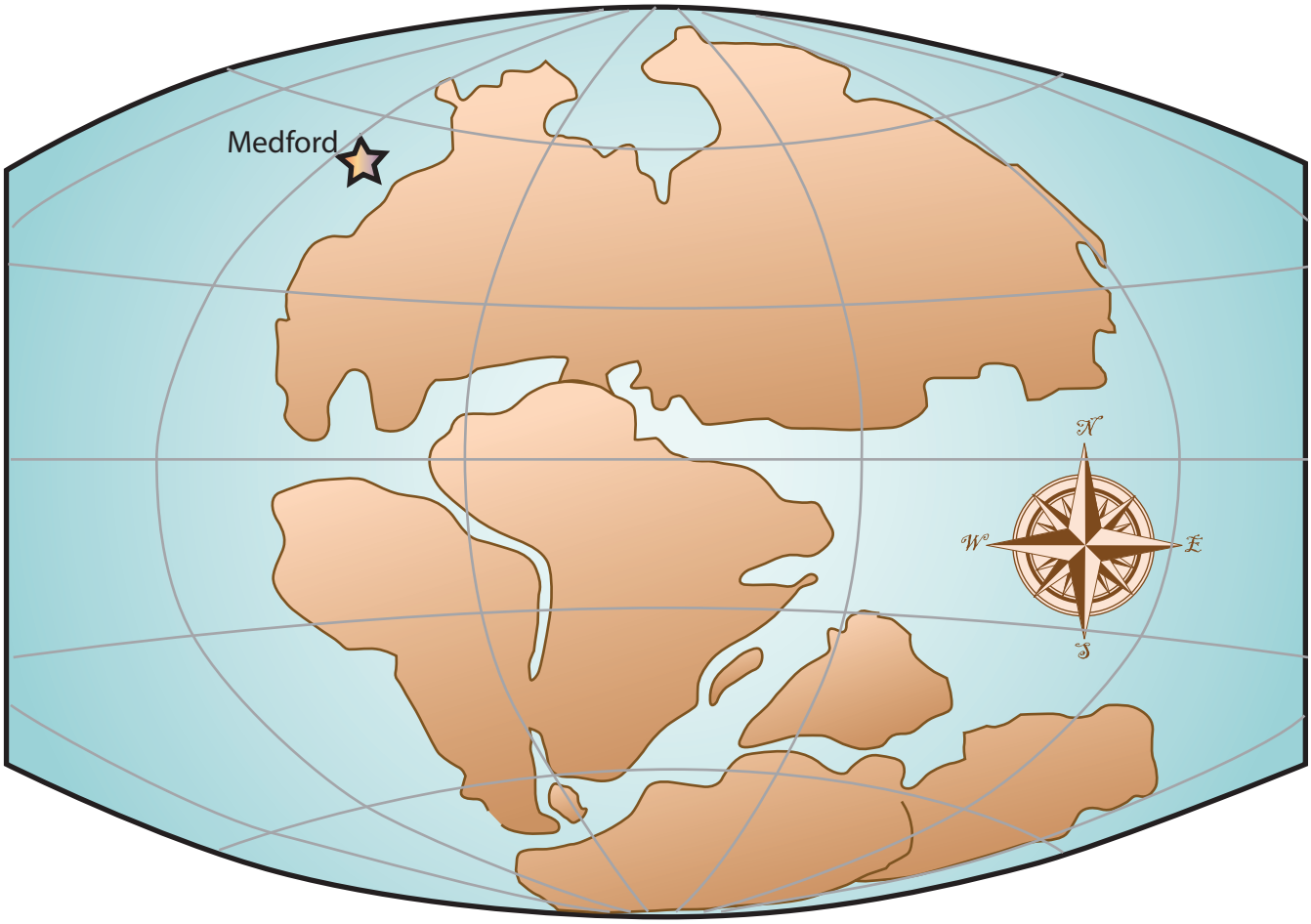
Society for Northwestern Vertebrate Biology
2010 Annual Meeting

CHANGES IN LATITUDES, CHANGES IN ATTITUDES:

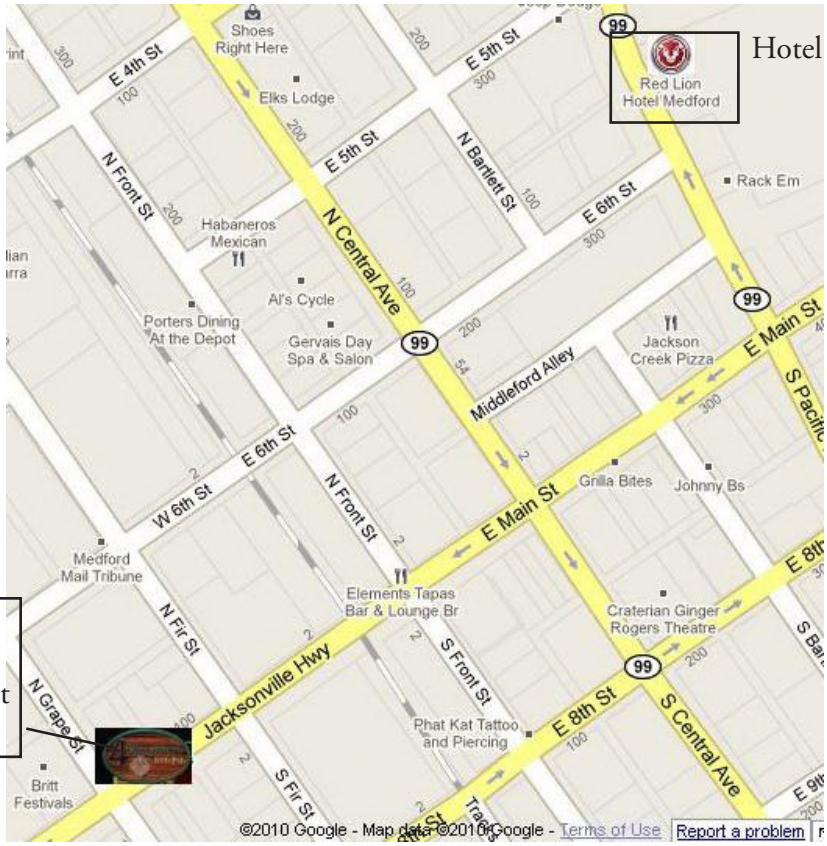
The Changing Climate of Science and Policy



