. To elevate this issue, the US Congress in a letter dated 2009 May 5 to US Secretary of the Interior Ken Salazar called on Secretary Salazar to provide immediate, emergency funding to the US Fish and Wildlife Service and US Geological Survey for critical research on and to create a cure for WNS. In addition, wind power continues to emerge as a threat with yet untold implications to bat populations. In a recent congressional address, US President Barack Obama emphasized the need to find new sources of energy with plans to double the US’s supply of renewable energy over the next 3 years, which will in part be met by wind power. Advances in our knowledge of how best to address the effects of wind power on bats and finding ways to prevent mortalities will be critical given the current demand for renewable energy.

Many other issues require our attention as well—I have only highlighted two. So on behalf of myself and the other WBWG officers, I invite you to share your ideas on how we can best address the needs of the WBWG and bats. Finally, we seek ways to engage more participation from the larger membership to serve on committees, and thus to enhance our ability to effect action.



Rita Dixon

In closing, I leave you with a quote from E.O. Wilson, who in spite of everything he knows, maintains an attitude of enthusiasm and optimism in a world of daunting challenges:

“You are capable of more than you know. Choose a goal that seems right for you and strive to be the best, however hard the path. Aim high. Behave honorably. Prepare to be alone at times and to endure failure. Persist! The world needs all you can give.”

Sincerely,

Rita Dixon

LETTER FROM THE EDITORS

This Newsletter

As was done in the spring 2006 newsletter issue, this issue focuses on the biennial conference program. Included you will find abstracts from the conference and the agenda of the wind energy workshop that preceded it. The full conference booklet and workshop booklet (including abstracts) can be found on the WBWG website. This issue has a truncated version of our State/Provinces Updates section, but this section will be in its entirety again in the Fall issue.

New Editors Starting in Fall

Wow, where has the time gone! Hard to believe it has already been four years since the newsletter first started! We have greatly enjoyed our time as editors of the WBWG newsletter during this time. However, it is time we pass on the torch! We'd like to introduce to you our next set of co-editors:

Lorraine Andrusiak, senior wildlife biologist with Keystone Wildlife Research in Surrey, B.C.
Julie York, wildlife biologist with USDA Forest Service in Bend, Oregon

Thank you Lorraine and Julie for taking on this important set of duties. We all look forward to hearing from you in the fall for our next issue of the newsletter!

Cori Lausen and Kristi DuBois,
Newsletter Editors (Outgoing)

STATE/PROVINCIAL UPDATES

ALASKA

Remote sensing camera system for evaluation of bat use of Abandoned Mines on the Chugach National Forest, Alaska.

Aaron Poe, Wildlife Biologist, Chugach National Forest, 907-754-2345, apoe@fs.fed.us;

There are numerous abandoned hard rock mines on public lands in Alaska. Many of those on US Forest Service managed lands are slated for eventual closure because they pose a risk to public safety. These mines may support important hibernacula for species of bats residing in the state, including the rare Keen's Myotis which was recently placed on the USFS Alaska Region Sensitive Species list. In other parts of their range, bats congregate in very large numbers during the winter. Little is known about the hibernation habits of bats in Alaska but it is possible that a high proportion of our bat populations winter in a relatively small number of mines and caves in southcentral and southeast Alaska where winter time temperatures are more moderate.

Most mines on US Forest Service managed lands in Alaska are remote and difficult to access even during the summer months, and many are nearly impossible to reach during the winter. Given these constraints the need exists to develop a remote tool to assess bat use of mines throughout the winter season which can last for several months. Working with Dr. Rick Sherwin from Christopher Newport University we are in the process of field testing remote camera systems in abandoned mines on the Kenai Peninsula and Prince William Sound. These units are designed to be deployed remotely for up to one year. They are capable of capturing and storing tens of thousands of time-stamped images of bat movements in underground workings, triggered by motion, thermal infrared and acoustic sensors. It is our hope that these current field tests will define operating procedures and precision estimates for unit deployment in harsh high latitude conditions like those in Alaskan mines.

Third Season of Inventory Study in Skagway

Dashiell Feierabend, Wildlife Biotechnician
Dave Schirokauer, Natural Resources Program Manager
Klondike Gold Rush National Historical Park

We are continuing our passive acoustic monitoring study in Skagway, Alaska, that was initiated in the summer of 2007. This season we will use an Anabat 2 unit paired with ZCAIM to collect daily recordings at a single site that has been monitored since 2007. The hope is to continue to gain an understanding of the arrival and departure of seasonal bats, as well as the fluctuation of activity with respect to daylight and temperature.

The call data from 2007 and 2008 suggest that bats arrive in Skagway in late April and depart in mid October.

Because Klondike Gold Rush NHP lacks the resources to conduct discriminant function analysis on calls, it was not possible to accurately identify most calls to species level. The primary candidate for most of the call data is *Myotis lucifugus*, based on its known range and the shape of the recorded calls. Other possibilities include *M. keenii*, *M. volans*, and *M. californicus*, which have been documented in Southeast Alaska and British Columbia. Twenty of the unidentified

recordings ranged down to 25 kHz and likely belong to *L. noctivagans* or *Eptesicus fuscus*. With the assistance of Cori Lausen, we confirmed a single occurrence of *Lasionycteris noctivagans*, which was previously considered a possible summer resident in the region.

The park would like to thank Aaron Poe and the Forest Service in Girdwood, Alaska, for the continued loan of Anabat equipment.

BRITISH COLUMBIA

New Bat Working Group

B.C. announces the formation of their bat working group! Because of the topographic complexity and size of the province, making travel extensive and expensive, the group opted for a first meeting via teleconference. More than 25 attendees from government, consulting, and other backgrounds met over the phone for a full day on 1 May. Presentations included the History of Bat Work in B.C., White Nose Syndrome, Wind Turbines, Mines, Centralized Database, Status/Conservation of Species, etc. The group is currently working closely with government to put into place wind turbine and white nose protocols/guidelines. Research and conservation priorities were identified, and 6 committees have been established: Wind Energy and Bats, WNS, Data Management and RISC Review, Bat Watch Outreach, Interagency, Bats and Risk. The group has a data share point that requires sign-on, but hopes to have a website later this year. A formal name for the group has not been established. A bat blitz is tentatively planned for early Sept. in the south Okanagan to target finding *Parastrellus hesperus*, a species anecdotally thought to be present in the province.

CALIFORNIA

Bat Conservation and the California Department of Fish and Game (CDFG)

Scott D. Osborn (sosborn@dfg.ca.gov)

After more than 10 years of work as CDFG's statewide coordinator for the conservation of bats, amphibians, and reptiles, Betsy Bolster has handed off the bat work to Scott Osborn. Betsy will be focusing on reptiles and amphibians now, but will continue to provide guidance to Scott as he attempts to emulate her high standard of performance. In addition to bats, Scott's position in the Nongame Program of CDFG's Wildlife Branch includes statewide coordination on conservation issues related to other small mammals, including rodents and lagomorphs.

Dr. Dixie Pierson continues to lead the California Bat Conservation Plan effort, working with other California bat experts under contract to CDFG. The draft Plan is due to CDFG in July 2009. The final Plan, including an Acoustic Library and Survey Protocols, is due in 2010.

Although White-Nose Syndrome (WNS) has not yet been detected in California, CDFG has begun including conditions in Scientific Collecting Permits to minimize the potential for introducing or spreading WNS. Scott has begun coordination efforts with CDFG's Wildlife Investigation Laboratory to ensure a veterinarian on staff keeps abreast of the latest developments related to WNS. CDFG will work with the Wildlife Lab, state bat working group, and WBWG to develop a response plan if WNS is detected in the state.

Scott is also working with Heather Johnson and others to address bat conservation during closure of abandoned mines in California. Using the successes in Nevada and other states as a model, Scott hopes CDFG can influence and improve efforts at assessing whether bats would be impacted by proposed mine closures and ensuring that roosts remain available to bats after closure.

MONTANA

Submitted by Bryce Maxell

Montana Natural Heritage Program

Bryce Maxell, Helena, Montana 59620-1800 bmaxell@mt.gov

We produced a report summarizing morphology information from all of the recent surveys in Montana and summarizing the latest distribution information. The report is posted at: http://mtnhp.org/Reports/USFS_Bats_2007.pdf

We have a statewide sampling scheme in place for monitoring bat species with occupancy analysis using quarter 1:24K quad maps as the sampling grid. We have completed surveys in NE Montana in 2008 with this methodology, will complete SE Montana in 2009, and will complete western Montana in 2010. This will yield statewide occupancy estimates for Montana bat species that can be used for future comparisons.

NEW MEXICO

Compiled by Jim Stuart and Ernie Valdez, NMBWG co-chairs

The New Mexico Bat Working Group (NMBWG) meets twice yearly and our most recent meeting was in April. Members include agency representatives, caving enthusiasts, and others interested in bats. Current projects by the NMBWG are completion of a state Bat Conservation Plan, the development of a reporting protocol for possible White-nosed Syndrome occurrences in New Mexico, and increased coordination and evaluation of wind energy projects.

Various members of NMBWG are involved in bat research projects in the state. Contractors working on lands at Kirtland Air Force Base (KAFB) near Albuquerque are in their third year of bat studies, including mist-net and Anabat surveys at water sources, use of radiotelemetry to locate roost sites, mine surveys, and a study of artificial roost boxes to identify temperatures and orientations most preferred by bats. The research team, led by Katherine Thibault and Travis Perry, has identified seven bat species at KAFB and obtained some interesting new information on maternity sites of Townsend's Big-eared Bat, Pallid Bat, Western Small-footed Myotis, and Southwestern Myotis. This season, they hope to obtain additional roosting ecology data, especially for the latter species.

Ken Harrington is working with a caving group in Eddy County and has recently identified a new cave site being used by Townsend's Big-eared Bat. They are also monitoring two other caves with populations of Cave Myotis estimated at 8,000 and 30,000. Jennifer Foote continues her survey work with BLM in southeastern New Mexico and in February did bat counts in three caves. Several hundred Townsend's Big-eared and up to several thousand *Myotis* spp. were detected at these sites.

BCI biologists Christa Weise and Dan Taylor have been working with White Sands Missile Range Technical Services to conduct an inventory of bat species by habitat and season, and an analysis water distribution and condition on the Ft. Bliss Military Reservation. Initiated last winter, the inventory work will continue through this summer and fall, and involves capture, acoustic detection, and roost searches. To date, a minimum of five species of bat have been detected, with Silver-haired, Mexican Free-tailed, Canyon, and Big Brown bats, and *Myotis* sp. (most likely *M. californicus*) active even on cold, winter nights. Silver-haired was caught at two high elevation sites at temperatures just above freezing. With funding from the New Mexico

Game & Fish Department Share With Wildlife grant program, Dan is also working with Forest Service biologists on the Smokey Bear Ranger District of the Lincoln National Forest to assess the condition and availability of water for sensitive bat species in the Bonito Watershed, and working with the Quivira Coalition, a progressive ranching association, to develop a showcase water development for livestock and bats on their Rowe Mesa ranch.

