



# WBWG NEWS

Volume 7, Number 3

Fall 2012



White-throated round-eared bats (*Lophostoma silvicolum*) - Josè Gabriel Martinez Fonseca photo



# WESTERN BAT WORKING GROUP NEWSLETTER

Fall 2012

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

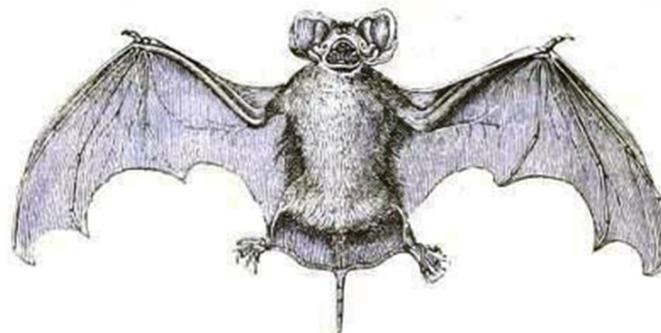


Membership in the WBWG is open to anyone who is interested in participating in bat conservation. There are no membership fees or dues. Funding for bat conservation work accomplished by the WBWG is generated by State and Federal land management agencies, non-governmental organizations, and by donations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

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

President	Angie McIntire
Vice President	Dave Johnston
Treasurer	Brad Phillips
Secretary	Rob Schorr
At-large representatives:	Amie Shovlain, Donald Solick

**Newsletter Editors:** Lorraine Andrusiak, Bronwyn Hogan



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

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



## WBWG NEWS

### New Co-editor of the WBWG Newsletter!

We'd like to welcome Bronwyn Hogan as new co-editor!

Bronwyn is a Wildlife Biologist with the US Fish and Wildlife Service Region 8 Renewable Energy Program. She is currently working on the Desert Renewable Energy Conservation Plan, but also becoming more involved in Service bat programs, including coordinating with refuge staff who are interested in setting up bat acoustic monitoring stations and moving into the Region 8 WNS coordinator position (as time allows).

She has a bachelor's degree in Wildlife Biology from UC Davis and a Master's degree in biology from CSU Sacramento, where she did her Master's thesis on bat activity in walnut orchards. Prior to her move to the US Fish and Wildlife Service this year, she worked for the California Department of Fish and Game's Renewable Energy program, where she focused on bats and wind energy issues.

## PRESIDENT'S CORNER

As we head into fall, planning for the April 2013 WBWG Biennial Meeting/Workshop is well underway. We'll meet at the beautiful Inn and Spa at Loretto in the Land of Enchantment - Santa Fe, New Mexico. What a great location this is going to be. Santa Fe is the oldest capitol city in the U.S. and I'm excited thinking about the history, culture, delicious southwestern food, gallery and museum options...oh, and of course the best part of all will be our conservation assessment of western bat species! A similar effort was undertaken back in 1998, when WBWG held a workshop in Reno, Nevada. The product of that workshop – Western Bat Species: Regional Priority Matrix – was intended to provide states, provinces, federal land management agencies, and interested organizations a better understanding of the overall status of western bat species by ecoregion. As decided at our 2011 Las Vegas WBWG meeting, it's time for an update. Emerging threats such as climate change, wind energy, and white-nose syndrome necessitate a re-evaluation of the existing matrix. In addition, our state of knowledge for many bat species has grown over the past 14 years, and it is important to evaluate, reassess and incorporate the latest biological information, not only to share that knowledge, but also to capture and build on it into the future.

In the next several months leading up to the Santa Fe Meeting/Workshop, we will reassess the conservation status of western bat species at a regional scale by applying NatureServe's methodology for assigning conservation status. The west will be broken down into nine Landscape Conservation Cooperative (LCC) regions. Nine regional teams will compile available information for eight core status rank factors – range extent, area of occupancy, population size, number of occurrences, number of occurrences or percent area occupied with good viability, overall threat impact, and short- and long-term trend. This information will be used to make status determinations for each species, using NatureServe's Rank Calculator. Our goal is to gather available data and complete these assessments prior to the Santa Fe meeting, where we will review and discuss the results, and make adjustments as needed.



We all know bats are a challenging group of creatures to study. At times it may seem like we know so little about most bat species. And yet, when we come together to share what we do know and where we need to focus attention on, the resulting collaborations advance our collective knowledge. As we undertake this assessment over the next several months, I encourage you all to participate, contribute, and be part of this effort that will result in a product that reflects our collective best understanding of the conservation status of bats in the west.

Sincerely,  
*Angie*  
Angie McIntire,  
President

## ELECTIONS

WBWG elections will soon be underway and we anticipate that the ballot will go out in December. Remember—each State/Province/Territory receives only ONE vote so it is essential that members send their vote to their respective State/Provincial representative. Also, those voting must be WBWG members. Instructions for obtaining membership, as well as information on elections, are located on our website at <http://www.wbwg.org/>

## STATE/PROVINCIAL UPDATES

### CANADA

#### **Canadian White-Nose Committee Meets to Draft National Action Plan**

On 16 – 18 Oct. 2012, just over 20 participants gathered in Ottawa to work on the first draft of the Canadian National Action Plans as outlined in the National Management Strategy, a document that was accepted by the Canadian Wildlife Directors last spring. These implementation plans mirror those of the US Plan with 6 working groups: Communications, Conservation and Recovery, Data Management, Diagnostics, Epidemiology, and Surveillance. Attending this workshop were 3 members of the US WNS Committee: Jeremy Coleman, WNS Coordinator USFWS; Scott Darling, Vermont Fish and Wildlife; Katie Gillies, Bat Conservation International, Imperiled Species Coordinator.

Ted Leighton, Director of Canadian Cooperative Wildlife Health Centre (CCWHC), will present the Action Plans to the Canadian Wildlife Directors in November 2012. As part of these plans, the group is requesting from the Wildlife Directors (provincial and federal directors) that a Canadian WNS Coordinator position be created at the CCWHC.

- submitted by Cori Lausen, Wildlife Conservation Society Canada; [clausen@wcs.org](mailto:clausen@wcs.org)





Canadian White-nose Syndrome committee. Photo by Michelle Jauvin

## Alberta

### Baseline Bat Work in Northern Alberta Continues

It was another busy field season conducting bat surveys in northern Alberta. We surveyed bats near Fort McMurray, Conklin, Wabasca and Peace River. We spent just under five weeks working on five different baseline surveys for Environmental Impact Assessments.

Standard mist netting and acoustic surveys were conducted at all five Project locations. In total we set nets up at 26 sites and collected data from 150 acoustic detectors throughout northern Alberta.