23-26 February 2010

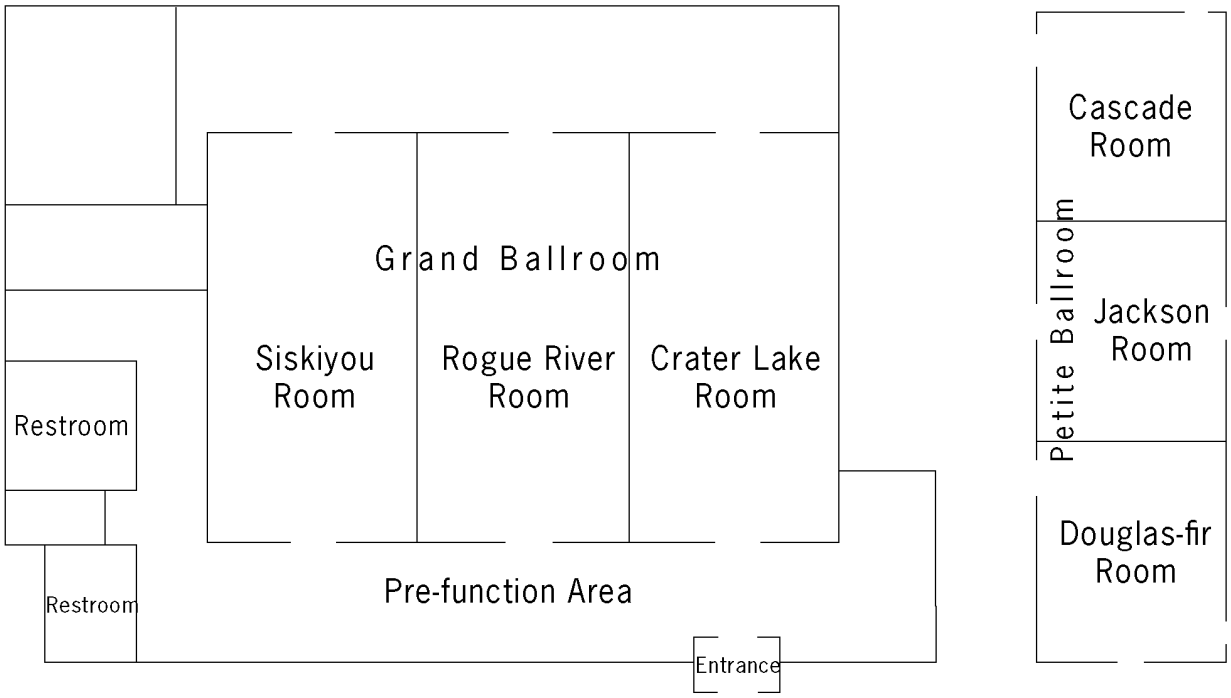
Red Lion Inn, Medford, Oregon

Medford Red Lion Inn and Downtown



Wednesday Night Social at 4 Daughters Irish Pub, 126 West Main Street

Meeting Rooms



The 2010 Annual Meeting of The Society for Northwestern Vertebrate Biology

"CHANGES IN LATITUDES, CHANGES IN ATTITUDES: The Changing Climate of Science and Policy"

Welcome to the 2010 Society for Northwestern Vertebrate Biology! It is no small feat orchestrating such an event. We are privileged to offer you a forum to foster information exchange, meet future collaborators, and develop long-lasting professional associates and friendships. We thank you for your participation and thank the meeting organizers for planning such a timely and worthwhile event.

The meeting theme, "Changes in Attitudes, Changes in Latitudes: The Changing Climate of Science and Policy", a play on words of a Jimmy Buffet song, was aptly chosen to address some of the challenges we face as we incorporate climate science into our research and policies. We also decided to spotlight the Northwest Forest Plan and the volley of Survey and Manage.

"Changes in Attitudes, Changes in Latitudes" of funding, administrations, and the organisms we study speak to the many facets of research, management, and conservation, by which decisions are made that have fleeting or lasting effects. When you look at the program, you will see a great line up of presenters, diverse in the organizations they represent, stages in their careers and topics they will address. We begin with a special symposium on landscape permeability for wildlife, and special screening of the award-winning independent film *Division Street*, a documentary about merging modern engineering with ecological research to provide landscape permeability. Opening the plenary session on Wednesday, you will hear four dynamic speakers, Bob Anthony, Eric Forsman, Hart Welsh, and Ryan O'Donnell, who speak to various aspects of policy and impacts on conservation science. In the second plenary session on Thursday, Jan Henderson, Ellen Goheen, Carlos Carroll, and Dominick DellaSala will examine climate change in the Pacific Northwest from several perspectives.

At the banquet, long-time member Steve Wagner will present a natural history travelogue of his work in Asia. We will also announce the recipient of the student scholarship and present the first SNVB award for commitment to teaching and student mentoring, so be sure to attend the banquet.

We close the meeting with a special session on carnivore conservation and an informational session hosted by our partner PARC, Partners in Amphibian and Reptile Conservation. We hope you will stick around for short field trips on Friday afternoon, and if you have time, a full day field trip on Saturday.

We hope you have a great time at the meeting!

Cheers, Tara

Tara Chestnut, President
Society for Northwestern Vertebrate Biology

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The Society for Northwestern Vertebrate Biology would like to acknowledge the generosity of the following sponsors of the 2010 annual meeting:

Watershed Sciences

ROGUE RIVER - SISKIYOU NATIONAL FOREST

We also wish to thank the individuals, businesses, and organizations who provided special contributions or donated items for our raffle and auction.

Special Events

Poster Session

Cascade Room

Wednesday 24 Feb.
3:50 - 4:30 pm

Photography Contest

Wed. & Thurs. 24-25 Feb.

Be sure to vote on the photography contest entries, on display in the Cascade Room (ballots due by 5:00 pm Thursday – winners announced at banquet). Categories: 1) ***Vertebrates***; 2) ***Flora***; 3) ***Landscapes and Habitats***, and 4) ***Biologists/ SNVB members in action*** (including funny material). All submissions should be limited to themes within the realm of SNVB (Pacific Northwest of Canada and the United States, and intermountain west (Utah, Montana, Idaho).

Medford BLM

Silent Auction and Raffle

Thursday 25 Feb.

Many items donated by generous sponsors and members will be on display Wednesday and Thursday, and during the poster session, for registrants to bid on during the annual silent auction. Bids can be made until 5:00 pm Thursday. There will also be a short raffle Thursday evening at the banquet that will include an assortment of interesting items and memorabilia.

The Photography Contest entries and the Silent Auction items will be set up in the Cascade Room.

Friday 26 Feb.
9:00 am - 11:00 am

Northwest PARC (Partners in Amphibian and Reptile Conservation)

Jackson Room

Updates and task team discussions in preparation for the upcoming annual meeting in Boise.

Field Trips

Gotcha! Carnivore Hair and Photo Station Visit

Friday 26 February, 1:00 pm - 4:00 pm

Join a BLM biologist as he/she visits a Fisher photo and hair tube station on the plateau, east of Medford. The plateau provides connectivity for predators and other charismatic megafauna between the Klamath-Siskiyou and Cascades. Bring your field guides and binoculars as one never knows what they are going to encounter on the plateau. Temperatures and moisture are highly variable in the Rogue Valley as well as on the plateau, so please come prepared for a short hike in muddy/snowy/windy conditions.

NW PARC Field Trip: On the Trail of the Turquoise Dragon

D DeGross

Friday 26 February, noon - 3:00 pm

A short expedition following the NW PARC session on Friday, to explore the amphibians and reptiles of the Siskiyou region.

Table Rocks Exploration

Friday 26 February, noon - 5:00 pm

Take a hike with an environmental educator up the most prominent features of the Rogue Valley. These mesas will provide viewing of the Cascades, the Siskiyou Mountains, weather and season permitting a wonderful display of over 70 wildflower species, and a diverse list of vertebrates.

Meeting At A Glance

Tuesday 23 February

7:30 am	Registration opens – *Hotel lobby*
8:00 am - 5:00 pm	**Transportation and Wildlife Issues Symposium** – *Siskiyou Room* *see schedule on page 11*

Wednesday 24 February

8:00 am	Registration opens – *Hotel lobby*
8:30 - 8:45 am	**Introductions & Welcome** – Tara Chestnut, *Grand Ballroom*
8:45 - 10:15 am	**Policy Plenary I & II: Robert Anthony, Eric Forsman –** *Grand Ballroom*
10:15 - 10:30 am	Coffee break
10:30 - 11:45 am	**Policy Plenary III & IV: Hart Welsh, Ryan O'Donnell –** *Grand Ballroom*
12:15 am - 1:00 pm	Lunch

	Douglas Fir Room Concurrent Session I	Jackson Room Concurrent Session II
1:00 - 2:20 pm	**Western Pond Turtle** *Moderator: Bruce Bury*	**Wildlife Conflict, Management, and Conservation** *Moderator: John Alexander*
2:20 - 2:40 pm	Break	
2:40 - 4:00 pm	**Western Pond Turtles** continues	**Wildlife Conflict, Management, and Conservation** continues
4:00 - 4:30 pm	**Poster Session** – *Cascade Room*	
4:30 - 5:45 pm	**SNVB Board Meeting** – *location TBA, at the Red Lion*	
5:45 - 9:30 pm	**Social** – 4 Daughters Irish Pub (126 West Main Street)	