NEVADA

Submission from Jennifer Newmark and Katie Miller

Nevada Bat Working Group

Katie Miller has replaced Derek Hall as the Nevada Bat Working Group Co-chair. Her email is kmiller@ndow.org and her phone is 775-777-2368. T

WBWG Conferences

2011 WBWG Conference announcement: Nevada will be the host for the next biennial meeting and conference in Las Vegas.

At the Austin 2009 conference, the following two presentations were made by Nevada biologists. Full abstracts are in the Conference Program below.

The Business of Building Bat Gates at Abandoned Mine Lands in Nevada

Katie Erin G. Miller* and Jason Williams, kmiller@ndow.org, Nevada Department of Wildlife, Elko, NV; Nevada Department of Wildlife, Ely, NV.

Using radio-telemetry to understand a migratory population of *Tadarida brasiliensis* in the Great Basin of Nevada

Jason A. Williams*, Richard E. Sherwin, and Michael J. Herder, jasonw@ndow.org, Nevada Department of Wildlife, Ely, NV; Christopher Newport University, Newport News, VA; Bureau of Land Management, Ely, NV.

MULTI-STATE

U.S. Forest Service Awards – Region 1

The following people were recognized by the U.S. Forest Service with the "Wings Across the Americas" awards. These were awarded for the multi-year bat survey and mine gating program.

Forest Service: Jenny Taylor, Amie Shovlain, Jenny Holifield, Joanne Bonn, Sarah Kaufman, Pat Ormsbee

Other Recipients: Joe Szewczak - Humboldt State University; Cori Lausen – Birchdale Ecological Ltd.; Bryce Maxell - Montana Natural Heritage Program; Kristi DuBois - Montana Department of Fish, Wildlife & Parks; Lewis Young – volunteer; Dan Taylor - Bat Conservation International

These twelve biologists were recognized in March with a national U.S. Forest Service award in Washington, D.C. for their bat research and habitat improvement work on national forests on twelve national forests in Idaho and Montana and a national grassland in North & South Dakota. The Forest Service has gated more than one hundred mines, mostly on the Idaho Panhandle

National Forests, that keep people out of unsafe mines while allowing bats to use the mines as hibernacula, maternity sites, etc. Starting with abandoned mine surveys on national forests in 1996, the Forest Service's bat inventory was expanded in 2005 with these objectives: (1) To use a standardized grid-based protocol to survey bats in a wide variety of habitats throughout its Northern Region; (2) train Forest Service biologists and interested partners to conduct bat surveys; and (3) consolidate bat data in state Natural Heritage Program databases to facilitate future bat research and partnerships.

BOB BERRY MEMORIAL FUND

2009 Awards Presented

Some excellent proposals were received and awards presented at the annual meeting of the WBWG in Austin April 17, 2009. The WBWG scientific research advisory committee reviewed the proposals.

The following awards were given:

The Bob Berry Holohil Award: Elizabeth Braun de Torrez of Boston University for *Foraging behavior, habitat selection and ecosystem services of bats in a Texas pecan agroecosystem* received six transmitters donated by Holohil and a \$1,000 cash award for receiver purchase or to cover research expenses.

The Bob Berry Titley Electronics Award: Tammy Branston and Eric Weiss of the California Department of Fish and Game for *Acoustic monitoring of bats during the rewatering of the Lower Owens River* received an SD1 receiver and a free spot (Eric participated) in one of the Anabat trainings donated by Titley Electronics.

The Bob Berry Binary Acoustic Technology and Sonobat Award: Janene Lichtenberg, Wildlife Biologist with the Confederated Salish and Kootenai Tribes for *Bat survey of the Flathead Reservation based on the Montana Bat Grid Protocol* received AR125 Ultrasonic Receiver, SPECT'R software and an FR125 field recorder donated by Mark Jensen, and a Sonobat full software suite donated by Joe Szewczak.

Awards criteria were:

- 1) the need for specific equipment or technological training to further bat field research and/or conservation.
- 2) that the results of the research or project will help to perpetuate bat conservation in Western North America, and the initial investment will continue to return benefits.
- 3) that sound scientific methods are integral to the proposed project.



Bob was always helping others.

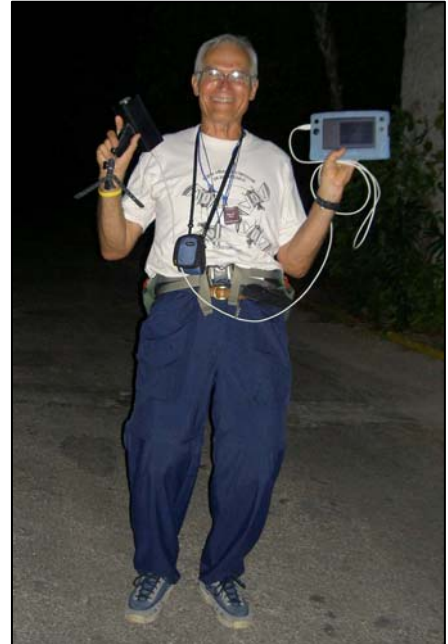
The impetus behind the generous donations to this fund is to perpetuate Bob's legacy of assisting others. Bob utilized his engineering and computer skills to refine the tools used for bat-related field work, and to help people to understand the different and changing technologies. Bob worked best one-on-one and offered his expertise to many students and agency biologists. The goal of these awards is to facilitate research by providing current technology and training from the developers of the technology.

Bob Berry Equipment Library Established

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.



Bob Berry, with his new Binary Acoustics system.



Pat Brown and Bob Berry.

UPCOMING EVENTS

American Society of Mammalogists 2009 Meeting. University of Alaska, Fairbanks. June 24 – 28th. 2009.

10th International Mammalogical Congress. Aug. 9 – 14th, 2009. Mendoza Convention Center, Mendoza Province, Argentina. Official language: English.

16th Annual Conference -- The Wildlife Society. Monterey, California. Sept. 20-24, 2009.

39th Annual Symposium on Bat Research. North American Society for Bat Research. Portland, Oregon. Nov. 4 – 7, 2009.

Symposium on Conservation and Management of Big-Eared Bats (*Corynorhinus*). Southeastern Bat Diversity Network. Athens, Georgia. March 9-11, 2010. Presentations covering the three taxa of big-eared bats (Ozark Big-eared Bat, Virginia Big-eared Bat, and Rafinesque's Big-eared Bat).

17th Annual Conference -- The Wildlife Society. Snowbird, Utah. Oct. 3 – 7, 2010.

Western Bat Working Group Biennial Conference. Las Vegas, Nevada. Spring 2011. Conference will likely be preceded by a Wind Energy and Bats Workshop.

BCI 2009 BAT CONSERVATION AND MANAGEMENT WORKSHOPS *Mammoth Cave, KY and Barree, PA*

These popular workshops are filling fast. Reserve your place for a unique opportunity to learn about bats, their conservation and the latest tools and techniques for studying them in the field. Experience six days of class work, discussions and hands-on field trips with expert instructors. More than 1,460 people have attended BCI workshops since 1990. Here's why:

- ▶ *Hands-on:* bat handling, identification, netting and trapping
- ▶ *Experience with field techniques:* radio-tracking, marking, light-tagging, echolocation recording, advanced capture techniques
- ▶ *Lectures and demonstrations:* habitat assessment and management, conservation and status determination
- ▶ *Qualified staff:* BCI biologists, local colleagues and regional experts with at least 20 years of bat-conservation experience
- ▶ *Small class size:* 1 instructor per 4-5 students at all field settings
- ▶ *Networking opportunities:* educators, consultants and peers
- ▶ *All-inclusive cost:* \$1,395 covers lodging, materials, meals and take-home resources

Kentucky: July 14-19

Pennsylvania: August 14-19

For information and online applications, visit:

<http://www.batcon.org/index.php/education/workshops.html> or contact Peg Lau Hee at 512-327-9721 or workshops@batcon.org



BATS AND WIND ENERGY WORKSHOP SUMMARY

The following is the program agenda from the WBWG Wind Energy and Bats workshop that took place at the Radisson – Town Lake, Austin, TX April 13 – 15, 2009. See the WBWG website for a pdf of the full program, including abstracts.



Host: Bat Conservation International and Texas Parks and Wildlife Department
Wind Energy Workshop Coordination: Ed Arnett, Paul Cryan, Bronwyn Hogan, Cori Lausen, Angie McIntyre, Rebecca Patterson, Ted Weller
Workshop Program: Rebecca Patterson, Bat Conservation International

Monday, April 13, 2009

BATS 101 - Joe Szewczak, Humboldt State University
Evening Social Poolside & Congress Ave Bridge Emergence

Tuesday, April 14, 2009

SESSION 1: INTRODUCTION to WIND ENERGY AND BAT ISSUES

Welcome and Opening Remarks

Carter Smith, Executive Director, Texas Parks and Wildlife Department

Future Wind Energy Technology Development in the United States and Implications for Wildlife Robert Thresher, National Renewable Energy Laboratory

The Law and Economics of Wind Glen Webb, P.C., Attorney at Law [TALK GIVEN BY ED ARNETT]

Wind Energy Development and Wildlife: Industry Challenges and Perspectives - Post Mountaineer Response by the Wind Industry

Jim Lindsay, NextEra Energy Resources

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

An Overview of Guidelines and Protocols for Wind Energy Development: Implications for Bats and Other Wildlife Bronwyn Hogan, California Department of Fish and Game

SESSION 2: STUDY DESIGN AND ESTIMATORS OF FATALITY

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

Wallace P. Erickson, Western Ecosystems Technology

Estimators of Wildlife Fatality: A Critical Examination of Methods

Manuela Huso, Oregon State University

SESSION 3: POST-CONSTRUCTION STUDIES and CONSIDERATIONS

Post Construction Fatality Studies and Lessons Learned

Eastern U.S.: Ed Arnett, Bat Conservation International

Western/Midwest U.S.: Jeff Gruver and Wally Erickson, WEST

Canada: Erin Baerwald, University of Calgary

Europe: Ivo Neirmann, University of Hanover

Each presentation will be 20 min. Topics will include: plot layout, plot and habitat delineation, handling carcasses and injured bats, conducting searcher efficiency and carcass removal trials, other data collection procedures, key findings from studies.