In total we captured 95 individual bats belonging to six different species while netting:

- *Eptesicus fuscus* (big brown bat) (1),
- *Lasiurus borealis* (eastern red bat) (4),
- *Lasionycteris noctivagans* (silver-haired bat)(25),
- *Lasiurus cinereus* (hoary bat) (3),
- *Myotis lucifugus* (little brown myotis)(30)and
- *Myotis septentrionalis* (northern myotis) (32).



We detected all the same species of bats with the acoustic detectors. Little brown, northern and silver-haired bats were detected at each of our study areas and at the majority of our detector locations. Hoary, red and big brown bats were not captured/detected as often.

In addition to our standard survey methods, Matrix has been swabbing each individual bat captured to collect DNA for species verification and to detect white nose fungus (*Geomyces destructans*). In certain cases, one swab and one wing punch are taken to compare the accuracy in determining species identification using the two methods. The hope is that in the future, we will only need to collect swabs from each individual

Eastern Red Bat



and can have the same data with less invasive methods.

To detect the presence of *G. destructans*, bat wings were swabbed with duplicate sterile dry cotton-tipped applicators. After swabbing, the applicators were shipped to the lab in individual sterile cases. Fungal DNA was extracted from the applicator tip, and probed for two different DNA regions specific to *G. destructans*. These regions were amplified by PCR (Chaturvedi et al. 2011; Lorch et al. 2010). To confirm that DNA was isolated from the swabs, a positive control PCR was performed that detected all fungi. Fungi were detected on all swab samples indicating that swabs had been collected in an appropriate manner.

Along with testing for *G. destructans* from DNA, one set of swabs were used for plating on agar medium. Sabourad-Dextrose agar plates, supplemented with chloramphenicol and gentamycin antibiotics to suppress bacterial growth, were used for culture. Plates were streaked with the dry swabs then incubated at 4°C in the dark for 30 days. Plates were examined for fungal growth at 20 and 30 days. Where fungal colonies developed on the plates, samples of each colony were examined microscopically in water mounts, using a Zeiss Axiocam 200 or 400X brightfield. Fungi were identified based on conidial morphology.

To date (not all swabs have been analyzed), the following has been detected:

1. *G. pannorum*
2. *Penicillium/Aspergillus* sp.
3. One sample of the order Mucorales

Our identification of *G. pannorum* corroborates the results found by Vanderwolf et al. (2012) that *Geomyces* species, which are not the pathogenic *Geomyces destructans*, are found on the external surface of bats.

Chaturvedi, V. and S. Chaturvedi. 2011. Editorial: What is in a name? A proposal to use geomycosis instead of white nose syndrome (WNS) to describe bat infection caused by *Geomyces destructans*. *Mycopathologia*. 171 (4):231-233

Lorch J.M., Gargas A., Uphoff Meteyer C., Berlowski-Zier B.M., Green D.E., Shearn-Bochsler V., Thomas N.J. and D.S. Blehert. 2010. "Rapid polymerase chain reaction diagnosis of White-Nose Syndrome in bats." *Journal of Veterinary Diagnostic Investigation*. 22: 224-230

Vanderwolf, K., McAlpine, D.F., Forbes, G and Malloch, D. 2012. The Pre-white-nose Syndrome, Mycological Flora Associated with Cave Hibernating Bats in New Brunswick, Canada (abstract). 41<sup>st</sup> Annual Meeting of the North American Society for Bat Research. Royal Ontario Museum, Toronto, Canada, October 26-29, 2011.

- submitted by Matrix Solutions Inc., Delanie Player, Kirsten Pinney, Lynsey Spry, Katerina Makos, Patti Swan and Cori Lausen, Calgary, AB

## USA

Multi-State SWG Grant: Western Coordinated Multi-State Response to a Deadly Emerging Threat: White Nose Syndrome in Bats (2011-2014)

This cooperative project between Arizona, California, Idaho, Nevada, Montana, Washington, and Bat Conservation International has provided grant money to the partner states to establish



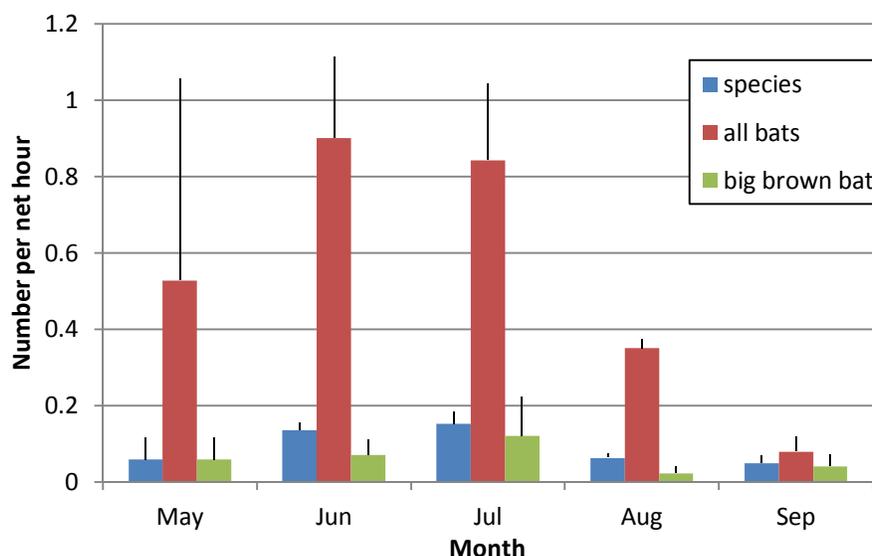
surveillance and various monitoring methodologies for white-nose syndrome. Funds are also being used for outreach, to work on white nose syndrome action plans, purchase and install data loggers in caves, conduct winter surveys at priority sites, collect soil samples to look for *Geomyces destructans*, deploy acoustic detectors to collect baseline activity data and detect winter bat activity, establish new white-nose syndrome information webpages, and hold coordination meetings with working groups and grottos.

## Arizona

### Flagstaff's diverse assemblage of bats – more than just big brown bats

Rabies is a highly fatal zoonosis that is transmitted by bite. The number of animal rabies cases increased significantly in Arizona during the past decade. This increase is linked to repeated spillover of rabies virus from big brown bats to striped skunks in Flagstaff. We are investigating interactions between these species in Flagstaff in rabies outbreak areas.