E. Halcomb

Meeting At A Glance

Thursday 25 February

8:00 am	Registration opens – *Hotel lobby*
8:30 - 8:45 am	**Introductions & Welcome** – Tara Chestnut, *Grand Ballroom*
8:45 - 10:15 am	**Climate Change Plenary I & II: Jan Henderson, Elaine Goheen –** *Grand Ballroom*
10:15 - 10:30 am	Coffee break
10:30 am - noon	**Climate Change Plenary III & IV: Carlos Carroll, Dominick DellaSalla –** *Grand Ballroom*
noon - 1:20 pm	Lunch – SNVB Society Luncheon

	Douglas Fir Room Concurrent Session I	Jackson Room Concurrent Session II
1:20 - 2:40 pm	**Amphibian & Reptile Conservation** *Moderators: Elke Wind & Aimee McIntyre*	**Emerging Ecological Challenges** *Moderator: Brent Matsuda*
2:40 - 3:00 pm	Break	
3:00 - 4:20 pm	**Amphibian & Reptile Conservation** continues	**Emerging Ecological Challenges** continues
4:20 - 5:00 pm	**Poster Session** – *Cascade Room*	
6:00 - 8:00 pm	**Banquet** – *Grand Ballroom* Wild Primates and Crazy Herps: Natural History and Conservation in Asia **– Steve Wagner**	

Friday 26 February

9:00 am - noon	**Carnivores Paper Session** *Moderator: Keith Aubry* Douglas Fir Room (break at 10:20)
9:00 am - 11:00	**Northwest Partners in Amphibian and Reptile Conservation (NW PARC)** *Moderator: Elke Wind* Jackson Room
11:00 am - 1:00 pm	Lunch
noon - 3:00 pm	**NW PARC Field Trip: On the Trail of the Turquoise Dragon** *with Elke Wind*
1:00 - 4:00 pm	**Field Trip: Gotcha! Carnivore Hair and Photo Station Visit** *with Dave Clayton*
noon - 5:00 pm	**Table Rocks Expedition**

Tuesday 23 February
Transportation and Wildlife Issues Symposium – *Siskiyou Room*

8:00 am - 5:00 pm **Co-moderators: Sandra Jacobson and Dave Clayton**

The symposium will speak to transportation and wildlife issues with perspectives from national, regional, and state levels, with a focus on landscape linkages, techniques for mitigating for wildlife, and real world successes with regard to transportation projects.

7:30 - 8:00 am	Registration
8:00 - 8:15 am	**Welcome –** Dave Clayton, *Rogue River-Siskiyou National Forest*
8:15 - 9:00 am	**Transportation Ecology: An Overview of Issues, Opportunities and Mitigation Measures –** Sandra L. Jacobson, *US Forest Service, Pacific Southwest Research Station*
9:00 - 9:45 am	**Oregon's Wildlife Movement Strategy Strategy Addressing Wildlife Movement and Habitat Fragmentation –** Simon N. Wray, *US Fish and Wildlife Service*
9:45 - 10:00 am	**Break**
10:00 - 10:45 am	**Northwest Forest Plan Consistency and the I-90 Snoqualmie Pass East Project, Okanogan-Wenatchee National Forest –** Patricia Garvey-Darda, *Okanogan-Wenatchee National Forest*
10:45 - 11:10 am	**An Assessment of Stream Habitat and Fish Passage Across Interstate 90 at Snoqualmie Pass, WA** – James Lamperth, *Central Washington University*
11:10 - 11:40 am	**Western Toad Movement Corridors: What's Hot and What's Not** – Michelle S. Lester, *Central Washington University*
11:40 - noon	**Monitoring Pikas and Pika Habitat Along the I-90 Corridor East of Snoqualmie Pass, WA** – Kristina A. Ernest, *Central Washington University*
noon - 12:45 pm	**Lunch**
12:45- 1:45 pm	***Division Street* –** Film
1:45 - 2:30 pm	**Incorporating Wildlife Habitat Connectivity and Ecosystem Function into the Land Use Planning Process –** Eugene Wier, *Rogue Valley Council of Governments*
2:30 - 3:00 pm	**Break**
3:00 - 4:00 pm	**Discussion of Talks and Film**
4:00 - 4:45 pm	**Ecology and Transportation: A National Perspective for the 21st Century** – Joseph Burns, *US Forest Service, Washington Office*
4:45 - 5:00 pm	**Closing** – Sandra Jacobson, *US Forest Service, Pacific Southwest Research Station*

Symposium abstracts, in order of presentation, begin on p. 23

Robert Anthony

Policy Plenary I

Robert Anthony is former Leader of the US Geological Survey Oregon Cooperative Fish and Wildlife Research Unit, and Professor of Wildlife Ecology at Oregon State University. Bob received his BS degree in Biology from Ft. Hays Kansas State University, MS in Wildlife Ecology from Washington State University, and Ph.D. from the University of Arizona in Zoology with a minor in Statistics. From 1972-1977, he was on the faculty at Pennsylvania State University, where he taught courses and conducted research in wildlife ecology. He joined the Cooperative Unit Program at Oregon State University in 1977 where his primary responsibilities are research, training of graduate students, and technical assistance to state and federal agencies. He has conducted research on forest-wildlife relationships with an emphasis on threatened and endangered species. Topics such as avian and mammal community structure, demography, population status, habitat associations, and conservation of forested ecosystems are a focus of his research. He has conducted research on Bald Eagles and Northern Spotted Owls and served on recovery teams for both species. He was a member of the Forest Ecosystem Management and Assessment Team that wrote the Northwest Forest Plan, and he is a member of the Effectiveness Monitoring Group for Spotted Owls.

DEMOGRAPHIC TRENDS OF NORTHERN SPOTTED OWLS: A META-ANALYSIS, 1985-2008. **Robert G Anthony,** *Oregon Cooperative Fish & Wildlife Research Unit, Oregon State University, Corvallis*, **OR 97331; Eric D Forsman,** *USDA Forest Service, Pacific Northwest Research Station, 3200 Jefferson Way, Corvallis, OR 97331*; **Katie M Dugger, Elizabeth Glenn,** *Department of Fisheries & Wildlife, Oregon State University, Corvallis, OR 97331*.

We analyzed demographic data from Northern Spotted Owls (*Strix occidentalis caurina*) from 11 study areas in Washington, Oregon, and California. We used SAS PROC MIXED to analyze data on fecundity, and program MARK to estimate apparent survival, recruitment, and annual rate of population change (λRJS) from capture-recapture data. Fecundity was higher for adults than subadults, and the mixed-conifer region had the highest fecundity compared to other regions. Nine of the 11 study areas had an even-odd year effect on fecundity, and there was evidence that fecundity had declined on 7 of 11 study areas. Fecundity was negatively associated with low temperatures and high precipitation during the early nesting season, and with the presence of Barred Owls (*Strix varia*) on some study areas. Apparent survival was higher for adults versus subadults, and survival rates were declining on 7 of the 11 study areas. We also found differences in apparent survival among ecological regions, and reproduction and presence of Barred Owls had a negative influence on survival. Estimates of annual rate of population change (λRJS) were <1.00 for all study areas, and there was strong evidence that populations on 7 of the 11 study areas had declined significantly during our study. The mean estimate of lambda was 0.971, indicating that the average rate of population decline for all study areas combined was 2.9%/y. Based on estimates of realized population change, populations on 4 areas declined 40-60%, and on 3 areas 20-30% during the study. Declines were greatest for the study areas in Washington. The meta-analysis of λRJS indicated differences among ecological regions and a negative effect of Barred Owls on apparent survival and recruitment. Fecundity, apparent survival, and populations of Northern Spotted Owls were continuing to decline, which should be of concern to managers and conservation biologists.