Equipment Demonstration at Congress Avenue Bridge

(Acoustic detectors, night vision, thermal imaging)

Chris Corben, Titley Electronics (ANABAT detectors)

Joe Szewczak, Humboldt State University (Pettersson detectors and SONOBAT)

Liz Braun, Boston University (Infrared Thermal Imaging)

Todd Mabee, ABR (Night Vision Binoculars)

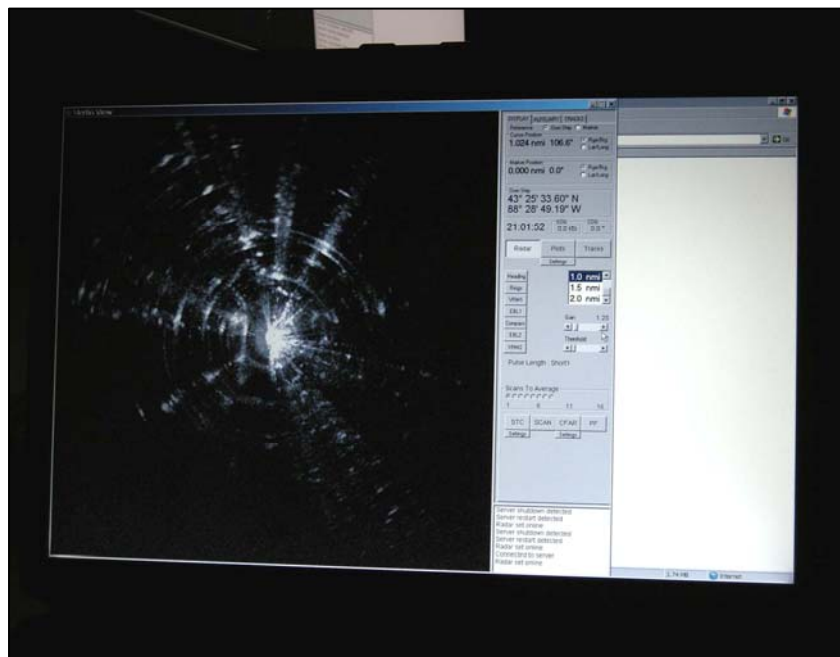
Adam Kelly, DeTect (Radar)



Anabat detector with PDA display. (Kristi DuBois Photo)



Infrared Thermal Imaging. (Kristi DuBois Photo)



Radar system. (Kristi DuBois Photo)

Wednesday, April 15, 2009

SESSION 4: PRE-CONSTRUCTION TOOLS FOR ASSESSING BAT ACTIVITY

An Overview of Tools for Assessing Preconstruction Bat Activity at Proposed Wind Facilities Joe Szewczak, Humboldt State University

Design Considerations and Data Needs for Pre-Construction Assessments

Ted Weller, USDA Forest Service, Pacific Southwest Research Station

Pre-Construction Studies: Techniques and Lessons Learned

-Key Findings and Deployment of Acoustic Equipment Jeff Gruver, Western Ecosystems Technology

-Acoustic Identification of Bats Eric Britzke, US Army Corps of Engineers

-Use of Marine Radar to Study Bat Emergence and Movement Patterns

Donald Solick, Western Ecosystems Technology

-New Advances in Radar Technology to Monitor Bats Adam Kelly, Jennifer Davenport, DeTect

SESSION 5: STRATEGIES FOR MITIGATING BAT FATALITIES

Options for Mitigating Bat Fatalities at Wind Facilities Ed Arnett, BCI

A Large-Scale Mitigation Experiment to Reduce Bat Fatalities at Wind Energy Facilities

Erin Baerwald, University of Calgary

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

Arnett, BCI and Erin Baerwald, University of Calgary

The Potential for Acoustic Broadcasts to Deter Bats from Approaching Wind Turbines Joe Szewczak, Humboldt State University

SESSION 6: BREAK OUT GROUPS

Anabat Detectors, Software, and Analysis Chris Corben, Titley Electronics; Eric Britzke, US Army Corps of Engineers

Pettersson Detectors and Sonobat Software Joe Szewczak, Humboldt State University

Field Methods for Deploying Detectors Michael Schirmacher, BCI; Cris Hein, ABR; Donald Solick, Western Ecosystems Technology

Radar Systems Adam Kelly, DeTect

Carcass Searches Ed Arnett, Bat Conservation International; Erin Baerwald, University of Calgary; Jeff Gruver, Western Ecosystems Technology

Fatality Estimation Manuela Huso, Oregon State University



Can you find the dead bat?

(Kristi DuBois Photo)

WBWG 2009 BIENNIAL MEETING SUMMARY AND ABSTRACTS

Western Bat Working Group 2009 Biennial Meeting for the Management and Conservation of Bats

The following is the program and abstracts from the WBWG Wind Energy and Bats workshop that took place at the Radisson – Town Lake, Austin, TX April 15 – 18, 2009. Highlights of the conference included the awarding of the Bob Berry Memorial Awards, the field trip to Bracken Cave to watch the free-tail emergence, the Congress Avenue nightly free-tail emergences, the live and silent auctions and the raffle, and the White Nose Syndrome Workshop.

Host: Bat Conservation International & Texas Parks and Wildlife Department

Program: Michelle Caviness, USDI Bureau of Land Management

Conference Logo and T-shirt Graphic: Original line drawing by Jason Huerta, Bat Conservation International

Registration: Michelle Caviness, USDI Bureau of Land Management
Rebecca Patterson, Bat Conservation International
Aimee Hart, USDI Bureau of Land Management
Nyta Hensley, Texas Parks and Wildlife Department

Field Trips: Rebecca Patterson and Ed Arnett, Bat Conservation International

Auction/Raffle: Pat Brown, Brown-Berry Biological Consultants. **And thank you to all folks who donated to the auction/raffle:** *BCI, Bronwyn Hogan, Bruce Talbot, Chester Martin, Cori Lausen, Cyndi Mosch, Deb Crough, Holohil, Lorraine Andrusiak, Mike Pearce, Pat Brown, Pat Ormsbee, Rick Perry, MH Wolfe Associates, Rio Frio Flight tours, Rio Frio Lodging, Sherry Tolman, Speleobooks, Steve Logsdon, Titley Scientific, and Turkeys Unlimited.*

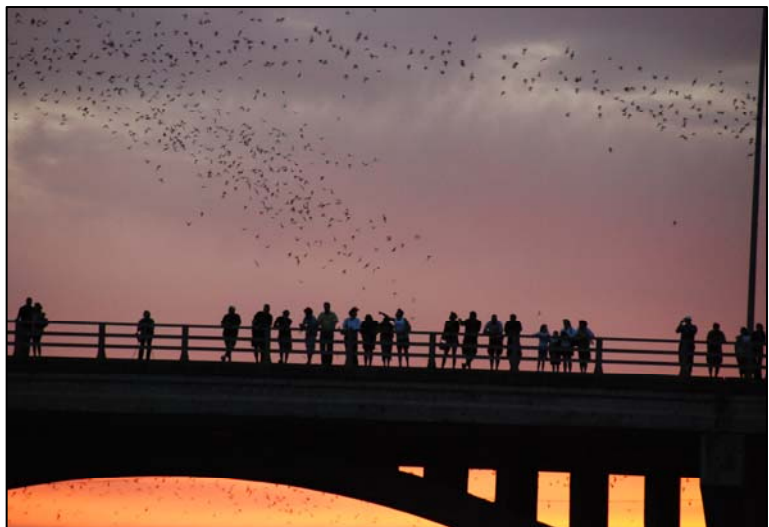
Website and online registration: Erinn Shirley, USDI Bureau of Land Management

Audio/Visual: Diana Foss and Jesus Franco, Texas Parks and Wildlife Department

Special thanks to: Ed Arnett, Rebecca Patterson, Brad Phillips, Pat Ormsbee, Toni Piaggio, Cori Lausen, Nyta Hensley, Dan Taylor, Alisha Shah, Mike Warner, and Emily Davis

Wednesday April 15, 2009

Social - Poolside & Congress Ave
Bridge Emergence



Mexican free-tailed bat emergence.

(Kristi DuBois Photo)

Thursday April 16, 2009

Welcome and opening remarks – Pat Ormsbee, Western Bat Working Group President (outgoing)

Bats and Wind Energy

Assessing the impacts of wind turbines on bats: An overview of issues and contemporary research. Edward B. Arnett, Bat Conservation International, Austin, TX

Bat migration and wind energy: Making the most of destructive sampling Erin F. Baerwald* and Robert M. R. Barclay, Department of Biological Sciences, University of Calgary, Canada

Bat monitoring at Isthmus of Tehuantepec, Oaxaca, and their interaction with wind farms Rafael Villegas Patraca, Institute of Ecology, Xalapa, Veracruz, Mexico

Bats of northeastern British Columbia – overlap with wind farm projects Rhonda L. Millikin*, EchoTrack Inc., Vancouver, B.C., Canada

Assessing bat activity and bat fatalities at wind-energy facilities in Germany Ivo Niermann*, Oliver Behr, and Robert Brinkmann, Leibniz Universität Hannover, Institute of Environmental Planning; University of Erlangen-Nürnberg, Department of Zoology; Universität Hannover, Institute of Environmental Planning

Ideas on using forest management practices to reduce potential bat/turbine interactions in forest landscapes Cris D. Hein*, and Todd J. Mabee, ABR, Inc.-Environmental Research and Services, Forest Grove, OR

Roosting Ecology

The domino effect: Biological significance of Rose Guano Cave Nevada for the long term conservation of northern colonies of Mexican freetail bats (*Tadarida brasiliensis*) J. T. Agee*, J. A. Williams, J. Schmitt, R. E. Sherwin, M. Herder, and D. Waldien, Christopher Newport University, Newport News, VA^{1,3,4}; Nevada Department of Wildlife, Ely, NV; Bureau of Land Management, Ely, NV; Bat Conservation International, Austin, TX

Using radio-telemetry to understand a migratory population of *Tadarida brasiliensis* in the Great Basin of Nevada Jason A. Williams*, Richard E. Sherwin, and Michael J. Herder, Nevada Department of Wildlife, Ely, NV; Christopher Newport University, Newport News, VA; Bureau of Land Management, Ely, NV

Thermal ecology of roosting bats in Nevada: Implications for management R. E. Sherwin* and A. Loftis, Christopher Newport University, Newport News, VA

Three dimensional models of roost use by the bats of Ash Meadows National Wildlife Refuge, Nevada M. Villanueva*, S. Skalak, J. Agee, M. Brigham, and R. Sherwin; Christopher Newport University, Newport News, VA^{1,3,5}; University of Regina, Saskatchewan, Canada^{2,4}

Activity patterns of cave myotis (*Myotis velifer*) at two southern Arizona hibernacula Debbie C. Buecher* and Ronnie Sidner, Buecher Biological Consulting, Tucson, AZ; Ecological Consulting/University of Arizona, Tucson, AZ

Townsend's big eared bats on Santa Cruz Island: Preserving historic structures as critical habitat for a rare species Patricia E. Brown*, Robert D. Berry, Cathy Schwemm and Tim Coonan. Brown-Berry Biological Consulting; University of California, Santa Barbara; Channel Islands National Park, Ventura, CA

The business of building bat gates at abandoned mine lands in Nevada Katie Erin G. Miller* and Jason Williams, Nevada Department of Wildlife, Elko, NV; Nevada Department of Wildlife, Ely, NV

Bracken Cave field trip

Friday April 17, 2009

Population Ecology



Bracken Cave. (Kristi DuBois Photo)