In the rabies outbreak area we captured bats on golf course ponds from May to October 2012 and located day roosts of big brown bats using radio telemetry. We captured a diverse assemblage of bats (254 individuals of 11 species; [Table 1](#)) including a lactating female bat listed by US Fish & Wildlife Service as a Sensitive Species, Allen's lappet-browed bat. The most common bat captured was the Arizona myotis, a close relative of the little brown bat (*Myotis lucifugus*), which commonly roosts in houses. Big brown bats were also commonly captured and represented 12% of our captures. Most captures of species and individuals occurred in June and July ([Figure 1](#)) when bats are reproductively active and form maternity colonies in northern Arizona. We had higher captures of big brown bats in May, June, and July and declines in capture rates in August and September.



**Figure 1. Number of species, individuals, and big brown bats captured per net hour (1 net hour = 1 6-m net open for 1 hour; mean  $\pm$  SE) during the reproductive season for bats in northern Arizona, 2012.**

We radio-tagged 20 of 30 big brown bats captured and monitored them for up to 14 days (when transmitters fell off). We also conducted exit counts at roosts. All bats used houses as roosts with the exception of one roost which was an artificial bat roost placed on the side of a house. Interestingly, all roosts were close ( $\leq 500$  m) to capture locations. We identified 16 roosts in 12



houses used by females. Males used 7 houses and never shared female roosts. During the 14-day period bats were tagged, bats used an average of 1.5 roosts. Maternity roosts averaged 30 individuals in May, June, and July (range 3 to 56) but for the single roost documented in August the number of individuals was low (n = 4), suggesting maternity colonies were dispersing.

Four of 10 bat roosts were positioned so that bats falling from roosts would contact the ground (as opposed to roof, wood pile or other inaccessible site) and thus be available for scavenging by carnivores. We placed mice (*Mus musculus*) carcasses on the ground below roosts for 2 weeks at these 4 bat roost sites and found that mice were removed at 2 sites. At one site mice were taken by a raccoon and a skunk, indicating potential for scavenging, contact, and rabies transmission by carnivores. If these roosts are representative, a rough estimate of bat-skunk contact rate could be based on the assumption that roughly 20% of roosts resulted in contacts. If a higher percentage of roosts were actually accessible for scavenging and all available roosts were visited, the number of bat-skunk exposures could increase substantially.

Next year we will again radio track bats to identify roosts (Figure 2). We will also track bats at night to develop home range estimates and for every bat captured, we will sample DNA to use in estimating populations of Arizona myotis and big brown bats.

- -submitted by Carol Chambers

**Table 1. Captures of bats from May – October 2012 in the rabies outbreak area of Flagstaff, Arizona.**

Common name	Species	# of females	# of males	Number captured	Percent of captures
Arizona myotis <sup>1</sup>	<i>Myotis occultus</i>	116	48	165	65.0
big brown bat	<i>Eptesicus fuscus</i>	21	9	30	11.8
long-legged myotis	<i>Myotis volans</i>	17	12	29	11.4
pallid bat	<i>Antrozous pallidus</i>	8	0	8	3.2
hoary bat	<i>Lasiurus cinereus</i>	1	5	6	2.4
long-eared myotis	<i>Myotis evotis</i>	4	2	6	2.4
Mexican free-tailed bat	<i>Tadarida brasiliensis</i>	1	3	4	1.6
western small-footed myotis	<i>Myotis ciliolabrum</i>	1	1	2	0.8
fringed myotis	<i>Myotis thysanodes</i>	2	0	2	0.8
Allen's lappet-browed bat	<i>Idionycteris phyllotis</i>	1	0	1	0.4
silver-haired bat	<i>Lasiionycteris noctivagans</i>	0	1	1	0.4

<sup>1</sup> Includes 1 individual of unknown sex



Figure 2. A big brown bat equipped with a radio transmitter prepares for flight.

## Nevada

Christy Klinger, Biologist in the Southern Region Nevada Department of Wildlife (NDOW) participated in several different mist net captures at Desert National Wildlife Range, Moapa National Wildlife Refuge and Las Vegas Wash. The “Bat Night at Moapa” was a public education event and there was a large attendance. Eastern Region NDOW Biologist, Jason Williams did extensive surveying of caves and mines for bats and collected samples of soil and guano for WNS testing. This survey included 12 caves and 50 abandoned mines. The Western Region NDOW Biologist, Jenni Jeffers surveyed 35 abandoned mines for bat use and 11 abandoned mines have been scheduled to have bat-compatible closures constructed this winter and spring.

During late August/early September a riparian bat study was done by Jenni Jeffers, George Baumgardner and two volunteers on one of the few intact cottonwood galleries along the Carson River in North-central Nevada. Fifteen bats were captured of eight different species, and six bats were fitted with transmitters, including two female *Lasiurus blossevillii*. One of the *L. blossevillii* was post lactating and she weighed a little over 14 grams. Bats were tracked for 3-11 days to record foraging activities, and day/night roosts. The two *L. blossevillii* roosted during the day just a few thousand feet from the capture site in some of the older age cottonwoods within the campground. The campground was occupied although not as active as in past years during the Labor Day holiday. At dusk we observed at least 35 *L. blossevillii* emerging from cottonwood trees in the campground. One female pallid bat used three different live cottonwood trees to day roost.

The BLM in Nevada constructed 98 bat-compatible closures on abandoned mines for the Federal fiscal year 2012. They conducted 167 bat specific surveys and 824 initial site inventories in the year. They also did hard closures on abandoned mines and environmental cleanups.

Ken Maas reports that the US Forest Service in Nevada installed 27 bat compatible closures (gates, grates and culvert gates) in the Ely area and Santa Rosa Mountains. He had bat surveys completed on another 65 features in the Manhattan/Belmont, Ellsworth area and Gabbs.

During 2012 Mike Visher from Nevada Division of Minerals (NDOM) reports that they paid for, and Environmental Protection Services (EPS) built, two bat gates and one cupola in Washoe County and one gate in Lyon County.

- Compiled by Jenni Jeffers, NDOW Biologist, Nevada, NVBWG co-chair



## New Mexico

### **Bosque Wildlife & Habitat / Lincoln National Forest**

Quentin Hays, wildlife biologist and owner of Bosque Wildlife and Habitat (and Assistant Professor at Eastern New Mexico University – Ruidoso) continued bat population survey and monitoring efforts for the Lincoln National Forest in southern New Mexico. Several sites on the Smokey Bear District and the Sacramento District continued to be monitored seasonally as part of long-term survey efforts. Unfortunately, several sites on the Smokey Bear District were damaged during the Little Bear Fire and subsequent large-scale flood events, including a wetland site in Littleton Canyon that was previously restored (for bat habitat) and for which the group was given a Wings Across the Americas award in 2010. Notable records included Eastern Red Bats (*Lasiurus borealis*) in the Sacramento Mountains, an apparent range expansion or previously unrecorded locality, as well as bat occupancy/use at previously un-surveyed caves (also in the Sacramento Mountains). On the Guadalupe District, in conjunction with the Lincoln National Forest Cave Specialist, White-Nose Syndrome surveillance efforts were implemented. This work was initiated by several internal cave surveys by biologists who accompanied the cave specialist, and will continue to be conducted internally by the Lincoln National Forest. USFS biologists who contributed to or assisted with this work include: Jack Williams (Sacramento District Biologist), Larry Cordova (Smokey Bear District Biologist), Rhonda Stewart (Forest Biologist), Jason Walz (Cave Specialist), Ryan Jonnes (Sacramento District) and Reuben Gay (Sacramento District).