Eric Forsman

Policy Plenary II

Eric Forsman is a Research Wildlife Biologist at the US Forest Service, Pacific Northwest Research Station in Corvallis, Oregon. He grew up in Eugene, Oregon, and received his BS, MS, and Ph.D. degrees from the Department of Fisheries and Wildlife at Oregon State University. He has spent over 30 y conducting research on the ecology of forest birds and mammals, especially Spotted Owls and their prey. He was a member of the

Interagency Scientific Committee that developed the first region-wide management plan for the Northern Spotted Owl, and was also a member of the Forest Ecosystem Management Assessment Team that developed Option 9, which laid the framework for the Northwest Forest Plan. His current research interests include the population dynamics of Spotted Owls, and the natural history, habitat associations, and population structure of tree voles.

Jim Swingle is a Faculty Research Assistant in the Department of Fisheries and Wildlife at Oregon State University. He grew up in the State of Washington on the Olympic Peninsula. He received his BS from the Department of Biology at the University of Washington, and MS from the Department of Fisheries and Wildlife at Oregon State University. He has spent the last 20 y researching Northern Goshawks, American Marten, Pileated Woodpeckers, Northern Spotted Owls, Barred Owls, and Red Tree Voles. His current research interests include ecology and life history variation in Douglas-fir, Western Hemlock, and Sitka Spruce forests; and historical distribution of tree voles.

TREE VOLES: AN UPDATE ON CURRENT RESEARCH, MANAGEMENT, AND STATUS. **Eric Forsman,** *USDA Forest Service, Pacific Northwest Research Station, Forestry Sciences Laboratory, 3200 SW Jefferson Way, Corvallis, Oregon 97331; eforsman@fs.fed.us;* **James Swingle**, *Department of Fisheries and Wildlife, Oregon State University, Corvallis, Oregon 97331; jimmy.swingle@gmail.com*

Although the distribution and reproductive biology of red tree voles (*Arborimus longicaudus*) have been well studied, the status of the species is poorly understood, and there is concern that tree voles may be declining in parts of their range. The US Fish and Wildlife Service is currently conducting a status review to determine if the species warrants listing under the Endangered Species Act. In this report we describe current efforts to better document the ecology of the species, including the first studies of pelage color variation and population age structure. We also summarize recent developments regarding a federal court case in which the judge ruled that Federal Agencies failed to follow the NEPA when they dropped requirements to conduct surveys for tree voles (and many other species) prior to cutting forests.

Hart Welsh

Policy Plenary III

Hart Welsh is a research wildlife ecologist with the US Forest Service, Pacific Southwest Research Station. He works at the Redwood Sciences Laboratory in Arcata, California. He has a BS Degree (Zoology) from the University of California at Berkeley, an MS Degree (Wildlife Biology) from Humboldt State University, and a Ph.D. (Wildlife Ecology) from UC Berkeley. He has previously worked in the Forestry and Natural Resources Department at UC Berkeley and the National Ecology Center (US Fish and Wildlife Service) in Colorado. His primary research interest is herpetology, and he has 80+ publications on the herpetofauna of the western United States and Mexico (Baja California). His current research includes: (1) investigating links between natural and anthropogenic landscape processes and the distributions and abundances of reptile and amphibian populations; (2) understanding the dynamics of stream networks, their channel characteristics, flow regimes, and riparian attributes and the distribution and abundance of lotic forestland herpetofauna; and (3) the use of amphibians as indicators of ecosystem health and integrity.

MANAGEMENT OF DENDRITIC STREAM NETWORKS ON FORESTED LANDSCAPES OF PNW: WHAT HAVE WE LEARNED SINCE THE NORTHWEST FOREST PLAN? Hartwell H Welsh, Jr, *USDA Forest Service, Pacific Southwest Research Station, 1700 Bayview Dr, Arcata, CA 95521: hwelsh@fs.fed.us*.

I review recent research on stream networks in the Pacific Northwest from the perspective of management prescriptions on forested landscapes. I compare riparian management guidelines developed under the Northwest Forest Plan with those of the 3 Pacific Northwest states, and discuss the fluvial and geomorphologic process domains of dendritic stream networks as they relate to these guidelines. I focus particularly on headwater channels and the effectiveness of current riparian guidelines to maintain viable populations of resident amphibian species. Using examples from multiple independent studies over 26 y, I demonstrate the ineffectiveness of current riparian rules to protect critical ecological processes of headwater environments. I examine 3 critical network parameters that these rules fail to adequately protect, detailing the responses of 3 resident headwater amphibian species to these adversely altered network attributes. Following the conceptual model of the stream continuum, I provide examples of the linkages between the status of the biota of headwater reaches and those that depend on downstream environments, such as salmonids. This research indicates that maintaining network system integrity, and the recovery of impacted species at both ends of the stream continuum, will require us to better protect all of its parts.

Ryan O'Donnell **Policy Plenary IV**

Ryan O'Donnell is a PhD student in Ecology at Utah State University in Logan, Utah. He has a B.S. in Zoology from the University of New Hampshire and an M.S. in Zoology from Oregon State University. Before returning to graduate school he worked for the Washington Department of Fish and Wildlife, where he studied the effects of timber harvest on stream-dwelling amphibians. His publications run the taxonomic gamut from plankton to people, but his primary interest is in the conservation and management of amphibians and reptiles. His current work is on the population genetics of Northern Leopard Frogs, especially focusing on the consequences of hybridization for conservation and the processes that determine genetic diversity. He also serves as an Associate Editor for Northwestern Naturalist.

CONSERVATION BIOLOGY IS HINDERED BY DELAYS IN THE SUBMISSION OF MANUSCRIPTS. **Ryan P O'Donnell, Sarah R Supp, Stephanie M Cobbold,** *Department of Biology and the Ecology Center, Utah State University, 5305 Old Main Hill, Logan, UT 84322-5305; Ryan@biology.usu.edu*.

Timely dissemination of scientific findings depends not only on rapid publication of submitted manuscripts, a topic which has received much discussion, but also on rapid submission of manuscripts after the research is completed. We measured submission delay (time from the last date of data collection to the submission of a manuscript) for every paper from 14 journals in 2007 and compared these submission delays among 4 fields of biology (conservation, taxonomy, behavior, and evolution). Manuscripts published in leading journals in the field of conservation biology have the longest intervals between completion of research and submission of the manuscript, and the longest delays in the publication of accepted manuscripts. Delay in manuscript submission accounts for more than half of the total time from last date of data collection to publication. Across fields, number of authors was significantly negatively correlated with submission delay, but conservation journals had the second highest number of authors and the greatest submission delay; so submission of conservation manuscripts was not hindered by a shortage of collaboration relative to other fields. Rejection rates were greater in conservation journals than in behavior and evolution, but rejection times were faster; thus, there were no obvious net differences among fields in the time papers spent waiting to be rejected. Publication delay has been reduced significantly in the last 7 y, but was still greater in conservation journals than in any of the other 3 fields we studied. Thus, the urgent field of conservation biology is hindered by slow preparation and publication of manuscripts.

Jan Henderson

Climate Change Plenary I

Dr. Jan Henderson is Area Ecologist with the US Forest Service. His current responsibilities include applied research in the field of vegetation and landscape ecology on the Olympic, Mt. Baker-Snoqualmie and Gifford Pinchot National Forests in Washington. He has held that position since 1979. Prior to that he was Assistant Professor of forest ecology and silviculture at Utah State University, and received Outstanding Teacher of the Year 1976, 1978. He has numerous publications and presentations in the areas of vegetation classification, ecological succession, fire and climatic history and use of Geographic Information Systems (GIS) in forest management. Publications include "Field Guide to the Forested Plant Associations of the Mt. Baker-Snoqualmie National Forest" (1992), "Forested Plant Associations of the Olympic National Forest" (1989) with Lesher, Peter and Shaw; "Forest Ecology and the Forest Ecosystem" (with John Aber) in R.A. Young "An Introduction to Forest Science" (John Wiley and Sons 1982); "Plant Succession on the *Alnus rubra* / *Rubus spectabilis* Habitat Type in Western Oregon (Northwest Science 1978); "Nature of Land and Resource Classification" (with R.G. Bailey and R.D. Pfister, Journal of Forestry 1978); "Some Aspects of Succession in the Spruce-Fir Zone of Northern Utah" (with D.A. Schimpf and J.A. MacMahon, Great Basin Naturalist 1980); and "Coniferous Forest Habitat Types of Northern Utah" (with R.L. Mauk, USFS GTR 1984). He was National Secretary of the Society of American Foresters Forest Ecology Working Group 1982-83, National Forest Ecology Working Group Program Chair (1995-1996) and Working Group Chair (1997-1998); on the Washington State, DNR, Natural Heritage Advisory Council from 1982-1988; President (1995) and Board of Trustees (1991-1996), Honorary Life Member of the Northwest Scientific Association. Born in Seattle Washington, December 31, 1943. He has a B.S. in Forest Management from Washington State University, an M.S. in Forest Ecology from Oregon State University and a Ph.D. in Plant Ecology from Oregon State University (1974).