Population genetic study of *Desmondus rotundus* in an area of high rabies incidence in cattle, San Luis Potosí State, Mexico Antoinette Piaggio*, Ignacio Amezcua Osorio, Alejandro Jiménez Ramírez, Luis Lecuona; USDA/WS/National Wildlife Research Center, Fort Collins, CO; Bovine Paralytic Rabies Campaign Coordinator. Pecuary Committee, San Luis Potosi State, Mexico; Coordinator of the National Campaign of Paralytic Rabies in Bovines (SAGARPA). Mexico City; USDA/APHIS/IS NAR Mexico, Mexico City

Assessing the use of a night vision camcorder as a method for determining population estimates of the Townsend's big-eared bat (*Corynorhinus townsendii*) at Lewis and Clark Caverns, Montana Todd Caltrider, Kristi L. DuBois*, and Kerry R. Foresman. College of Forestry and Conservation, University of Montana, Missoula, MT; Montana Fish, Wildlife and Parks, Missoula, MT; University of Montana, Missoula, MT

Bat banding: Trials and tribulations for estimating survival over a landscape scale Robert A. Schorr*, Laura E. Ellison, and Paul M. Lukacs, Colorado State University, Fort Collins, CO ; USGS BRD, Fort Collins, CO; Colorado Division of Wildlife, Fort Collins, CO

Dispersal and philopatry of prairie bat species: Understanding the influence of river valleys on bat movement using landscape genetics Cori L. Lausen*, Isabelle Delisle, Robert M.R. Barclay and Curtis Strobeck, University of Calgary, Dept. of Biological Sciences and Birchdale Ecological Ltd., Kaslo, B.C.; University of Alberta, Campus Saint-Jean, Edmonton, AB; University of Calgary, Dept. Biological Sciences, Calgary, AB; University of Alberta, Dept. Biological Sciences, Edmonton, AB.

Inventory, Monitoring and Habitat Use by Bats

Seasonal range maps for western red bats (*Lasiurus blossevillii*) in California and wintering western red bat in red gum eucalyptus (*Eucalyptus camaldulensis*) leaf litter Dave S. Johnston* and Susan Whitford. H. T. Harvey & Associates, Los Gatos, CA; MCB Camp Pendleton, San Diego Co., CA

Using pseudo-absence models to evaluate landscape level patterns of bat distributions in Utah Joel M. Diamond*, Robert N. Knight, Lauren B. Wilson, Kimberly Asmus Hersey, and Ben Sutter; General Dynamics, Inc., Natural Resources Program Manager; U.S. Army Dugway Proving Ground Biologist; U.S. Army Dugway Proving Ground, Sensitive Species Biologist, Utah Division of Wildlife Resources; Database Zoologist, Utah Natural Heritage Program

Morphometrics and plasticity in echolocation calls of little brown bats (*Myotis lucifugus*) at the northern edge of their range Cori L. Lausen*, Jennifer M. Talerico, Lea A. Randall, Thomas S. Jung, Brian G. Slough, David W. Nagorsen, Doug Burles, and Laura Friis, Birchdale Ecological Ltd., Kaslo, B.C.; University of Calgary, Calgary, AB; University of Calgary and Environment Yukon; Environment Yukon, Whitehorse, Yukon; Whitehorse, Yukon; Mammalia Consulting, Victoria, B.C.; Parks Canada, Sandspit, Haida Gwaii; B.C. Ministry of Environment, Victoria, B.C.

Using vein patterns in the tail and wing membranes of bats for species-level and individual-level identification Greg Falxa, Cascadia Research Collective, Olympia, WA

Hosted Lunch (WBWG business meeting)

Bat Conservation Strategies

Thirsty bats and dwindling water; evaluating, restoring, and creating safe and accessible water sources for bats and other wildlife in the arid west Daniel Taylor, Bat Conservation International, Austin, TX

South Dakota bat book project Bradley Phillips* and Joel Tigner, USDA Forest Service, Rapid City, SD; Batworks, LLC., Rapid City, SD

“What bat ate that? You’re guano love it!” WBWG curriculum débuts at the National Science Teachers’ Association conference in Portland Aimee Hart*, Deborah Crough, and Michelle Caviness, USDI BLM, Lakeview, OR; Santa Ana USD, Golden West College Huntington Beach, CA; USDI BLM, Vale, OR

Results of a workshop, “Conserving North American bat diversity” Mary K. Clark, Angela McIntire*, Tim Snow, Rodrigo Medellin, Pat Ormsbee, Jamie Stewart, and Michael Herder; Southeastern Bat Diversity Network, Raleigh, NC; Arizona Game and Fish Department^{2,3}; Instituto de Ecologia, UNAM; USFS, Eugene, OR; OMNR, Canada; USDI BLM, Ely, NV

Planning for climate change in western North America Mark A. Hayes* and Rick A. Adams, University of Northern Colorado, Greeley, CO

A primer on White Nose Syndrome, its effects on hibernating bat colonies in the northeastern U.S., and the significance to the west Patricia C Ormsbee and Paul Cryan USFS and BLM Regional Bat Specialist, Eugene, OR; U.S. Geological Survey Fort Collins Science Center

Poster and Technology Sessions

Silent and Verbal Auction

Saturday April 18, 2009

Working session: Raising awareness and prevention for White Nose Syndrome in the west

The objective of this session is to draft our collaborative vision of a strategy to increase the awareness and prevention of spreading WNS to the west. The output will be a draft action plan that will be used by the WBWG WNS committee to take action on this issue. In addition to WBWG members, we will have participation from grotto members and the National Speleological Society.

After a brief introduction to the session, we will break in to facilitated working groups to address collaboration with the caving community, educational tools and public relations needs, site restriction recommendations, state/provincial working group roles, inventory and monitoring, research issues, and review and update of current WBWG WNS recommendations. Breakout groups will reconvene as one group and present their input which also will be submitted to the WBWG WNS committee for synthesis, further development, and implementation.

Presentation Abstracts

The domino effect: Biological significance of Rose Guano Cave Nevada for the long term conservation of northern colonies of Mexican freetail bats (*Tadarida brasiliensis*)

*J. T. Agee**, *J. A. Williams*, *J. Schmitt*, *R. E. Sherwin*, *M. Herder*, and *D. Waldien*,
jagee4@gmail.com, *Christopher Newport University, Newport News, VA 1,3,4; Nevada Department of Wildlife, Ely, NV; Bureau of Land Management, Ely, NV; Bat Conservation International, Austin, TX*

Rose Guano Cave, located roughly 40 miles east of Ely, Nevada has a long history of use by Mexican freetail bats. While neither a large, nor impressive cave, the site has realized sufficiently intense and prolonged historical use by this species that internal guano deposits were mined in two discrete cycles. Historical accounts of the exact nature of use vary, with early records indicating maternity use, while more recent surveys indicate fall migratory use by bachelor males and non-reproductive females. There has been no standardized monitoring of the site, and estimates of colony sizes range from as few as a few hundred individuals to over 500,000. Despite the lack of clarity on the exact demography of or size of the roosting colony, there has been a general agreement that the site is only occupied by this species from mid-summer to early fall. In this study we are attempting to 1) gain an understanding of exactly how and when *T. brasiliensis* utilize the cave, 2) developing standardized methods for determining colony size, 3) investigate group cohesion, 4) gain a better understanding of how individuals from the cave utilize the landscape surrounding the cave, and 5) understand the significance of Rose Guano Cave as part of the contextual roosting landscape of *T. brasiliensis*. Initial data indicate that the cave is used as part of a migratory corridor, through which hundreds of thousands of bats continually flow. This has profound implications regarding the significance of Rose Guano Cave, as any perturbations at the cave will directly impact seasonal migrants from a potentially vast geographical area.

Assessing the impacts of wind turbines on bats: An overview of issues and contemporary research

Edward B. Arnett, Bat Conservation International, Austin, TX

Unexpectedly high numbers of bat fatalities reported at wind energy facilities on ridge tops in the eastern United States, and more recently in open prairies of southern Alberta, have heightened the urgency to understand problems and identify solutions. Here, I present an overview of key issues surrounding wind energy development and bat fatality, the extent of the problem, our current state of knowledge, and provide an update on current research efforts of the Bats and Wind Energy Cooperative (www.batsandwind.org).

Bat migration and wind energy: Making the most of destructive sampling.

Erin F. Baerwald and Robert M. R. Barclay, Department of Biological Sciences, University of Calgary, Canada*

Bat fatalities at wind energy facilities offer the potential for insights into bat migration because the majority of such fatalities involve migratory tree-roosting bats during fall migration. Using a combination of acoustic and fatality monitoring at several wind energy facilities across southern Alberta, Canada, we examined patterns and variation in migratory-bat activity and fatality. At a broad-scale, we found that activity and fatality of migratory bats varied among sites, suggesting that, rather than migrating south randomly or evenly over a wide East-West area, bats concentrate along select routes. Activity rates of both *Lasiurus cinereus* and *Lasionycteris noctivagans* were higher near the foothills of the Rocky Mountains to the West than on the prairie grasslands further east. At a finer-scale (i.e. at an individual wind energy facility), we found that migratory-bat activity and fatality were often correlated and varied with weather variables. Activity of migratory bats was greater in low wind speeds, higher ambient temperatures and greater moon illumination, while fatality of migratory bats was greater in low wind speeds, with greater moon illumination, and with falling barometric pressure. Investigating bat activity and fatalities at wind energy facilities not only addresses the applied issue, but has the potential to increase our knowledge of basic bat biology.

Townsend's big eared bats on Santa Cruz Island: Preserving historic structures as critical habitat for a rare species

Patricia E. Brown, Robert D. Berry, Cathy Schwemm and Tim Coonan.*

Brown-Berry Biological Consulting, 134 Eagle Vista, Bishop, CA 93514 USA (patbobbat@aol.com), Department of Ecology, Evolution and Marine Biology, University of California, Santa Barbara, CA 93106 (schwemm@lifesci.ucsb.edu), Channel Islands National Park, 1901 Spinnaker Dr., Ventura, CA 93001-4354 USA (Tim_Coonan@nps.gov).

A maternity colony of Townsend's big-eared bat (*Corynorhinus townsendii*) roosts in the adobe at Scorpion Anchorage on Santa Cruz Island. Because the adobe is an historic structure, this situation presents challenges for preserving and interpreting a cultural resource that is also critical habitat for a rare mammal. Efforts to preserve the building may have disturbed the bats, as could future plans for interpretive use of the adobe. *Corynorhinus* typically roost in caves or cave-like structures and are very sensitive to human disturbance. The species has declined in numbers across the western United States, particularly in coastal California. Several causative factors have been identified, and roost disturbance or destruction appears to be the most important. The authors have monitored the population in the Scorpion adobe since 1994. Since 2005 the population has declined by almost 50%. A 1994 telemetry study determined that these

bats foraged at least seven kilometers from the coastal roost in native vegetation in an area with many small natural caves. Although these caves were used for night roosts, the bats exhibited high fidelity to the adobe as a day roost. Thermal data-loggers were placed for a year in the adobes at Scorpion and Smuggler's Cove, and in coastal and inland caves. The Scorpion adobe provides a warmer environment during the maternity season, and this may be a reason for the bats' preference. The purposes of the current research are to monitor the resident bat population at Scorpion Ranch; to survey for additional colonies on SCI; to provide recommendations for protecting the colony from disturbance; and to develop and to develop guidelines for future management of both the bat and the cultural resources.