### **Bat Data Logger Testing**

This fall/winter the Lincoln National Forest will partner with the US Forest Service's San Dimas Technology & Development Center to test and demonstrate the efficacy and cost-effectiveness of using bat data loggers. The intent of the demonstration is to test the ability of bat data logging devices to monitor bat activity and environmental conditions within the bat hibernaculum and to monitor nightly and/or seasonal bat activity to and from the cave (ingress and egress).

The partners plan to test at least two bat data logging devices in caves on the Lincoln National Forest: the Bat Logger II manufactured by Tony Messina and the recently released AnaBat Roost Logger manufactured by Titley Scientific. For more details contact: Jason Walz of Lincoln National Forest (JAWalz@fs.fed.us) or Rey Farve of SDTDC (RFarve@fs.fed.us).

### **DOD Surveys**

The Department of Defense Legacy Program has, for the past two years, funded an extensive and comprehensive roost survey and documentation effort across all of New Mexico's DoD lands. To date, the project has surveyed over 700 abandoned mine and natural cave features with most of the effort being concentrated on White Sands Missile Range (WSMR). Bat Conservation International working in a close partnership with DoD personnel will be helping the resource managers at DoD installations update or revise their Integrated Natural Resource Management Plans (INRMP) to account for best practices when managing bat roosts, largely subterranean bat roosts. The project has one more year left in which to wrap up field efforts and focus on management recommendations. Many important roost sites have been located during the course of this work and will be protected due to the survey efforts.

### **Bridge Monitoring for Bat Use**

NMDGF is funding Justin Stevenson of RD Wildlife Management to conduct monitoring of bridges and their use by bat species as roosts in the middle Rio Grande Valley over a 12-month period. His project began this spring. He is looking at bat species composition, roost



microhabitat, changes in thermal regimes within bridges, and seasonal changes in bat numbers and species at roosts.

## South Dakota



**Eager participants at the Bat Festival.**

The 7<sup>th</sup> Annual 'Bat Festival' hosted by SD Bat Working Group was held August 18<sup>th</sup>. The festival continues to grow and as always is a fun event with activities for kids and adults. It's held in Custer State Park in the southern Black Hills. Planning for next year's event has already started.

The SDBWG 'Bat Books for schools' program continues and a few more sets of books awarded to elementary schools across the state. SDBWG members also did bat education presentations to schools and civic groups, and installed a few bat boxes.

The Black Hills National Forest, working with SDBWG and the Paha Sapa Grotto, has started a program to monitor for WNS. Temp/Rh data loggers were also installed this summer in a dozen caves known to be bat hibernation sites. The Rocky Mountain Region of the Forest Service is still under an Emergency Cave Closure Order.

- by Brad Phillips



**A cave closure is in effect in the Rocky Mountain Region.**

## Texas

The Republic of Texas has been ramping up bat survey efforts through key partnerships. This summer, Texas Parks and Wildlife and Bat Conservation International partnered to conduct summer roost surveys for *Myotis austroriparius* and *Corynorhinus rafinesquii*. Field surveys were conducted in early July at 13 sites with assistance from USFWS personnel and private landowners. A total of 502 individual bats were documented. This survey effort contributes to one of Texas's only long term bat datasets. Currently, an analysis and report of this 18 year dataset is contracted and should be completed this month. As these two species are rare on the Texas landscape, this report will help resource managers direct limited resources for conservation priorities.



***Corynorhinus rafinesquii* artificial roost.**

The Texas Parks and Wildlife Department currently has 2 Requests for Proposals out which specifically address bat conservation needs. Wildlife Conservation Grants from TPWD and



Section 6 Traditional Grants from TPWD both seek to expand survey and monitoring efforts for *Geomyces destructans* and White-nose Syndrome as well as collating cave and karst environmental baseline and trend data in the state. Projects that meet these goals will help Texas meet objectives in their Wildlife Action Plan as well as contribute to a national WNS surveillance effort.

*Submitted by: Katie Gillies, Bat Conservation International*

## Utah

Our annual “Bat Blitz” is held to help fill in data gaps in under-surveyed areas of the state. This year, eleven biologists and volunteers met in the Raft River Mountains of northwestern Utah with their nets and acoustic gear. Highlights included one potential acoustic record for a spotted bat.

An acoustic inventory training workshop led by Janet Tyburec was held in Escalante. It was an excellent opportunity for biologist to gain and improve their detector placement and call analysis skills.

Utah received \$25k of White-Nose Grants to States funding. That money was used to support summer monitoring efforts and will be applied to hibernacula monitoring this winter.

Biologist with the Utah Division of Wildlife and partners conducted acoustic surveys at our 65 long-term monitoring sites. Additional netting and acoustic work was completed improve our knowledge of species distribution and habitat associations.

- *Kimberly Asmus Hersey, Utah Division of Wildlife Resource*

## Washington

- *compiled by Greg Falxa*

### **USFWS Region 1, Eastside Refuges Acoustic Bat Inventory**

In summer 2012, the USFWS I&M Initiative began an acoustic inventory of bat species on select National *Wildlife* Refuges in Region 1. The project was conducted on 13 refuges in eastern Washington, eastern Oregon, and Idaho (Figure 1). A sampling scheme based on the OR/WA Bat Grid was used to select sample locations on refuges. Pettersson D500x bat detectors were deployed adjacent to water features and left for 7 nights at a time. Timers were set to record from sunset to 3.5 hours after sunset. SonoBat 3.05 was used to automatically classify call files and calls are being verified by an experienced bat biologist. Sampling will continue in 2013, and 4 additional refuges are planning to participate.

Bat detectors were deployed at 64 locations. Over 64,000 files were analyzed using SonoBat software and over 16,000 were automatically classified to species. A total of 14 species were detected on the refuges. The study also provides data on summer bat activity, which provides a baseline to site occupancy and activity data for future monitoring, especially in light of White-nose Syndrome.