HISTORY OF CLIMATE AND VEGETATION OF WASHINGTON AND OREGON. Jan A Henderson, *USDA Forest Service, 2930 Wetmore Avenue, Suite 3A, Everett, WA 98201; jahenderson@fs.fed.us.*

The more we learn about climate and vegetation history, the more complex it becomes. Our perspective on climate based on our modern experience cannot prepare us for understanding the great changes in climate that have occurred over the history of life on Earth. This talk will try to set the perspective for understanding present climate by discussing what we know about the history of climate and vegetation over the long run. In particular, the history of the Pleistocene and the variation in climate and vegetation that may have occurred in the Pacific Northwest will be discussed. Climate history is more than the reconstructed history of temperature change. Precipitation and the broader moisture regime are, in many respects, more important than temperature changes, yet we know much less about the changes in the moisture regime than we do temperature. Some possible drivers of the changes in temperature regime, as well as the precipitation regime, are discussed, including the correlation between temperature change, CO_2, and solar influences.

Ellen Michaels Goheen

Climate Change Plenary II

Ellen Michaels Goheen is a Plant Pathologist with USDA Forest Service, Forest Health Protection and is located at the Southwest Oregon Forest Insect and Disease Service Center in Medford, Oregon. She has worked for Forest Health Protection in the Pacific Northwest since 1983 and has been in Medford since 1994. She is the lead plant pathologist for the US Forest Service Pacific Northwest Region's Sudden Oak Death program, is the Rogue River-Siskiyou National Forest's Climate Change contact and has represented Forest Health Protection in westwide discussions and workshops on climate change.

CLIMATE, CLIMATE CHANGE, AND FOREST INSECTS AND PATHOGENS. Ellen Michaels Goheen, *USDA Forest Service, Forest Health Protection, Southwest Oregon Forest Insect and Disease Service Center, 2606 Old Stage, Central Point, OR 97502: egoheen@fs.fed.us.*

Insects and pathogens are extremely important agents of vegetation change in North American forests. Tree mortality, growth loss, and reduced reproductive capacity associated with the activities of insects and pathogens influence stand structure, composition, and function across landscapes by creating variable-sized canopy gaps, altering vegetation succession, creating decay columns within trees and snags, and contributing woody material to the forest floor and streams. Climatic changes that increase host susceptibility to insects or pathogens, or result in an environment more suitable for insects or pathogens will affect disturbance processes. The magnitude of effects is difficult to predict and will be determined by the type, host specificity, and aggressiveness of the insect or pathogen involved and the functional importance and distinctiveness of its hosts. Although we are uncertain how specific forest insects and pathogens will respond to climate change, it is believed that their distribution and influence on status and trends of forests will change, their epidemiology will be altered, prediction of outbreaks will become more difficult, their rates of evolution will surpass that of their hosts, and invasion by new nonnative insects and pathogens may be facilitated. The effects of climate change on hosts, insects, pathogens, and their interaction will have numerous and most likely adverse consequences to forest ecosystems. Most of these consequences are not currently accounted for in climate change models.

Carlos Carroll

Climate Change Plenary III

Carlos Carroll is a wildlife ecologist with the Klamath Center for Conservation Research, Orleans, CA. He received his PhD in Forest Science in 2000 from Oregon State University. His research focuses on the use of habitat and viability models in conservation planning in western North America.

INCORPORATING CONNECTIVITY AND RESILIENCE TO CLIMATE CHANGE INTO REGIONAL-SCALE CONSERVATION PLANNING IN THE PACIFIC NORTHWEST. Carlos Carroll, *Klamath Center for Conservation Research, PO Box 104, Orleans, CA 95556; carlos@klamathconservation.org*; Jeffrey R Dunk, *Department of Environmental and Natural Resource Sciences, Humboldt State University, Arcata, CA 95521*; Jeffrey.Dunk@humboldt.edu; Atte Moilanen, *Department of Biological and Environmental Sciences, PO Box 65, FI-00014 University of Helsinki, Finland; atte.moilanen@helsinki.fi.*

Conservation planning has traditionally addressed biodiversity pattern while implicitly ignoring landscape dynamics. However, the effectiveness of a network of reserves such as established under the Northwest Forest Plan may be compromised under climate change as species' habitat shifts to non-reserved areas; a problem that may be compounded when well-studied vertebrate species such as the Northern Spotted Owl (*Strix occidentalis caurin*a) are used as 'conservation umbrellas' for other taxa. We used the program Maxent to develop habitat models for the Northern Spotted Owl and 130 localized species in the Pacific Northwest, and evaluated how effectively the owl acts as an umbrella for localized species under current and projected future climates. We used the program Zonation to identify a system of areas that efficiently captures habitat for both the owl and localized species, and prioritizes refugial areas of climatic and topographic heterogeneity where current and future habitat for dispersal-limited species is in proximity. Reserve solutions based on the owl overlap areas of high localized-species richness, but poorly capture core areas of localized species' distribution. Congruence between priority areas across taxa increases when refugial areas are prioritized. Reserve networks can retain an important role in conserving species in dynamic systems if designed with a broadened taxonomic scope and increased attention to potential effects of climate change. The effects of climate change emphasize the need for "thinking big" to ensure persistence of both area-dependent species such as the owl and narrowly-distributed endemics whose persistence may depend on protection of refugia and climate corridors.

Dominick DellaSala

Climate Change Plenary IV

Dr. Dominick A DellaSala is President and Chief Scientist of the National Center for Conservation Science & Policy in Ashland, Oregon. He is an internationally renowned author of over 150 technical papers including *Temperate Rainforests Of The World: Ecology & Conservation* (Island Press, 2010); co-author of 4 books on biodiversity and sustainable forest management; subject editor for the Natural Areas Journal; guest editor for Conservation Biology; and President of the Society for Conservation Biology, North America section. Dr. DellaSala has conducted field research in forest ecosystems from Michigan's mixed hardwood forests to Oregon's Cascade Range and the temperate rainforests of Alaska, Canada, and the Pacific Northwest. He has given plenary and keynote talks at academic conferences, workshops, and the United Nations (Earth Summit II), and has appeared in National Geographic, Science Digest, Science Magazine, Time Magazine, Audubon Magazine, High Country News, Terrain Magazine, NY Times, LA Times, Jim Lehrer NewsHour, CNN, MSNBC, "Living on Earth (NPR)," and Public Radio and TV (including several conservation films). Dr. DellaSala has testified in numerous congressional hearings, including the Endangered Species Act, roadless area conservation, national monument designations, forest health, and post-fire logging. For his efforts, he received the President's Conservation Award from World Wildlife Fund in 2000 and 2004, the Wilburforce Foundation Conservation Leadership Award in 2006, and was nominated for an international conservation award for his work as a whistleblower while on the US Fish & Wildlife Service Spotted Owl recovery team. He co-founded the National Center for Conservation Science & Policy in July 2006.