Activity patterns of cave myotis (*Myotis velifer*) at two southern Arizona hibernacula
Debbie C. Buecher* and Ronnie Sidner, dbuecher@comcast.net, Buecher Biological Consulting, Tucson, AZ; Ecological Consulting/University of Arizona, Tucson, AZ

We monitored two high elevation pit-cave bat hibernacula from August 2006 – April 2008 to determine seasonal use, activity patterns and hibernation ecology of cave myotis (*Myotis velifer*) in southern Arizona. We installed passive infrared bat counters to document the approximate period that cave myotis move from summer roosts to winter hibernation sites. Cave myotis appeared to arrive in large numbers in late August but high activity levels by bats at these two sites in the fall also suggest autumnal mating activity. We conducted periodic emergence counts at both sites to calibrate the automatic IR counters and to confirm population sizes. From these visits we were able to document predation on emerging cave myotis by a Mexican spotted owl (*Strix occidentalis lucida*). Analysis of temperatures at both sites suggest that hibernating cave myotis use sites with more stable cold temperatures ($7.7 \text{ }^{\circ}\text{C} \pm 0.40\text{C}$) and high humidity (~100%) during winter months. We also determined when bats began to arouse and move from these caves to summer roosts in the spring. Our passive techniques provided information regarding activity patterns, population size and seasonal movement patterns for two remote high elevation caves. Due to negative impacts on colonial bats from human visitation at roosts, we strongly suggest these or similar passive techniques be used to monitor winter bat hibernacula and/or summer maternity sites.

Assessing the use of a night vision camcorder as a method for determining population estimates of the Townsend's big-eared bat (*Corynorhinus townsendii*) at Lewis and Clark Caverns, Montana

Todd Caltrider, Kristi L. DuBois*, and Kerry R. Foresman. College of Forestry and Conservation, University of Montana, Missoula, MT.; kdubois@mt.gov, Montana Fish, Wildlife and Parks, Missoula, MT; University of Montana, Missoula, MT

Lewis and Clark Caverns State Park in southwestern Montana hosts a maternity colony of Townsend's big-eared bats (*Corynorhinus townsendii*), which has apparently declined during the last decade. However, we have been unable to get accurate estimates of the total population and rate of decline due to the difficulty in obtaining accurate counts of a tightly-packed bat colony. Our objective was to analyze the use a Sony Nightshot video camera to get population estimates of the Townsend's big-eared bat colony with minimal disturbance. The maternity colony was filmed a total of 15 times during summer of 2007. The resulting videos were downloaded into a computer and analyzed to locate frames that could be used to count the number of bats present in the colony. The countable frames were then exported to Microsoft Paint, where the bats in the cluster were marked and counted. Each frame was counted 5 different times. The variance between each frame was measured to assess the accuracy of the method. The overall ability of

the method to detect changes in population due to birth was also assessed by measuring the average number of bats counted before and after the birth of the pups. The ability to get precise estimates of the population size was good, with an SE of ± 2.77 (pre birth) and ± 1.189 (post birth). This method will provide a consistent way to document population size of this colony over time.

Results of a workshop, “Conserving North American bat diversity”

Mary K. Clark, Southeastern Bat Diversity Network, Raleigh, NC, Angela McIntire, Arizona Game and Fish Department, Tim Snow, Arizona Game and Fish Department, Rodrigo Medellin, Instituto de Ecologia, UNAM, Pat Ormsbee, USFS, Eugene, OR, Jamie Stewart, OMNR, Canada, Michael Herder, USDI BLM, Ely, NV*

Special interest groups representing birds, fishes, herpetofauna and other taxa have organized nationally and internationally to achieve greater success through collaborative conservation efforts for their respective groups. The resulting partnership coalitions, such as Partners in Flight and the North American Fish Habitat Initiative, have successfully achieved implementation of large-scale or continent-wide conservation strategies to address landscape scale and cross-border challenges. A need for such a collaborative effort for bats has long been recognized. Bats as a group face a growing number of conservation pressures in North America. Of the 16 species shared by the three countries, at least a dozen cross Canadian, U. S. and Mexican borders. Progress at the national and international levels will require coordinated communication on bat conservation needs to key decision makers; in addition new funding initiatives such as State Wildlife Action Plan funds provide new opportunities for bats that can only be utilized through an organized and coordinated efforts. For the last four years, an initiative to promote bat conservation across North America has been presented to the Trilateral Committee for Wildlife and Ecosystem Conservation and Management, which facilitates cooperation and coordination among wildlife agencies of the three nations. The Trilateral Committee endorsed the initiative as a priority in 2007 and 2008. In addition, the Association of Fish and Wildlife Agencies, which represents North America’s fish and wildlife agencies, also supported the need to organize a new bat conservation initiative. In 2008 funding was secured from state, federal and non-governmental organizations to support a workshop to develop a continental conservation effort for bats. The workshop was held at the Arizona Sonora Desert Museum in August, and was attended by a diverse group of bat conservationists who drafted a mission statement, identified goals and objectives, and outlined an infrastructure that will allow planning input from a diverse group of interests. Participants included representatives from each of the three countries, state/provincial and federal agencies, industry and private organizations. Follow-up action items include seeking more widespread input, collaboration and endorsement for this initiative, as well as developing a strategic North American bat conservation plan.

“What bat ate that? You’re guano love it!” WBWG curriculum débuts at the National Science Teacher’s Association conference in Portland

Aimee Hart, Deborah Crough, and Michelle Caviness, USDI BLM, Lakeview, OR; Santa Ana USD, Golden West College, Huntington Beach, CA; USDI BLM, Vale, OR*

The curriculum group was selected by NSTA to present educational materials at the regional conference in November, 2008. We managed to capture an audience of approximately 75 educators in a tough time slot and presented hands-on lab experience and shared materials developed for WBWG. We will report on successes, teacher needs, current work, and plans for location of funding sources for future projects.

Using pseudo-absence models to evaluate landscape level patterns of bat distributions in Utah

Joel M. Diamond, Robert N. Knight, Lauren B. Wilson, Kimberly Asmus Hersey, and Ben Sutter; General Dynamics, Inc., Natural Resources Program Manager; U.S. Army Dugway Proving Ground Biologist; U.S. Army Dugway Proving Ground, Sensitive Species Biologist, Utah Division of Wildlife Resources; Database Zoologist, Utah Natural Heritage Program*

U.S. Army Dugway Proving Ground and the Utah Division of Wildlife Resources teamed up to coordinate a Legacy Resource Management Program funded, three-year approach to managing bats in Utah. The management of bat populations on a regional scale requires the integration of historical distributional data across species. This Department of Defense initiative consolidated 103 years of spatially informed data to create descriptive habitat models for 18 bat species in Utah. This data set consisted of records for 28,629 individual bats and 13,895 events. With the use of the existing tessellated Grid in Utah we divided the state into over 2100, 20 X 20 km hexagonal cells. The bat records for each cell were then used to create a presence or pseudo-absence across species for each cell. We used calculated and recorded covariates to create a descriptive multiple linear regression analysis. Up to 17 distinct A priori models were created for each species and evaluated with Akaike's Information Criterion (AIC) weights to select models with a high degree of fit and parsimony in relationship with the distribution of bat populations. Preliminary findings indicate relationships between climatic, geologic and landform variables and communities of bat species. This analysis provides a descriptive model of bat distributions in Utah that can be used to aid in the management of bat species, populations and communities.

Using vein patterns in the tail and wing membranes of bats for species-level and individual-level identification

Greg Falxa, Cascadia Research Collective, Olympia, WA

Several pairs of bat species in the Western U.S. can be troublesome to distinguish in the field. Recent papers have described a method for distinguishing similarly cryptic myotis species pairs in Japan, using the differences in the shape of a vein clearly visible in the interfemoral membrane. I have started photographing this vein of captured Little Brown bats (*Myotis lucifugus*) and Yuma Myotis bats (*M. yumanensis*), one of these cryptic pairs. I present preliminary results which show that this technique may prove useful, but a larger and broader sample set is needed for analysis and evaluation. I devised an easily duplicated method for photographing these veins, which can be used by other researchers interested in building a sample set needed for the development of this method. I also evaluated the uniqueness of vein patterns visible in bats wing membranes. These dendritic patterns, although similar among individuals, appear unique to individual bats, much like fingerprint or retinal patterns in humans. I describe the method used for cataloging Blue and Humpback whale identification photographs, a system which enables whale researchers to perform mark-recapture and migration analysis. Applied to bats, this non-invasive method may, with the development of a cataloging system, allow for individual-level identification of recaptured bats without the adverse effects of banding.

Planning for climate change in western North America

Mark A. Hayes and Rick A. Adams*

Hayes4932@bears.unco.edu, University of Northern Colorado, Greeley, CO

Western North America is experiencing rapid climate changes resulting in environmental modification with potentially significant influences on bat species of conservation concern. However, the precise affects of climate changes on local bat populations are unknown. Here, we consider potential steps toward planning for climate change in western North America and discuss steps we are initiating in Colorado to plan for a hotter, drier climate in the Southern Rocky Mountains. These steps include: identifying and protecting maternity colonies of sensitive species; monitoring and conserving water resources near maternity sites; collecting and maintaining data sets regarding the reproductive status of sensitive bat species; and seeking expert information on the best climate models for predicting current and future climate change in our region.

Ideas on using forest management practices to reduce potential bat/turbine interactions in forest landscapes

Cris D. Hein, and Todd J. Mabee, ABR, Inc.-Environmental Research and Services, Forest Grove, OR*

As wind development continues to increase in forest landscapes, it is important to understand how management practices influence the structure and dynamics of bat populations. Bat activity in and around forests is a function of numerous factors, including degree of structural clutter, availability of water and insect prey, and amount of suitable roosting habitat. Thus, altering stand conditions through forest management can impact overall bat presence, activity and species diversity. For example, creating small forest openings or increasing edge habitat typically enhances commuting and foraging opportunities for bats. Such favorable conditions often are created during road construction and turbine siting at wind-energy facilities in forest landscapes. In this discussion, we consider ideas to potentially decrease bat/turbine interactions at project sites by using forest management practices that discourage bat presence. In addition, we present data from several night-vision optic studies examining bat behavior near meteorological towers to address several attraction hypotheses.