SPECIES	Camas	Cold Springs	Conboy Lake	Deer Flat	Grays Lake	Hart Mountain	Kootenai	Little Pend Oreille	Malheur	McKay Creek	Minidoka	Toppenish	Umatilla
	NUMBER OF 7 NIGHT DEPLOYMENTS												
	4	3	4	2	3	2	5	9	3	3	4	4	9
<i>Antrozous pallidus</i>	D*												
<i>Corynorhinus townsendii</i>							D				D		
<i>Eptesicus fuscus</i>	D		D	D	D		D	D	D		D	D	
<i>Lasiurus blossevillii</i>									D				
<i>Lasiurus cinereus</i>	D	D	D	D	D		D	D	D	D	D	D	D
<i>Lasionycteris noctivagans</i>	D	D	D	D	D	D	D	D	D	D	D	D	D
<i>Myotis californicus</i>	D		D				D	D	D	D	D	D	D
<i>Myotis ciliolabrum</i>	D	D	D		D		D	D	D	D	D	D	D
<i>Myotis evotis</i>			D		D	D	D	D	D		D		D
<i>Myotis lucifugus</i>	D	D	D	D	D	D	D	D	D	D	D	D	D
<i>Myotis thysanodes</i>			D		D		D	D			D		
<i>Myotis volans</i>			D		D		D	D	D	D	D		
<i>Myotis yumanensis</i>	D	D	D	D		D	D	D	D	D	D	D	
<i>Parastrellus hesperus</i>									D			D	D

\*D = detected at that refuge based on preliminary classification from SonoBat software. Highlighted values represent rare species or species detected out of their range. These calls will be scrutinized during the verification process.

- Jenny Barnett, Zone Inventory and Monitoring Biologist ([jenny\\_barnett@fws.gov](mailto:jenny_barnett@fws.gov)), assisted by Refuge biologists and staff

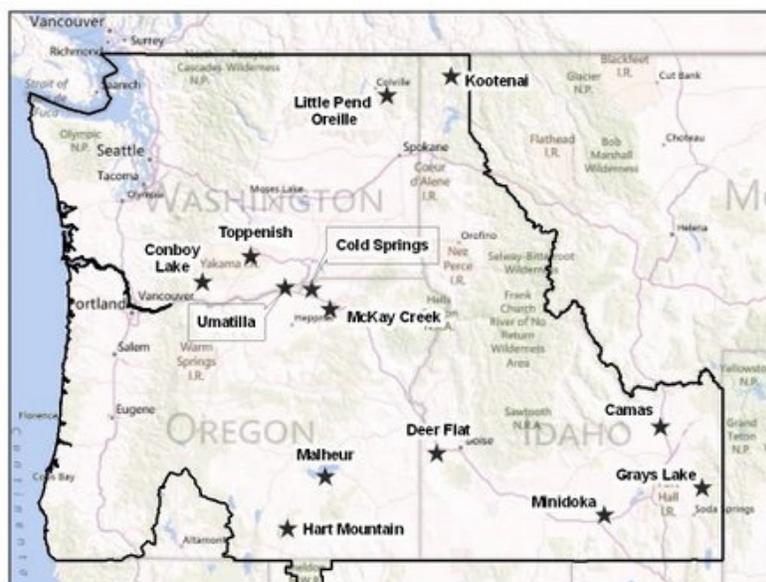


Figure 1. Location of National Wildlife Refuges acoustically sampled for bats during summer, 2012. Refuges participated in the Eastside Refuge Acoustic Bat Inventory, coordinated by the USFWS Region 1 Inventory and Monitoring Initiative.



## Hibernation Chamber Protected at Boulder Cave

Thanks to the help of numerous Naches District employees, volunteers, WDFW employees and the expertise of Jim Nieland, we were able to install a long awaited bat gate at Boulder Cave. This gate will provide much needed protection to hibernating Townsend's big-eared bats through the elimination of winter disturbance.

Boulder Cave provides a winter roost site to one of the largest known Townsend's big-eared bat populations in eastern Washington. The cave presents wildlife management challenges, since it is a developed recreation site, receiving over 30,000 summertime visitors each year.



With the assistance of wildlife and recreation experts, a long term management strategy was started in 1995 to protect and enhance bat use while maintaining recreational access. The cave offers a special opportunity for public education. The Naches Ranger District has developed a program to educate the public on the ethics of caving; bat ecology and WNS. The program includes on-site interpretive programs for schools and visitors to the cave. Interpretive signs at the trailhead describe the importance of bats and threats they face.

### **Welding gate.**

Boulder Cave was once used by a large Townsend's big-eared bat maternity colony. Dalquest documented seeing hundreds of pregnant Townsend's big-eared bats in Boulder Cave. After an access trail was constructed to the cave by the CCC in the mid 30's, numbers dropped to less than 75 females. Presently Boulder Cave is not used as maternity roost.

Management actions attempt to protect hibernating bats from human disturbance and provide a protected area for maternity use if the bats are so inclined to use it. Winter hibernation surveys have shown a steady increase in bat numbers.

### Management highlights:

- 1993: a gate was installed on the Boulder Cave access road, ½ mile from the cave. The gate is closed summer nights and during the bat hibernation season.
- 1995: an area closure order was instituted closing the cave and trail between November 1 and April 1. In 2011 this closure period was increased from October 1 through April 31.
- September 1997: two bat-friendly gates were installed to close off the suspected maternity roost site.
- January bat surveys have taken place at Boulder Cave yearly since 1990 and Townsend's numbers have gradually increased. During the late 1980's numbers were in the lower 40's; by the mid 1990's they had increased to 70. In 2005 they had increased to 85 and in 2012 over 100 Townsend's big-eared bats were counted. Even though closures were in place, people continued to access the cave during the winter months.
- By 2009: winter surveys identify a small side chamber where 60% of bats hibernate.
- 2010: bat experts meet to review management. Protection of the hibernation chamber was identified.



- September 2012: a new bat gate is installed to protect the hibernation chamber.



**Boulder Cave gate.**

Funding for the bat gate project was provided by Pacific Northwest Regional Office of the U.S. Forest Service and Oregon/Washington State Office of the Bureau of Land Management Interagency Species Status/Sensitive Species Program. A special thanks goes to the many volunteers and agencies and employees who made the project possible: Ella Rowan, Peter Forbes, Gary Wiles, Chris Anderson, Laurie Ness, Patrick Paulson, Jim Nieland, Joan St. Hilaire, Cary Henning, Kevin Hill, Jacob VanVleck, Doug Rohl, Monica Kim, Jake Wilcox, Angie Niebuhr, Lindsay Boutillier, and Lindsey Lenox.