CLIMATE CHANGE AND A FEDERAL LANDS "NEW DEAL". Dominick DellaSala, *National Center for Conservation Science &Policy, 84 4th St, Ashland, OR 97520; dominick@nccsp.org.*

Federal lands in the Pacific Northwest have been managed historically under various management paradigms depending on which way the political winds are blowing. This has ranged from extraction as the dominant use to multiple use and sustained yield, ecosystem management, and, more recently, climate change preparation. With the onset of climate change, and interest in planning for it, federal lands are at their most critical crossroads. The steps taken today could decide the ability of these lands to adapt to rapidly emerging climate change impacts. This talk will explore the latest developments on federal lands management as viewed through the lens of climate change. A federal lands "new deal" is proposed as a means for preparing these forests for the unprecedented challenges of climate change that is based on 3 essential actions: (1) manage forests according to the 3 Rs of adaptation (reduce stressors, maintain resistant and resilient properties of ecosystems); (2) switch to a low-carbon energy and low-carbon forestry and agriculture "diet", and (3) protect climate refugia (such as roadless areas) and vital ecosystem services like drinking water supplies and carbon-dense, old forests. This "new deal" vision needs to be implemented within 10 y, lest federal lands will lose their ability to adapt to climate change in ways beneficial to humanity.

Banquet Speaker

Steve Wagner

Dr. Steve Wagner is a herpetologist and has been a Professor of Biological Sciences at Central Washington University (CWU) since 2000. Interested in science at an early age, he spent a lot of time alone reading Scientific American and National Geographic. During his formative academic career he had interests in molecules and completed B.S. degrees in Chemistry and Biology (1991) at CWU. He went on to pursue a PhD in Genetics at Oregon State University and worked for 3 years on a project investigating genetic differences among cellular organisms; specifically, bacteria that make cheddar cheese (*Lactococcus lactis cremoris*). Despite his love for cheese, he made a taxonomic leap and switched projects to explore Pacific Northwest forests and search for amphibians. He completed his PhD in Genetics (2001) with a dissertation focused on salamander evolution and conservation genetics. At CWU, in collaboration with students and colleagues, he has published many articles and given numerous presentations related to amphibian conservation. Most recently his research team is investigating a number of topics including how diseases (i.e., chytrid fungus and water molds), pollutants, and mountain roads impact amphibians. He is co-director of CWU Biodiversity and Primate Behavior field school in the Yellow Mountains of China, and has taken students there for research since 2004. This experience and collaboration with primate colleagues expanded his interests to include the complexity of nonhuman primate social behavior. As a result, he studied orangutans during the day and amphibians at night in Kalimantan, Borneo for his sabbatical in 2008-2009. He is committed to education and helped develop Project CROAK! and the National Science Foundation funded Yakima WATERs (Watershed Activities to Enhance Research in Schools) Project to infuse authentic science in the GK-12 curriculum to get kids excited about science. He enjoys traveling in China (Mainland to Tibet) and Southeast Asia (Nepal to Indonesia) for research and observing wildlife. In the Pacific Northwest he enjoys mountaineering and sliding on telemark skis.

WILD PRIMATES AND CRAZY HERPS: NATURAL HISTORY AND CONSERVATION IN ASIA R. Steven Wagner, *Department of Biological Sciences, Central Washington University, 400 E University Way, Ellensburg, Washington 98926; wagners@cwu.edu*

Asia hosts an interesting and wide diversity of wildlife and habitats but presents enormous conservation challenges. Throughout Asia, eco-tourism has been increasing with greater economic stability. However, the increased number of visitors and easier access for them to view flagship species, such as Tibetan macaques and Orangutans, in previously remote areas are increasing environmental pressures on other organisms. I will present a natural history travelogue of interesting species studied and encountered, and discuss the impacts of human encroachment and eco-tourism.

Wednesday 24 February

8:00 am	Registration opens	*Hotel Lobby*
8:30 - 8:45 am	Introductions & Welcome – **Tara Chestnut**	*Grand Ballroom*
	Policy Plenary Session	*Grand Ballroom*
8:45 - 9:30 am	**Robert Anthony –** Demographic Trends of Northern Spotted Owls: A Meta-analysis, 1985-2008	
9:30 - 10:15 am	**Eric Forsman –** Tree Voles: An Update on Current Research, Management, and Status	
10:15 - 10:30 am	Coffee Break	
10:30 - 11:15 am	**Hart Welsh –** Management of Dendritic Stream Networks on Forested Landscapes of the Pacific Northwest: What Have We Learned Since the Northwest Forest Plan?	
11:15 - 11:45 am	**Ryan O'Donnell –** Conservation Biology is Hindered by Delays in the Submission of Manuscripts	
11:45 am - 1:00 pm	Lunch	

1:00 pm - 2:20 pm, Concurrent Paper Presentation Sessions

	Douglas Fir Room	**Jackson Room**
Time	**Western Pond Turtles** *Moderator:* Bruce Bury	**Wildlife Conflict, Management, and Conservation** *Moderator:* John Alexander
1:00 pm - 1:20 pm	Rangewide overview of the Western Pond Turtle – Bruce Bury	The role of wildlife forensics in conservation and law enforcement – Pepper Trail
1:20 pm - 1:40 pm	The effects of seasonal drying on Western Pond Turtle movement and body condition – Cheryl Bondi	Wildlife conflict in southwest Oregon – Rosemary Stussy
1:40 pm - 2:00 pm	Movement patterns of Western Pond Turtles on the Carrizo Plain Ecological Preserve – David Pilliod	The migratory status of Black-tailed Deer in Josephine County – Steven Niemela
2:00 pm - 2:20 pm	Comparative ecology of the Western Pond Turtle on two forks of the Trinity River – Don Ashton	A case study in the use of elk relocation as a management tool – Daniel Ethridge

Wednesday 24 February

2:20 - 2:40 pm **Break**

2:20 pm - 4:00 pm Concurrent Paper Presentation Sessions

Time	Douglas Fir Room	Jackson Room
	Western Pond Turtles continues	**Wildlife Conflict, Management, and Conservation** continues
2:40 pm - 3:00 pm	Thermoregulatory behavior and growth characteristics of WPT on the Trinity River – Jamie Bettaso	Bird communities of the Ashland Watershed: baseline results inform land management planning – Jaime Stephens
3:00 pm - 3:20 pm	Analysis of population data of Western Pond Turtles in southern Oregon – Simon Wray	Collection and contribution of data to the Avian Knowledge Network and the Western Hummingbird Partnership – Karen Hussey
3:20 pm - 3:40 pm	Long-term ecological comparison of the Western Pond Turtle – Bruce Bury	Taxonomic challenges in mapping the distribution of amphibian chytridiomycosis – Kathryn Ronnenberg
3:40 pm - 4:00 pm	Discussion	Effectiveness of vertebrate passage and prevention structures: Boeckman Road – Leslie Bliss-Ketchum

4:00 - 4:30 pm **Poster Session** *Cascades Room*

4:30 - 5:45 pm **SNVB Board Meeting** *location TBA, Red Lion*

5:45 - 9:30 pm **Social at 4 Daughters Irish Pub** *See map on p. 1*

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Thursday 25February

8:00 am	Registration opens	*Hotel Lobby*
8:30 - 8:45 am	Introductions & Welcome – **Tara Chestnut**	*Grand Ballroom*
	Climate Change Plenary Session	*Grand Ballroom*
8:45 - 9:30 am	**Jan Henderson –** History of Climate and Vegetation of Washington and Oregon	
9:30 - 10:15 am	**Ellen Michaels Goheen –** Climate, Climate Change, and Forest Insects and Pathogens	
10:15 - 10:30 am	Coffee Break	
10:30 - 11:15 am	**Carlos Carroll –** Incorporating Connectivity and Resilience to Climate Change into Regional-scale Conservation Planning in the Pacific Northwest	
11:15 am - noon	**Dominick DellaSala –** Climate change and a federal lands "new deal"	