Seasonal range maps for western red bats (*Lasiurus blossevilli*) in California and wintering western red bat in red gum eucalyptus (*Eucalyptus camaldulensis*) leaf litter

Dave S. Johnston and Susan Whitford, djohnston@harveyecology.com, H. T. Harvey & Associates, 983 University Ave., Los Gatos, CA; MCB Camp Pendleton, San Diego Co., CA*

We used GIS-based ArcView 9 and western red bat (*Lasiurus blossevilli*) location records from the California Natural Diversity Data Base, museum records, and capture and acoustic data from E. Pierson, W. Rainey, C. Corben, D. Johnston, D. Stokes, S. Whitford, and S. Remington and various reports to predict seasonal ranges in California. Land cover attributes, political boundaries, and records were combined into a single table. GAP polygons that showed only the primary wildlife habitat relationship (WHR) vegetation community were used to generate the GIS-based range maps. The breeding (summer female and young) range comprised valley foothill woodland habitats in the Central and Salinas valleys, and in coastal areas of Southern California. The male summer range included the Sierra Nevada and other mountainous regions adjacent to the female – young summer range. The winter range was mostly limited to the San Francisco Bay Area, the Delta and central portion of the Central Valley, and coastal areas with

valley foothill riparian habitat. Additionally, we documented locations and habitats of 2 wintering western red bats in non-native river eucalyptus (*Eucalyptus camaldulensis*) leaf litter. For 20 randomly selected points of this leaf litter habitat we determined a mean thickness of 9.9 cm, SE = 0.82; a mean distance of 1.31 m to the nearest tree >20 cm, SE = 0.20; and 5 of the 20 points were relatively dry after heavy rains. These data suggest that the leaf litter from groves of non-native eucalyptus potentially provide valuable winter roosting habitat for the western red bat.

Dispersal and philopatry of prairie bat species: Understanding the influence of river valleys on bat movement using landscape genetics

Cori L. Lausen*, Isabelle Delisle, Robert M.R. Barclay and Curtis Strobeck,
corilausen@birchdalebc.ca, University of Calgary, Dept. of Biological Sciences and Birchdale Ecological Ltd., Kaslo, B.C.; University of Alberta, Campus Saint-Jean, Edmonton, AB; University of Calgary, Dept. Biological Sciences, Calgary, AB; University of Alberta, Dept. Biological Sciences, Edmonton, AB.

Given their ability to fly, one might expect bats to be relatively uninfluenced by landscape structure, similar to non-sedentary birds. We investigated whether prairie landscape features shape bat movement, dispersal and consequently genetic population structure. We tested the hypothesis that degree of mobility and habitat specificity affect bat genetic population structure by comparing three species of bats (big brown, *Eptesicus fuscus*; little brown, *Myotis lucifugus*; western small-footed, *M. ciliolabrum*) in southern Alberta and north-central Montana, where river valleys are the dominant landscape feature. Using both nuclear DNA microsatellites and mitochondrial DNA sequences, we found varying degrees of structure according to rivers and river systems, with *E. fuscus* displaying the least amount of genetic structure associated with rivers, and *M. ciliolabrum* displaying the greatest degree of structuring by river topography. We concluded that greater flight ability corresponded to less genetic structure, and that specificity for rock-roosts in the prairies may cause greater dependency on rivers as movement corridors. As riparian cottonwoods continue to disappear, and drought puts additional pressure on governments to dam and divert rivers, the prairie landscape is almost certain to change in a way that will influence many species, including bats.

Morphometrics and plasticity in echolocation calls of little brown bats (*Myotis lucifugus*) at the northern edge of their range

Cori L. Lausen*, Jennifer M. Talerico, Lea A. Randall, Thomas S. Jung, Brian G. Slough, David W. Nagorsen, Doug Burles, and Laura Friis, Birchdale Ecological Ltd., Kaslo, B.C.; University of Calgary, Calgary, AB; University of Calgary and Environment Yukon; Environment Yukon, Whitehorse, Yukon; Whitehorse, Yukon; Mammalia Consulting, Victoria, B.C.; Parks Canada, Sandspit, Haida Gwaii; B.C. Ministry of Environment, Victoria, B.C.

Little brown bats (*Myotis lucifugus*) reach the northern edge of their range in Yukon, Canada. At higher latitudes they encounter short, luminous nights, relative to conspecifics at lower latitudes. *M. lucifugus* is often the only bat found in an area, and they face less competition with ecomorphologically similar species with slightly different ecological niches. We were interested in how morphology and echolocation-call characteristics may be influenced by environmental conditions in the North, and the lack of competition with congeners. In 2007 and 2008, echolocation calls were recorded from captured *M. lucifugus* at various locations in western Canada, via frequency division detectors. Calls of *M. lucifugus* in the Yukon were found to be steeper than conspecifics further south. Because steeper calls tend to be associated with long-

eared bats flying among clutter, we examined ear length. We found that Yukon *M. lucifugus* had longer ears than conspecifics in B.C.; this piece of evidence together with observations of these bats foraging more often in clutter, and less often in the open, supports the observation that little brown bats in the North have evolved echolocation-call designs to forage in cluttered habitats, possibly in response to an elevated predation risk associated with high light levels. We also report a south-north cline in forearm length, similar to that found for *M. lucifugus* in the prairies.

The business of building bat gates at abandoned mine lands in Nevada

Katie Erin G. Miller* and Jason Williams, kmiller@ndow.org, Nevada Department of Wildlife, Elko, NV; Nevada Department of Wildlife, Ely, NV

The state of Nevada has a long and colorful history of hard rock mining. There are an estimated 200,000 historic mine features. This unparalleled number of abandoned mine lands requires a proactive and effective approach to manage these unique biological resources. The Nevada Department of Wildlife has partnered with the Bureau of Land Management, the US Forest Service, the Nevada Division of Minerals, mining companies, biological consultants, and private land owners to identify and locate abandoned mines, conduct biological surveys, identify and pool financial resources, and secure abandoned mines important to roosting bats with bat compatible gates. Our methodology and cooperative approach to resource management has been successful in the state of Nevada and can be used as a template for resource managers in other states and provinces to protect bat resources. We will present an overview of our program, including its successes and failures.

Bats of northeastern British Columbia – overlap with wind farm projects

Rhonda L. Millikin*rmillikin@echotrack.com, EchoTrack Inc., Vancouver, B.C., Canada

This talk examines the effect of geography on the distribution and diversity of bats, particularly for species at risk to a collision with wind turbine blades. Bat activity was monitored from mountain ridge to valley bottom in three areas of potential wind development, during the spring and fall. Radar and Acoustic samples were taken from sunset to sunrise, analyzed for species and expressed as the number of passes per minute for acoustics, and number of flights within or outside of the blade sweep area, 6.7 km³ for radar. Six species of bats were recorded; Little brown bat, *Myotis lucifugus*, Long-legged myotis, *Myotis volans*, Northern long-eared bat, *Myotis septentrionalis*, Big brown bat/Silver-haired bat, *Eptesicus fuscus* /*Lasionycteris noctivagans*, Eastern red bat, *Lasiurus borealis*, and Hoary bat, *Lasiurus cinereus*. The Little brown bat was most widely distributed in fall and the only species recorded in spring. The Hoary bat and the Silver-haired bat, species reported to be sensitive to wind development, were less common. Flight activity peaked at 20 to 50 minutes after sunset. Bat heights averaged 143 m. Bat diversity is low in spring and bat flight is restricted to the valleys. In fall, bats fly higher in elevation in forested habitat.

Assessing bat activity and bat fatalities at wind-energy facilities in Germany

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We will present preliminary results of a research project that aims to establish methods of examining and quantifying the risk of turbine-caused bat fatalities at onshore wind-energy plants in Germany. We were particularly interested in determining whether a correlation exists between acoustic bat activity in a wind turbine's rotor-swept area and the number of fatalities found at its base. Therefore, we conducted acoustic monitoring at seven wind-energy facilities in different regions of Germany throughout 2007. In 2008, bat detectors continuously sampled bat activity at a total of 35 German wind-energy facilities. Two synchronized infrared cameras were used in a standard stereo-view set-up to test the range of the bat detectors in use and to provide a comparison of the acoustic and visual recording techniques. In 2008, we also successfully developed and implemented a remote data download via GPRS for the Anabat SD1 detectors we used in some of the plants' nacelles. Simultaneously, ground searches were performed at selected wind parks in order to estimate the extent of wind turbine-related bat mortality. The number of bat carcasses found on a given day was highly correlated to the acoustic activity measured during the previous night. Based on our data, parameters such as date (i.e. season), time of night, and wind speed enable a prediction of both the activity of various bat species and the occurrence of fatalities. This data set will therefore be used to propose site-specific mitigation measures consisting of periods of restricted turbine operation.

A primer on White Nose Syndrome, its effects on hibernating bat colonies in the northeastern U.S., and the significance to the west

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White Nose Syndrome (WNS), named for the white fungus evident on the faces, ears, and wing membranes of some victims, has decimated hibernating colonies of bats in the northeastern US. In 2006, bats were first observed leaving a hibernaculum in-mass during daylight in the cold of February in Schoharie County, New York. By 2008, all 28 hibernacula within a 130 km circle of the epicenter were affected by WNS and resulting colony mortalities were 81-97%. WNS has now been confirmed at locations in NY, VT, MA, WV, VI, NH, and CT. Scientists have struggled to identify the cause of the aberrant behavior, starvation, and deaths attributed to WNS. Through extensive collaborative investigations by State, Federal, and Private scientists, hypotheses have been formulated and testing initiated. A primary catalyst of current investigations has been the discovery of a psychrophilic (cold-loving) fungus colonizing the skin of bats collected from afflicted sites. Tests on the rare fungus, have shown that it is phylogenetically related to *Geomyces* spp. and it thrives between 5-10° C, a temperature range that also is typical of bat hibernacula. There is growing support that symptoms of WNS are associated with the cutaneous infection by this fungus. While the presence of WNS in the US is currently restricted to the east, human awareness and modified behavior are critical in limiting its potential spread.

South Dakota bat book project

Bradley Phillips UDSA Forest Service, Rapid City, SD; Joel Tigner Batworks, LLC., Rapid City, SD*

As part of our education goal, the South Dakota Bat Working Group has organized a BAT BOOK FUND to purchase a series of books for public elementary school libraries throughout South Dakota. This 12-book series is fully bound for library use and written for the 3rd – 5th grade student. The books provide factual information about bats to kids in a fun and friendly manner. We believe kids that learn the truth about bats grow up to be adults that understand and appreciate bats. To date the fund has supplied 36 sets to elementary schools across South Dakota. The Western Bat Working Group's non-profit status allows individual tax deductible donations be made to the Book Fund. This program is now available for other State Bat Working Groups. Learn how.