- *Joan St. Hilaire, USFS, Naches District*

### **Bats Northwest: A Unique Organization**

Bats Northwest is a not-for-profit organization formed in 1996 by scientists, educators, and interested lay people to help protect Pacific Northwest bat populations through education and research. Bats Northwest (BNW) maintains an excellent web site <<http://www.batsnorthwest.org>>. BNW puts out several quality newsletters each year, back issues can be found on the web site (for folks interested in Pacific Northwest bats, I highly recommend John Bassett's article in the summer/fall 2011 issue titled "*Update on the Status of the Western Red Bat in Washington State: Death of an Urban Legend?*").



**BNW volunteers at Crescent Lake Wildlife Management Unit prior to a night acoustic survey.**

The BNW web site provides numerous resources for bat conservation and education; BNW has assisted with the Washington Bat Grid surveys, organizes and leads 8 or more summer bat walks at an urban lake in Seattle, and the organization has a booth at the annual 5-day Flower and Garden Show in Seattle. Bats Northwest membership includes bat rehabilitation experts, researchers, private and government wildlife biologists, and educators. Meg, Barb, and John are familiar faces at WBWG and NASBR meetings.

This past summer Chris Anderson of Washington Department of Fish and Wildlife (WDFW) organized a series of acoustic bat surveys with strong involvement from volunteers from Bats Northwest. Three WDFW Wildlife Management Units (WMU) in Lower Snoqualmie Valley (east of Seattle) were surveyed: the Stillwater, Cherry, and Crescent Lake WMUs. Surveys were conducted via manual "active" recordings by multiple teams equipped with a Pettersson D240x detectors and an iRiver recorder. Each of the three sites was surveyed during June, July, and August by doing area searches on foot. The recordings are now being examined by Bats Northwest members who have been learning call analysis from a couple of the bat acoustic 'techs' in the group. Food-inspired social events have turned into planning and training sessions. Check out the web site if you get a chance!

- *Greg Falxa, BNW member*



## Factors Affecting the Foraging Activity of Bats over Wetlands

Foraging animals face decisions about when and where to forage and these decisions are mediated in part by prey availability. For temperate insectivorous bats, prey availability fluctuates temporally as well as spatially. Wetlands are an important component of bat foraging habitat because they contain high abundances of insects. However, insect densities are typically patchy in distribution because species exhibit differential flushes in response to biotic (e.g., species phenology, macrophyte communities) and abiotic (e.g., water depth and temperature, hydroperiod) factors. This past summer, I conducted my graduate research at Turnbull National Wildlife Refuge (TNWR) in Cheney, Washington. With over 180 wetlands and 12 bat species (including several Washington priority species), TNWR provided an ideal location to examine what biotic and abiotic factors affect bat foraging over wetlands. I chose 12 wetlands as study sites and sampled each 3 times throughout the summer. To measure insect abundance at my sites, I used a combination of aquatic emergence nets, pan traps, and sticky nets. Each site contained 10 stations with each type of trap. I used acoustic monitoring equipment to record bat activity on same nights when I was collecting insects. I will use the recorded bat calls to gain a relative measure of foraging activity by counting the number of feeding buzzes each night. I also recorded water temperature, water depth, abundance of emergent vegetation, presence/absence of fish, and hydroperiod at each site. I am currently in the process of identifying the insects I collected and analyzing the acoustic recordings. I hope to have results to share by the spring! In the long run, by evaluating what factors influence bat foraging, my study will help identify quality habitat for conservation purposes.

- Sarah Stankavich, Eastern Washington University

## Wolf Haven Prairie-Oak Habitat Restoration - Update



In the Spring 2012 WBWG Newsletter we reported on the bat habitat enhancement and public education work underway Wolf Haven in partnership that includes USFWS and CNLM on 40 acres of native prairie-oak habitat in rural western Washington State. The Year of the Bat was highlighted during summer evening 'howl-in' events, and included a table with the ever popular 'guano station:' a microscope and 3 types of guano -- from moth, fly, and beetle specialists.

Six custom bat houses were constructed and installed during March 2012, and interpretive signs are in production. In addition to four standard flat boxes, the 6 new pole-mounted houses had bat use this first summer, including occasional counts of 30-50 myotis bats day-roosting in the large nursery box. Three dual-chambered rocket boxes of the BCI design had varying amount of use, and unattended acoustic monitoring indicated a large amount of bat activity near the array of 2 'rockets' and the large nursery box, which may indicate use as night roosts as well as the documented day roosting. The maternity roost box which we've installed will help provide some replacement to the loss of snags and other natural roost habitat in the local area.

- Submitted by Sanders Freed, Center for Natural Lands Management (CNLM)



## WESTERN BAT WORKING GROUP TO MEET IN SANTA FE

The Western Bat Working Group is pleased to announce the 2013 Western Bat Working Group Biennial Meeting to be held April 1-4 2013 at the Inn at Loretto in Santa Fe, New Mexico.

The WBWG meeting will begin with an opening reception on Monday evening. The conference will feature several invited speakers, and three days of facilitator-run workshop where we will review and update the Western Bat Species: Regional Priority Matrix. During the conference there will be an acoustic workshop which will demonstrate hands on state-of-the-art workflow solutions available from Binary Acoustic Technologies, Pettersson, Titley, and Wildlife Acoustics. We will also have a poster session, banquet, and special auction on Wednesday evening. The meeting will conclude at 5 p.m. on Thursday. After the conference, on April 4-6, Wildlife Acoustics will be holding a Song Meter SM2BAT+ and Echo Meter EM3 training class.



Since the development of the first Western Bat Species Regional Priority Matrix in 1998, emerging threats such as climate change, wind energy, and WNS necessitate a reevaluation of the matrix. In addition, better methodology for assessing species' status allow more consistent, repeatable, and transparent ranking. To update the matrix, WBWG will reexamine the status of western bat species by applying NatureServe's methodology for assigning conservation status ranks. We will assess species' status within each of the eight western Landscape Conservation Cooperatives (LCCs). For each species, regional teams will compile available

information for eight core status rank factors. The initial assessment will be presented for review and discussion during the April 2013 WBWG Biennial Meeting.

Located at 7,000 feet in the southern Rocky Mountains, Santa Fe is one of the great destination cities of the world. There are numerous art galleries and museums in Santa Fe, and culinary enthusiasts can find great restaurants in every price range. The city lies on the edge of the Santa Fe National Forest and 320,000 acres of wilderness, which offers skiing, hiking, fishing, mountain biking, river rafting, horseback riding, hunting, camping and outdoor adventures. The rich multi-cultural history, mild climate and clean air make the area a delightful experience.