11:45 am - 1:00 pm SNVB Society Lunch

1:20 pm - 2:40 pm, Concurrent Paper Presentation Sessions

	Douglas Fir Room	**Jackson Room**
Time	**Amphibian & Reptile Conservation** *Moderators:* Elke Wind and Aimee McIntyre	**Emerging Ecological Challenges** *Moderator:* Brent Matsuda
1:20 pm - 1:40 pm	Historical demography of the Desert Nightsnake – Edward Myers	Integrating climate change preparation among natural and human communities – Marni Koopman
1:40 pm - 2:00 pm	Behavioral responses to potential prey through chemoreception by the Sharp-tailed Snake – Robert Weaver	Can invasive Bullfrogs plastically accelerate larval development in a drying environment? – Megan Tetsuko Cook
2:00 pm - 2:20 pm	Field observations of oviposition and development of the Coastal Tailed Frog – Amber Palmeri-Miles	Occurrence and distribution of *Batrachochytrium dendrobatidis* at high latitudes – Tara Chestnut
2:20 pm - 2:40 pm	Abundance and biomass of Rocky Mountain Tailed Frogs in northern Idaho streams – Kirk Lohman	An update on White Nose Syndrome and what we can do to prepare – Pat Ormsbee

Thursday 25 February

2:40 - 3:00 pm Break

3:00 pm - 4:20 pm Concurrent Paper Presentation Sessions

Time	Douglas Fir Room	Jackson Room
	Amphibian & Reptile Conservation continues	**Emerging Ecological Challenges** continues
3:00 pm - 3:20 pm	Up and over: headwater linkage areas extend riparian reserves over ridgelines – Deanna Olson	Mercury contamination in lampreys of the Lower Klamath basin – Jamie Bettaso
3:20 pm - 3:40 pm	Short-term response of Pacific Giant Salamanders to timber management in SW OR – Niels Leuthold	The role of pesticides in the decline of amphibians in the Sierra Nevada, California – Gary Fellers
3:40 pm - 4:00 pm	Plethodontid salamander movement, survival, and recapture frequencies in managed headwater forest, OR – Matt Kluber	Habitat restoration influence on amphibian assemblage structure, Willamette Mission State Park – Rebbecca Hill
4:00 pm - 4:20 pm		Monitoring wildlife responses to restoration projects – David Pilliod

4:20 - 5:00 pm **Poster Session** *Cascades Room*

6:00 - 8:00 pm **Banquet** *Grand Ballroom*
Wild Primates and Crazy Herps: Natural History and Conservation in Asia – **Steve Wagner**

Friday 26 February

8:00 am — Registration opens — *Hotel Lobby*

9:00 - 11:00 am — **NW PARC (Partners in Amphibian and Reptile Conservation) meeting** — *Jackson Room* — *short field trip follows*

9:00 am - noon, Carnivore Paper Presentation Session

Time	Douglas Fir Room — *Moderator:* **Keith Aubry**
9:00 am - 9:20 am	Interagency Fisher conservation assessment and strategy – Bob Naney (Laura Finley presenting)
9:20 am - 9:40 am	Short-term impacts of fuel management activities on Fishers in the western United States – Craig Thompson
9:40 am - 10:00 am	Reintroducing Fishers to Olympic National Park: Progress through year 2 – Jeff Lewis
10:00 am - 10:20 am	Discussion of Fisher works
10:20 am - 10:40 am	Coffee Break
10:40 am - 11:00 am	Phylogeography of the North American Red Fox: vicariance in Pleistocene forest refugia – Keith Aubry
11:00 am - 11:20 am	North American montane red foxes: expansion, fragmentation, and the origin of the Sacramento Valley Red Fox – Benjamin Sacks
11:20 am - 11:40 am	Origin of putative nonnative Red Foxes in the contiguous United States: translocations or natural range expansions? – Mark Statham
11:40 am - 12:00 pm	Discussion of North American Red Fox

12:00 pm — **Meeting adjourns (afternoon fieldtrips!)**

noon - 3:00 pm — **NW PARC Field Trip: On the Trail of the Turquoise Dragon** *with Elke Wind*

1:00 - 4:00 pm — **Gotcha! Carnivore Hair and Photo Station Visit** *with Dave Clayton*

noon - 5:00 pm — **Table Rocks Expedition**

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TRANSPORTATION ECOLOGY: AN OVERVIEW OF ISSUES, OPPORTUNITIES AND MITIGATION MEASURES. **Sandra L Jacobson,** *USDA Forest Service, Pacific Southwest Research Station, Bend, OR; sjacobson@fs.fed.us, 541-678-5240.*

Transportation systems, especially highways, are barriers to wildlife movement, and adversely affect virtually all wildlife species to some extent. This overview will provide insight into how highways differentially impact species groups based on varying behavioral and sensory attributes, and therefore how the risk of population level impacts from highways vary based on factors such as habitat proximity, traffic volume, and periodicity of traffic. Proven and new technologies to mitigate impacts will be presented as well as how transportation ecologists use knowledge of animal behavior to design effective wildlife crossing structures. A brief discussion of the economics of mitigating highway impacts to wildlife will be presented as a tool for decision makers to determine appropriate mitigation measures. This overview is summarized from a 3-day accredited course called Innovative Approaches to Wildlife and Highway Interactions.

OREGON'S WILDLIFE MOVEMENT STRATEGY ADDRESSING WILDIFE MOVEMENT AND HABITAT FRAGMENTATION. **Simon N Wray,** *Oregon Department of Fish and Wildlife, 61374 Parrell Road, Bend, OR 97702; simon.n.wray@state.or.us.*

Barriers to wildlife movement is one of the 6 key conservation issues identified in the Oregon Department of Fish and Wildlife's (ODFW) Oregon Conservation Strategy. In 2006, ODFW began addressing the barrier problem by working with the Oregon Department of Transportation (ODOT), US Forest Service, US Fish and Wildlife Service, and others to develop the Wildlife Movement Strategy. Ultimately, the strategy will address movement barriers for all wildlife species wherever they occur on the landscape; however, due to the enormous scope of such an endeavor, preliminary efforts have focused on the effects of state highways on 15 focal species. In 2007, wildlife experts convened at statewide workshops to identify key movement linkage areas that cross state highways. ODOT concurrently analyzed multiple years of dispatch carcass records to identify animal/vehicle collision hot spots. Using both data sets, a list of priority linkage areas has been identified. The basic groundwork is now complete and Oregon has begun to work on defining solutions. In 2008, the Wildlife Movement Strategy member agencies, the Federal Highways Administration, and the Oregon Zoo, collaborated to provide a symposium and workshops designed to present natural resource specialists, roadway designers, engineers, etc., with the latest information and options to address the impacts of highways on wildlife. Next steps include solution implementation and development of web based tools to assist end users such as federal land managers and county and city staff to address wildlife movement barriers within their jurisdictions.

NORTHWEST FOREST PLAN CONSISTENCY AND THE I-90 SNOQUALMIE PASS EAST PROJECT, OKANOGAN-WENATCHEE NATIONAL FOREST. **Patricia Garvey-Darda, William Ehinger,** *Cle Elum Ranger District, Okanogan-Wenatchee National Forest, USDA Forest Service, 803 W 2nd St, Cle Elum, WA 98922; pgarveydarda@fs.fed.us, wehinger@fs.fed.us.*

We collaborated with the Washington Department of Transportation, US Fish and Wildlife Service, and Washington State Department of Wildlife to develop site-specific mitigation measures and ecological connectivity structures designed to meet National Forest wildlife viability and Aquatic Conservation Strategy (ACS) requirements on 15 miles of Interstate 90 over Snoqualmie Pass in the Washington Cascades. We used information regarding the distribution of vascular plant, lichen, bryophyte, mollusk, amphibian, rare fungi, and mammal species to identify locations for bridges and wildlife overcrossing, and hydrologic connectivity structures. The goal of the mitigation structures is to connect all habitats, species, and hydrologic features found in the project area. We will discuss the process used to identify Connectivity Emphasis Areas (CEAs) and Hydrologic Connectivity Zones (HCZs). The CEAs and HCZs required different connectivity structures based on different ecological objectives and a unique assemblage of terrestrial species and habitats.