Bat monitoring at Isthmus of Tehuantepec, Oaxaca, and their interaction with wind farms

Rafael Villegas Patraca, Institute of Ecology, Xalapa, Veracruz, Mexico

During a complete monitoring year 34 bat species were registered, these account for 40.47% of the bat species that occur in the state of Oaxaca. The Insectivore dietary guild was the best represented, accounting for 47.50% of the records. Ten of the identified aerial insectivore species have high probabilities of collision with windmills due to its flight behavior, there are collision records at CE La Venta II wind farm of three insectivore species that fly under the canopy level. This study provides the first records of bat collisions in Mexico at a Wind Farm located at the Isthmus of Tehuantepec. During two monitoring years at the Wind Farm a total of 206 bat carcasses have been reported. The species with most records of collision are Davy's naked-backed bat (*Pteronotus davyi*), Northern yellow bat (*Lasiurus intermedius*) and Ghost faced bat (*Mormoops megalophylla*); there are records of collisions for fifteen other species. First analyses do not show a particular spatial pattern. There are scarce collision records for nectarivore and frugivore species, even when they are relatively abundant in the area. The information provided sets the baseline that will allow inferences regarding the impact on bats of wind farm development at a large scale at the Isthmus of Tehuantepec region.

Population genetic study of *Desmodus rotundus* in an area of high rabies incidence in cattle, San Luis Potosí State, Mexico

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The common vampire bat (*Desmodus rotundus*) feeds on mammalian blood and creates significant economic impacts through transmission of rabies to livestock. In a multi-year study we have investigated population dynamics of *D. rotundus* using mitochondrial DNA (mtDNA) sequences and 12 microsatellites. In Mexico field studies have revealed that *D. rotundus* populations may be expanding. Evidence of population expansion from DNA is critical for providing confirmation. If populations are expanding, vampire bat rabies outbreaks could occur in areas not previously considered at risk, including the USA/Mexico border region. Further, we wished to test for metapopulation dynamics among vampire bat populations as a dynamic that allows rabies, a fatal disease in bats, to be maintained among vampire bat populations. To test for metapopulation dynamics and population expansion we have used samples collected from the

states of San Luis Potosi and Tamaulipas, Mexico, where an outbreak of vampire bat rabies in livestock has occurred. The results of this study contribute to our understanding of *D. rotundus* population movements and allow us to infer how these bats move rabies virus across the landscape.

Bat banding: trials and tribulations for estimating survival over a landscape scale

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The recent evidence that wind farms are killing large numbers of bats has motivated interest in understanding what this loss means for bat populations. Recent proposals have suggested the implementation of broad-scale bat banding as a tool for estimating these impacts and assessing relevant population parameters such as abundance and survival. We review the history of the bat banding effort focusing on the limitations of this technique and the likely confounding effects of a marking method that can adversely impact the individual. Also, we explore the potential to use mark-recapture techniques to estimate broad-scale population parameters, presenting simulations of such data and the effort required to collect it. Based on the documented complications of banding and the sampling effort required to assess meaningful estimates of survival we feel certain that the costs, both monetarily and in terms of individual survival, may preclude using bat banding as a method for estimating the impacts of wind farms on a landscape scale.

Thermal ecology of roosting bats in Nevada: implications for management

*R. E. Sherwin and A. Loftis; rsherwin@cnu.edu, Christopher Newport University, Newport
News, VA*

Bats attained powered flight as early as the Eocene (*Onychonycteris finneyi*- 52.5 mya) and they quickly radiated to fill the open niche space of primary volant, nocturnal, predator. The attainment of powered flight by bats required the evolutionary developments of small body size, high metabolic rates, and a unique, yet conservative body plan. These combinations of morphological and physiological traits that have made bats so evolutionarily successful have come at a cost, particularly in temperate regions of the globe, such as those encountered throughout much of the continental United States. High surface-to-volume ratios translate into low energetic efficiency. Small body size, and high metabolic demands, coupled with the need to remain light, lead to water imbalances. And the eruptive and ephemeral nature of their insect prey leads to nightly and seasonal periods of energy stress. These factors, among others, have led to a general consensus that temperate bats will be profoundly limited in distribution, density, and demography by the availability of roost sites that provide benign climatic environments where individuals can roost without incurring physiological cost. This assumption has led to the development of habitat models where roost quality is diagnosed based on the thermal characters of the roost in question. These thermal models have been developed using hand held thermometers and climatic data loggers, which measure the temperature of the air or substrate inside of a roost, and it is then generally assumed that the temperature of the bat will match that of the roost. In this study we tested the assumption that general thermal conditions inside of a roost (measured using traditional techniques) are truly indicative of microclimate conditions where bats are roosting. We used a variety of tools to test this assumption, including climatic data loggers, thermal sensors and probes, and thermal imaging equipment. In this presentation we will discuss our findings, and specific management implications of these results for predicting roost use based on coarse climatic variables.

Thirsty bats and dwindling water; evaluating, restoring, and creating safe and accessible water sources for bats and other wildlife in the arid west.

Daniel Taylor, Bat Conservation International, Austin, TX

Bats are especially vulnerable to water shortages, sometimes losing up to 30% of their body weight daily to evaporative water loss, with pregnant and lactating individuals having the greatest need. In the most arid regions of North America, water may be more limiting than roosts to bat populations. Over the last century, the western U.S. has warmed at a faster rate than any region of the planet, resulting in a decrease in water availability and distribution. This trend is likely to continue into the foreseeable future. During the same time, water sources developed for livestock have become a critical resource to bats and other wildlife. However, bats and other animals attracted to troughs and storage tanks often become trapped and drown if a suitable escape structure isn't installed, and low water levels, and fencing and bracing, can make access difficult or impossible. Additionally, most wildlife water developments such as wildlife drinkers and "guzzlers" are accessible to few if any bat species. To address these issues, BCI and the Natural Resources Conservation Service created the Water for Wildlife Project. Over the last four years, the Project has raised awareness about the importance of these water sources to bats, and trained thousands of ranchers and range and wildlife managers in techniques for making them safer and more wildlife accessible. The Project has now expanded its scope to develop and disseminate site and landscape-level methods for providing reliable and well-distributed water sources in proximity to key roosts and habitats.

Three dimensional models of roost use by the bats of Ash Meadows National Wildlife Refuge, Nevada

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Even the most basic understanding of habitat use by bats has been extremely hard to acquire. Their small size, nocturnal lifestyle, and ability to fly all serve to confound those who attempt to truly understand patterns of habitat use. Researchers have generally been forced to either focus research attention at roosts, where bats are more sedentary, or use capture tools to intercept bats as they navigate through landscapes. Unfortunately these interception tools (mist nets, bat detectors, etc.) do not provide any information on where the animals were coming from, where they are traveling to, or what their presence in that part of the landscape at time of capture may mean. Even radio telemetry, where individuals are tracked across landscapes over time, provides researchers with only limited ability to diagnose sub-landscape scale associations. Only rarely have multiple sampling tools been used concurrently to understand habitat use by bats. This general lack of complementary data has largely limited our ability to truly understand how bats utilize and move across landscapes. In this study we are combining all traditional survey tools including continuous acoustic monitoring, mist netting, roost surveys, and radio telemetry to study bat activity across the landscape of Ash Meadows NWR. Additionally we are developing and testing tools for videography at water sites, and a radar system which can track movements of bats through horizontal and vertical space. In this presentation we will discuss our first year's findings along with objectives for our second year of data collection.

Using radio-telemetry to understand a migratory population of *Tadarida brasiliensis* in the Great Basin of Nevada

*Jason A. Williams**, *Richard E. Sherwin*, and *Michael J. Herder*, *jasonw@ndow.org*, Nevada Department of Wildlife, Ely, NV; *Christopher Newport University*, Newport News, VA; *Bureau of Land Management*, Ely, NV

We used radio telemetry during Fall 2008 to collect flight and dispersal information on a large colony of Brazilian free-tailed bats (*Tadarida brasiliensis*) occupying a natural cave in east-central Nevada. Five successive week-long telemetry sessions yielded data on 64 telemetered bats from 2,622 hours of field effort spanning both diurnal and fixed-point nocturnal ground-based tracking, as well as daytime aerial telemetry surveys. We found the colony to be highly migratory, with residency periods lasting only a few days before individual bats continued their migration. Some bats were tracked more than 100 miles away from the capture site just 24 hours after release, while other individuals traveled east or west over multiple mountain ranges before migrating out of the study area. Telemetered bats rarely returned to the roost cave on successive nights, and instead roosted elsewhere in the study area.

Poster and Technology Session Abstracts

Overview of the LCR MSCP and preliminary results of bat monitoring at habitat creation sites

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The Lower Colorado River Multi-Species Conservation Program (LCR MSCP) is a 50-year cooperative Federal-State-Tribal-County-Private effort to manage natural resources of the LCR watershed, provide regulatory relief for use of water resources, create native habitat types along the LCR, and monitor 31 covered species. Four covered bat species are being managed for and monitored: western red bat (*Lasiurus blossevillii*), western yellow bat (*Lasiurus xanthinus*), California leaf-nosed bat (*Macrotus californicus*), and Townsend's big-eared bat (*Corynorhinus townsendii*). Post-development monitoring of covered bat species is being completed at various habitat creation areas within a 196 mile stretch of the river from Needles, CA to Yuma, AZ. Monitoring includes both acoustic and capture surveys. Acoustic surveys are performed quarterly using Anabat bat detectors. A long term passive Anabat station was established at one site in April of 2008. Capture surveys are conducted five times between late spring and early fall. A total of 16 species have been recorded acoustically, and 9 species have been captured. Both techniques have revealed a species from a site that had been previously unknown using the other technique. Together, the two survey techniques provide a good picture of bat use of each habitat creation site. These are preliminary data which will be used during the adaptive management process to further direct the monitoring of current habitat creation areas and to determine how to make created sites more suitable for bat use in the future.

Department of defense legacy initiative and bat conservation in Utah

*Joel M. Diamond**, *Robert N. Knight*, *Lauren B. Wilson*, *Kimberly Asmus Hersey*, and *Ben Sutter* *General Dynamics, Information Technology; Natural Resources Program Manager, U.S. Army Dugway Proving Ground; Biologist, U.S. Army Dugway Proving Ground; Sensitive Species Biologist, Utah Division of Wildlife Resources; Database Zoologist, Utah Natural Heritage Program*

Department of Defense (DoD) Legacy Resource Management Program (LRMP) funding enabled a broad scale analysis of bat habitat and species status in Utah and across DoD lands. The first iteration of Legacy funding in Utah allowed for the consolidation of all known bat data in the State of Utah. The second iteration provided the funding necessary for a frequency analysis of 103 years of data and the development of a Utah bat monitoring protocol. The third funding iteration will enable the implementation of the Utah based bat monitoring protocol. The consolidation of historical bat data in the state resulted in data for 19 species and 13,000 events. These data provided a baseline for monitoring, protocol development, risk assessment, and threat management for Utah's bat populations. The findings of this analysis were used to develop and implement the landscape scale bat monitoring protocol. This regional approach to managing bats within Utah and specifically understanding regional trends and patterns on DoD lands directly supports stewardship objectives, sustainable range priorities, and goals fundamental to sound land management policies. This effort was a partnership between U.S. Army Dugway Proving Ground, the Utah Division of Wildlife Resources, the LRMP, and the Utah Bat Conservation Cooperative.