A more detailed circular of information and online registration will be available in December. <http://www.wbwg.org/business/biennialmeetings/2013/2013WBWGmeeting.html>

We hope to see you in Santa Fe!

During the conference there will be an acoustic workshop which will demonstrate hands on state-of-the-art workflow solutions available from Binary Acoustic Technologies, Pettersson, Titley, and Wildlife Acoustics. For preliminary details contact John Chenger <[jchenger@batmanagement.com](mailto:jchenger@batmanagement.com)> of Bat Conservation and Management.



## AUCTION ITEMS NEEDED FOR APRIL 2013 WBWG MEETING

In past WBWG meetings, we had a fun fundraiser thanks to the generous donations of our members and vendors. To keep this great tradition going, we need your help. Please contribute an item or service for our raffle and/or auction for the April 2013 biennial WBWG meeting in Santa Fe. Contact Marikay Ramsey ([marikayr@blm.gov](mailto:marikayr@blm.gov)) with what you can contribute. We will have an address in Santa Fe where you can send the item to in March if you don't want to carry it to the meeting. Thanks in advance for your generosity.



## SONGMETER TRAINING COURSE AT THE WBWG MEETING

[Wildlife Acoustics](#) is donating an [Echo Meter EM3](#) handheld bat detector and training session in support of the **Bob Berry Scholarship fund**.



After the conference, on April 4-6, Wildlife Acoustics will be holding a Song Meter SM2BAT+ and Echo Meter EM3 training class.

**Course Description:** Conducted by Dr. Cori Lausen of Birchdale Ecological ([corilausen@birchdalebc.ca](mailto:corilausen@birchdalebc.ca)), **The Wildlife Acoustics Bat Detector Training Course** will provide background on the principals of bat echolocation, hands-on experience with the [SM2BAT+ and EM3](#), and discussion of the various software components for configuration and analysis. Topics will include:

- Understanding bat echolocation – properties of sound, effects of clutter, etc.
- Principles of bat detector technology
- Basics of bat species identification – pulse shapes and terminology
- Principles of passive and active monitoring
- How to use and program the SM2BAT+
- How to use the EM3
- Software for obtaining recordings – WAC, WAV, WAC2WAV and the Configuration Utility Software
- Basics of analyzing recordings – Zero-Crossing and Full Spectrum



**Sign up now because seating is limited.**

Contact [sales2012@wildlifeacoustics.com](mailto:sales2012@wildlifeacoustics.com), **sign on today** or call **+1 978-369-5225** for more information.



## LARGE FOREST PATCHES INCREASE BAT SPECIES DIVERSITY IN A FRAGMENTED LANDSCAPE IN NICARAGUA

- by Carol Chambers

Tropical dry forests supply important ecological and economic benefits. However, threats to forests in Central America such as resource extraction and forest conversion to other land uses



**Figure 1.** Pale-faced bat *Phylloderma stenops* with Arnulfo Medina and Carol Chambers.

(e.g., agriculture) often result in a fragmented landscape. We surveyed bats on the Paso del Istmo of southwestern Nicaragua. This isthmus, between the Pacific Ocean and Lake Nicaragua, is considered an important passageway for migrating wildlife. Our objective was to increase knowledge of bats and determine impacts of forest fragmentation on bats. We mist netted bats for 35 nights during the dry season (December 2011 – January 2012) and captured 1476 bats representing 44 species. We recorded a new species for Nicaragua - pale-faced bat [*Phylloderma stenops*] (Figure

1) - and range extensions for at least 2 species, chestnut short-tailed bat (*Carollia castanea*), and white-throated round-eared bat (*Lophostoma silvicolum*; Figure 2).

Three species (Jamaican fruit-eating bat [*Artibeus jamaicensis*], Seba's short-tailed bat [*Carollia perspicillata*], common vampire bat [*Desmodus rotundus*]) that are associated with altered forest landscapes (logged or farmed) accounted for 50% of all the bats we captured. Only 5% of captures represented the forest-associated subfamily Phyllostominae. We compared



**Figure 2.** White-throated round-eared bat by José Gabriel Martínez Fonseca

capture rates of individuals and species (number per net hour) to fragmentation indices for capture locations using FRAGSTATS. Capture rates of individuals were higher in areas with extensive young forest but captures of species was positively related to total landscape edge and density of mature forest patches. Despite their scarcity on this landscape, mature forest patches helped maintain a more diverse bat assemblage. Increasing patch size and connectivity will benefit forest-associated bats.

Our team of 16 volunteers from the US and Canada with our Nicaraguan colleagues captured this female pale-faced bat, the first capture for the species in Nicaragua. This gives us hope that mature forest fragments provide habitat for forest-associated bats like this species.



Captures of two species, the chestnut short-tailed bat and white-throated round-eared bat (Figure 2), extend known ranges of these species indicating the importance of Nicaragua's Paso del Istmo as habitat. Our radio telemetry work in June 2012 proved that reproductive groups of white-throated round-eared bats use arboreal termite nests as roosts as they do elsewhere in Central America.

## ANNOUNCEMENTS

### **Post-doctoral position – Bridging the Gap between Renewable Energy Solutions and Bat Conservation in Arizona**

The School of Forestry seeks a Post-Doctoral Scholar to conduct work on population genetics of Arizona bat populations in relation to wind power development. The Post-Doctoral Scholar will work under the mentorship of Dr. Carol Chambers (Forestry) and Dr. Jeff Foster (Biological Sciences). Molecular genetic approaches to investigate scientifically intractable species, such as bats, have recently come of age, and provide an effective means to understand basic ecology and populations. This project will dovetail novel genetic analyses for estimating bat population sizes and migration routes with GIS-based landscape genetic and species distribution models, thereby generating more realistic mitigation thresholds for wind energy developers.

This job is for 2 years at \$50,000/year plus full benefits. The work will be done in the School of Forestry at Northern Arizona University in Flagstaff, Arizona. Applicant should have: (1) an earned PhD in the field of biology with expertise in molecular genetic approaches by the time of appointment, (2) a publication record in biology and genetics, (3) experience with collaborative interdisciplinary research, (4) a strong interest in this topic, and (5) availability to start January 2, 2013. For more information, contact Carol Chambers, Professor, School of Forestry, Northern Arizona University, Flagstaff AZ 86011-5018 USA; Phone: 928-523-0014; E-mail: [Carol.Chambers@nau.edu](mailto:Carol.Chambers@nau.edu)

*Be a part of it! Unravelling the mysteries of bat migrations and winter hibernation:*

### **Western Acoustic Monitoring Initiative**

There is of course a growing urgency to determine bat migration routes and hibernacula. The WBWG, USFWS and USFS are working together for a broad-scale approach to filling in these knowledge gaps. Currently there is a core group of individuals meeting to discuss strategy, how best to network those doing bat acoustic monitoring in western US and Canada, and how to move forward with a database. This Western Acoustic Monitoring Initiative is in its early stages, but the goal is to network everyone doing long term bat acoustic monitoring in the West. A database will facilitate visualization of large scale patterns that will hopefully elucidate important bat migration routes or features, and provide insight into where the various species may be congregating/migrating for mating and hibernation in Western North America. If you are doing long term acoustic monitoring of bats in the West and would like to be part of this network, please fill out the form that can be found at:

<http://dl.dropbox.com/u/52367482/ACOUSTIC%20MONITORING.Western%20Contacts.March2012.xlsx> and contact [Karen.bleiwas@alaska.gov](mailto:Karen.bleiwas@alaska.gov)



## New tools for long-term passive monitoring:

Titley's new RoostLogger, installed in an abandoned mine in B.C. This new inexpensive detector enables mines, caves, buildings, bridges, and more to be monitored for use by bats long term. This unit can sub-sample throughout the day/night for 6 months running on 4 internal D batteries.



Wildlife Acoustics SM2BAT+ recording near a small water body that stays open year-round in the BC Interior. In zero-cross mode, this detector can monitor continuously from dusk to dawn for one month using 4 internal D batteries.

- Cori Lausen, Wildlife Conservation Society Canada,

[info@batsRus.ca](mailto:info@batsRus.ca)

## PDF CORNER

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

Alsheimer, Laura. 2011. The Effect of Artificial Night Lighting on the Little Brown Bat (*Myotis lucifugus*). M. Sc. Thesis. State University of New York at Fredonia. <http://dspace.sunyconnect.suny.edu/bitstream/handle/1951/57866/Alsheimer.pdf>

Grol, B.P.F.E., A. M. Voûte, and B. Verboom. 2011. The influence of a Christmas market on hibernating bats in a man-made limestone cave. *Lutra* 54 (2): 69-88. [http://zoogdierwinkel.nl/sites/default/files/imce/nieuweweb/Publicatie%20fotos/Lutra/downloads/Lutra\\_54\\_2.pdf#page=6](http://zoogdierwinkel.nl/sites/default/files/imce/nieuweweb/Publicatie%20fotos/Lutra/downloads/Lutra_54_2.pdf#page=6)

Silvis, A., W. M. Ford, E.R. Britzke N.R. Beane and J. B. Johnson. 2012. Forest succession and maternity day roost selection by *Myotis septentrionalis* in a mesophytic hardwood forest. *International Journal of Forestry Research*, vol. 2012, Article ID 148106, 8 pages, 2012. doi:10.1155/2012/148106. <http://downloads.hindawi.com/journals/ijfr/2012/148106.pdf>

Langwig, K. E., W. F. Frick, J. T. Bried, A. C. Hicks, T. H. Kunz, A. Marm Kilpatrick. 2012, Sociality, density-dependence and microclimates determine the persistence of populations suffering from a novel fungal disease, white-nose syndrome. *Ecology Letters* 15: 1050–1057. <http://bio.research.ucsc.edu/people/kilpatrick/publications/Langwig%20et%20al%202012%20Ecology%20Lett.pdf>

Reeder DM, Frank CL, Turner GG, Meteyer CU, Kurta A, et al. 2012 Frequent arousal from hibernation linked to severity of infection and mortality in bats with White-Nose Syndrome. *PLoS*



ONE 7(6): e38920. doi:10.1371/journal.pone.0038920 .  
<http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0038920>

Jonasson, and C. Willis. 2012. Hibernation energetics of free-ranging little brown bats. Journal of Experimental Biology. 215, 2141-2149.  
[http://www.willisbatlab.org/uploads/8/0/0/6/8006753/jonasson\\_and\\_willis\\_2012\\_hibernation\\_energetics.pdf](http://www.willisbatlab.org/uploads/8/0/0/6/8006753/jonasson_and_willis_2012_hibernation_energetics.pdf)

Papadatou,E. Carlos Ibáñez, Roger Pradel, Javier Juste and Olivier Gimenez. 2011, Assessing survival in a multi-population system: a case study on bat populations. Oecologia 165( 4): 925-933. <http://www.springerlink.com/content/hqv7642282751252/>

Brownlee, S. 2011. Altered Behavior in Bats Affected by White-Nose Syndrome. M. Sc. Thesis, Bucknell University. [http://fedora.bucknell.edu:8080/fedora/get/bu-dl:sab045\\_2011/VIEW](http://fedora.bucknell.edu:8080/fedora/get/bu-dl:sab045_2011/VIEW)

Voigt, C.C., K. Schneeberger, S. L. Voigt-Heucke and D. Lewanzik. 2011. Rain increases the energy cost of bat flight. Biol. Lett. 23 vol. 7 no. 5 793-795.  
<http://rsbl.royalsocietypublishing.org/content/7/5/793.full>

## UPCOMING EVENTS

### USA

WBWG Conference 2013 - April 2-4, 2013, at Santa Fe.  
<http://www.wbwg.org/business/biennialmeetings/2013/2013WBWGmeeting.html>

North American Wildlife and Natural Resources Conference - March 25-30, 2013, Arlington, Virginia.  
[http://www.wildlifemanagementinstitute.org/index.php?option=com\\_content&view=article&id=348&Itemid=61](http://www.wildlifemanagementinstitute.org/index.php?option=com_content&view=article&id=348&Itemid=61)

The Wildlife Society (Western Section), Jan. 28-Feb. 3, 2012, Sacramento, CA  
[http://joomla.wildlife.org/western/index.php?option=com\\_content&task=view&id=220&Itemid=350](http://joomla.wildlife.org/western/index.php?option=com_content&task=view&id=220&Itemid=350)

National Wildlife Rehabilitators Association (NWRA 2013 Annual Symposium, March 5 to March 9 in Portland, Oregon. <http://www.nrawildlife.org/content/exhibitor>

Western Association of Fish & Wildlife Agencies, January 3 - 6, 2013, Tucson, AZ.  
<http://www.wafwa.org/2013/Winter/index.html>

### ELSEWHERE

9th International Conference on Behaviour, Physiology and Genetics of Wildlife 2013. Sept. 18-21, 2013. University of Freiburg, Germany. <http://www.wildlife.uni-freiburg.de/events-1/izw2013>

Conference on Wind Power and Environmental impacts - Effects on Human Interests, Wildlife, and Nature, 5 February - 7 February 2013, Stockholm, Sweden.  
<http://www.business-biodiversity.eu/default.asp?Menu=25&Termin=278>