The Townsend's ear: An experimental method for improving the acoustic detection range of the whispering bats

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Townsend's Big-eared bats and other long-eared bats tend to have quieter echolocation calls than most North American bats. While call detection technology and call analysis software has been steadily improving, the ability to detect these covert bats has not. Many bat researchers acknowledge that both acoustic-based and net-based surveys suffer from false negatives, leaving Townsend's Big-eared bats under-represented in these surveys. I will demonstrate a simple bat detector accessory that can increase the detection range for these whispering bats built from items found in my refrigerator. When tested with pre-recorded *Corynorhinus townsendii* calls, broadcast from an ultrasonic playback unit (AT800, Binary Acoustic Technology), I measured the received signal levels at various distances from the artificial bat unit, with and without the accessory in place. The reference signal level measured with a standard Pettersson D240x detector at 8.2 meters was achieved at 21.5 meters when the range extender accessory was enabled. I could receive the simulated call 2.6 times farther when using the extender. The drawbacks of this device will be demonstrated as well; system is more directional when using the range extender accessory. "There's no such thing as a free lunch."

Bat activity at tunnels and abandoned mines on the Nevada Test Site, south-central Nevada

Derek B. Hall, *National Security Technologies, LLC, Las Vegas, Nevada*

Exit surveys were conducted at 55 sites across the Nevada Test Site (NTS). Sites were active and inactive tunnels built in the mid- to late-1900's or abandoned mine adits and shafts that remain from mining operations conducted during the early 1900's. Techniques used to detect bats at tunnel and mine entrances included direct capture using mist nets, acoustic detectors to

record bat vocalizations, video-taping activity using a camera with NightSight™ technology, and visual observations with night vision goggles. A total of 68 bats, representing five species were captured, and 3,294 files were recorded containing calls of ten bat species. Three maternity roosts were discovered during the surveys. Townsend's big-eared bats (*Corynorhinus townsendii*) occurred at all three roosts and fringed myotis (*Myotis thysanodes*) occurred at two of the three roosts. Several day roosts and night roosts/foraging sites were also documented. Bat activity was detected at all but two sites. Abandoned mines and tunnels are important biological resources that provide roosting and foraging habitat for at least ten of the fifteen bat species known to occur on the NTS.

Testing of a new tethering method for reference call collection: Bat-kiting

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Obtaining representative acoustic reference calls from bats is challenging. While the recording of free-flying bats is most desirable, obtaining reference calls from known free-flying individuals is difficult. Ensuring that a bat is successfully recorded often requires some form of tethering, such as zip-lining (J. Szewczak). We tested a new method of tethering bats for reference call recording, which we nick-named "Bat-Kiting." This method, like zip-lining, involves placing a loosely tied elastic cord around the bat's neck. Instead of attaching the other end of this cord to a horizontal zip-line, we hold the spool of elastic thread, reeling out more line as the bat flies further/higher. In this way, the bat is subtly directed by the person holding the spool of cord, but is less confined in its flight pattern as it is allowed to fly higher or further than the zip-lining method allows. The tether on zip-lines is typically <1.5 m, forcing the bat to fly close to the ground (<3 m), whereas Bat-Kited individuals may fly as much as 6–8 m above the ground. We hypothesized that different bat species respond differently to methods of tethering. Here we present preliminary findings, with a focus on reference calling of long-eared species of *Myotis*.

Winter, the other bat season: Observations from Washington state

*Jon Lucas** and Greg Falxa, jonathan.lucas@areva.com, AREVA Federal Services, Richland, WA; Cascadia Research, Olympia, WA

We share our regional field observations of winter bat activity in Washington state, and encourage other researchers to conduct studies during this season. We report on bats observed flying during winter months in two distinct regions: southeastern Washington (U.S. Dept. of Energy's Hanford site, latitude-46 degrees N.) and in Western Washington (southern Puget Sound, latitude- 47 degrees N.). Recorded acoustic data and temperature data was collected during the past several winters in the previously described regions and will be discussed in this presentation.

Winter activity in southeastern Washington was an average of 1.67 calls per day (n=30 recording days) in December, and an average of 1.13 calls per day (n= 31 recording days) in January. December had calls recorded at least every day, whereas in January, calls were recorded approx. every 4 days. The lowest recorded temperature with associated call activity was approx. - 8 degrees C. near the latter part of January.

In western Washington, foraging observations of two species of bats were documented with acoustic monitoring during all winter months, from 2004 to 2009. Silver-haired and California Myotis bats have been observed active as low as 4 degrees C. and up to five hours after sunset, typically returning to the same feeding areas each night when the weather was not severe. Studies during this time have been few, especially in the northern latitudes of North America, but to gain a fuller understanding of the ecology of bats in order to make better conservation and management decisions, studies during this season are greatly needed.

Unforeseen challenges with the development of bat study designs for proposed wind energy facilities

Perry, Rick L. M.H. Wolfe and Associates Environmental Consulting, Inc., Bakersfield, California

In November of 2007, the California Energy Commission (CEC) issued the final version of their California Guidelines to Minimize Impacts to Birds and Bats from Wind Energy Development. During the process of issuing draft versions of the document over a couple years, many proposed projects were faced with the challenge of attempting to create study designs while the requirements in the document changed on a nearly monthly basis. Prior to the completion of the guidelines, we developed a study design that would hopefully be close to the final CEC recommendations and at the same time provide informative data on the use of an area by all possible bat species. The difficulty in correlating bat occurrence detected in proposed wind farm areas with any resultant impacts has been discussed by many professionals. However, we have discovered many other challenges in implementing study designs that are not necessarily related to any recommendations or legal requirements and which have not been discussed in the literature relative to designing the data collection and analyzing ultimately what is documented. These challenges included project boundary changes throughout project design, theft and vandalism, excessive noise files created by wind for which the only solution can result in potentially important data losses, the problems that can arise in randomly selecting files for analysis and other issues. Some of these challenges can be overcome more easily than others; however, some can continue to create complications. The need for early planning for bat studies in proposed wind farm areas is highly recommended based on our experiences. However, it must be realized that wind energy facility design, by nature of the business and availability of equipment, must remain highly flexible, changing sometimes even after a permit is issued. Consequently, although necessary, advanced planning creates its own challenges in potential data analysis and interpretation.

Isolation of microsatellite loci from the lesser long-nosed bat (*Leptonycteris curasoae yerbabuena*) and gene flow analysis between roosts in Arizona

Ramirez, Judith, Adrian Munguia, and Melanie Culver, judithrm@email.arizona.edu, School of Natural Resources, University of Arizona, Tucson, AZ*

The lesser long-nosed bat (*Leptonycteris curasoae yerbabuena*) is a nectarivore that migrates up to 1,500 km between wintering and breeding grounds. Females mate in southern Mexico, and migrate to maternity roosts in northern Mexico and southern Arizona to give birth. We isolated microsatellite enriched DNA and obtained 96 clone sequences, 46 of which had microsatellite repeats. We designed primers for 40 of the sequences and obtained ten polymorphic microsatellite DNA markers for the lesser long-nosed bat. Microsatellites can be used to resolve finer scale population differentiation, individual ID, as well as to determine the magnitude and directionality of gene flow. Consequently, we will use these markers to determine if significant

gene flow occurs between southwestern and southeastern Arizona roosts of the lesser long-nosed bat. In addition, we tested these markers on two other bats genus: *Leptonycteris nivalis* and *Choeronycteris mexicana*; therefore, these markers could also be used to resolve population genetic questions of *L. nivalis* and *C. mexicana*.

“Fix A Shaft Today (FAST!) Campaign”

Erinn Shirley, Abandoned Mine Lands Specialist, USDI BLM, Washington Office

The Bureau of Land Management, the US Forest Service, the National Association of Abandoned Mine Lands Programs, the National Mining Association, and Bat Conservation International have collaborated to form a voluntary partnership focused on mitigating dangers posed by open shafts and other abandoned mine lands (AML) hazards along off-highway vehicle trails and high-use areas in the southwestern states. Mine shafts on and near public lands pose serious hazards to outdoor enthusiasts. States in the southwest have experienced an unsettling increase in OHV deaths and accidents associated with open abandoned mine shafts. Through unique partnerships the *FAST!* Campaign quickly and effectively addresses mine shafts before accidents happen. Modeled after successes achieved by the BLM in Nevada, the *FAST!* Campaign encourages stakeholders, volunteers, industry, and state and local governments to partner with the BLM in AZ, CA, UT, CO, and NM, through the donation of time, labor, and equipment necessary to address the NEPA issues, claimant rights, and construction needed to close dangerous mine shafts on public lands.

Donating bats and tissue samples for genetic and oxygen isotope analyses

Nancy B. Simmons, Ariel Fleming, and Eileen Westwig, simmons@amnh.org, Department of Mammalogy, American Museum of Natural History, New York, NY*

Genetic and isotope studies provide unique data for understanding genetic diversity, geographic structure, population sizes, and migratory patterns of bats. This information is becoming critical for conservation efforts as bat populations are increasingly threatened by habitat loss, wind power development, and White Nose Syndrome (WNS). To facilitate ongoing research, the American Museum of Natural History is actively soliciting donations of bat specimens (including whole animals, tissue samples, hair samples, wing punches, or any combination of these) for archiving and use by researchers. We have established a website (<http://research.amnh.org/mammalogy/batgenetics/>) containing all the information necessary to donate specimens. The primary requirement is that samples be collected legally (copies of permits are required before we can accept samples). It is not necessary for donated specimens to be fresh (i.e., from live animals) – carcasses collected under wind turbines may be submitted, or samples from these specimens. We encourage individuals who are capturing bats for other reasons (e.g., ecological studies) to consider donating wing punches from their study animals. The AMNH will provide free tissue sample tubes and free shipping of specimens (either samples or whole animals) to individuals interested in contributing. We are particularly interested in samples from migratory tree bats (*Lasiurus*, *Lasionycteris*), species affected by WNS (e.g., *Myotis lucifugus*), and rare and endangered species (e.g., *Myotis sodalis*) because these taxa are the focus of current research efforts, but specimens of all taxa will be accepted. Donated specimens will be archived permanently and made available for use by qualified researchers from around the world.

Acoustic recording hardware and automated acoustic species classification using SonoBat
Joseph M. Szewczak, Humboldt State University, Arcata, CA

Joe Szewczak, SonoBat developer, will demonstrate acoustic recording hardware and automated acoustic species classification using SonoBat software.

WBWG 2009 BIENNIAL MEETING PHOTO GALLERY

Photos by Kristi DuBois



Aimee and Bat Woman.



Mexican free-tailed bats leaving the Congress Avenue Bridge.



Chris Corben demos the latest Anabat system.



Sage waits for orders from Ed Arnett to search for dead bats.



Bracken Cave BBQ--great food and friends.



Merlin Tuttle addressing the Western Bat Working Group.



Mexican free-tailed bats.



Bracken Cave bat emergence.



Lisa Wilkinson and Erin Baerwald demonstrate the Bat Handshake.