AN ASSESSMENT OF STREAM HABITAT AND FISH PASSAGE ACROSS INTERSTATE 90 AT SNOQUALMIE PASS, WA. **James Lamperth, Paul W James,** *Department of Biological Sciences, Central Washington University, 400 E University Way, Ellensburg, WA 98926; lampertj@cwu.edu, jamesp@cwu.edu.*

A major highway project to expand Interstate 90 over Snoqualmie Pass was recently initiated by the Washington State Department of Transportation. The project will include the construction of wildlife

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crossing structures and will replace several existing stream-crossing structures. A pre-construction study was conducted in 2008 and 2009 to assess stream habitat conditions and to monitor fish movement through existing culverts and bridges. We created treatment and control study reaches (approximately 200 m in length) in each of 9 fish-bearing streams within the project area. Treatment reaches included existing interstate stream crossing structures, and control reaches were areas of the stream outside of the influence of existing stream crossing structures. Backpack electrofishing and underwater snorkel surveys were conducted to quantify relative fish abundance in each study reach. Additionally, we implanted passive integrated transponder (PIT) tags in 100 individuals in 2 streams. Stream habitat was quantified using several metrics including substrate composition, large woody debris count and volume, and cross-sectional stream shape. Nine species of fish were identified with Cutthroat Trout (*Oncorhynchus clarki*) being the most common species. Federally listed adfluvial Bull Trout (*Salvelinus confluentus*) inhabited one of the streams, and bridge construction over the stream did not appear to affect their migration to spawning grounds. Juvenile Chinook Salmon (*O. tshawytscha*) were found upstream of a culvert in another stream indicating fish passage had occurred during spring flows in both years. Fish movements and stream habitat characteristics will continue to be monitored during and after completion of the highway expansion project.

WESTERN TOAD MOVEMENT CORRIDORS: WHAT'S HOT AND WHAT'S NOT. **Michelle S Lester, Jason T Irwin, Susan F Brady, April Barreca, R Steven Wagner,** *Department of Biological Sciences, Central Washington University, 400 E University Way, Ellensburg, WA 98925; Lesterm@cwu.edu.*

Roads can have significant impacts on amphibian population viability. Impacts can be especially severe when they intersect amphibian movement corridors where amphibian mortality rates can be as high as 100%. To investigate the movement patterns of Western Toads (*Anaxyrus* (aka *Bufo*) *boreas*) and locate movement corridor "hotspots" within the vicinity of Interstate 90, nighttime driving surveys were conducted along a 16 km stretch of FS 4832, which runs parallel to the freeway. Surveys were conducted in conjunction with the I-90 Snoqualmie Pass East construction project designed to improve ecological connectivity. We conducted 37 surveys between May and October 2009, and found 15 toads on the roadway, including 1 roadkill. To identify hotspots, encounters were grouped by neighbor distance (500 m) and weighted by number of encounters producing 4 separate hotspots all located along streams. Preliminary habitat analysis was conducted in the highest weighted hotspot (5) and compared to a control transect where no encounters occurred despite an equivalent layout on the landscape in regards to forest age and development, elevation, slope gradient, aspect, and proximity to a stream and the highway. The hotspot had significantly less overhead canopy cover (66-68%) and greater shrub vegetation type (42-56%) compared to the control transect with 88-96% mean canopy cover and 19-24% mean shrub ground cover. Additional analysis is needed, but results suggest general habitat characteristics for identifying prospective toad movement corridors adjacent to roadways, which could aid in designing and implementing measures to minimize effects of roadways and improve connectivity between populations.

MONITORING PIKAS AND PIKA HABITAT ALONG THE I-90 CORRIDOR EAST OF SNOQUALMIE PASS, WA. **Kristina A Ernest,** *Department of Biological Sciences, Central Washington University, 400 E University Way, Ellensburg, WA 98926; ernestk@cwu.edu;* **Patricia Garvey-Darda,** *Cle Elum Ranger District, Okanogan-Wenatchee National Forest, 803 W 2nd Street, Cle Elum, WA 98922; pgarveydarda@fs.fed.us;* **Patrick Emblidge,** *Department of Biological Sciences, Central Washington University, 400 E University Way, Ellensburg, WA 98926; emblidgep@cwu.edu.*

We are monitoring American Pika (*Ochotona princeps*) populations and Pika habitat along a 15-mile section of I-90 east of the Cascade Range crest in central Washington. In this stretch of the interstate, Washington State Department of Transportation (WSDOT) has begun improvements and expansion to improve traffic flow and safety, reduce delays due to avalanches, and improve ecological connectivity of wildlife populations. Our objectives are to (1) assess where talus habitat occurs within about 2 miles of the interstate in this project area; (2) determine which talus patches are occupied by Pikas; (3) collect tissue samples to determine whether populations north and south of the interstate are genetically distinct; and (4) provide recommendations to WSDOT on types and habitat features of crossing structures that may increase the likelihood of use by Pikas. Since 2008, we have mapped 72 talus patches onto topographic maps and entered GPS locations into a GIS layer. Ninety-five percent of patches surveyed in 2008 and 88% of those surveyed in 2009 were occupied by Pikas. Habitats occupied by Pikas included natural undisturbed talus slopes; natural talus slopes disturbed by road cuts and quarrying; and human-made rock piles (road and

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railroad fill material; rip-rap along streams). Pikas occupy some human-made rock habitats directly adjacent to the interstate shoulders and under interstate bridges. In 2009, we injected PIT tags into 25 Pikas to track their long-term residency in talus patches and possibly determine when Pikas move under the current I-90 bridges or between talus sites.

INCORPORATING WILDLIFE HABITAT CONNECTIVITY AND ECOSYSTEM FUNCTION INTO THE LAND USE PLANNING PROCESS. **Eugene Wier,** *Rogue Valley Council of Governments, 155 N 1st St, Central Point, OR 97502; ewier@rvcog.org.*

Through the Regional Problem Solving (RPS) process, Rogue Valley Council of Governments (RVCOG) is assisting the municipalities in the Rogue Valley plan for urban growth. As an addition to this process, RVCOG, with support from the Bullitt Foundation, collected natural resource information including sensitive species inventories, bird counts, and riparian surveys, and used them with on the ground observations to draft a set of recommendations for preserving wildlife corridors, habitat connectivity, and ecosystem function within lands being annexed into the urban growth boundaries. The data was sourced from local jurisdictions, state and federal agencies, and local biologists. A test of this method was applied in Central Point in 2009. The information and recommendations were presented to citizen stake holder planning groups who were drafting land-use and zoning recommendations for the newly annexed lands. The natural resource data was presented in a map and poster format and 2 biologists were available to answer questions during the planning process. The results indicate that presenting natural resource data within this context has the effect of generating land-use recommendations which incorporate wildlife corridors, open space reserves, and preservation of riparian connectivity. Eugene Wier is a Natural Resource Technician with Rogue Valley Council of Governments. He is a graduate of Southern Oregon University and has a diverse back ground in wildlife research and habitat restoration. His current focus is on improving water quality and wildlife habitat within the Bear Creek Watershed.

ECOLOGY AND TRANSPORTATION: A NATIONAL PERSPECTIVE FOR THE 21ST CENTURY. **Joseph Burns,** *National Transportation Ecology Program Leader, US Forest Service, Headquarters, 1400 Independence Avenue, MS 1121, Washington, DC 20250-1121.*

Our Nation's Interstate Highway System celebrated its 50th birthday in 2006. While the last 50 y of highway construction and operation brought tremendous prosperity and increases in quality of life for many of us, it also resulted in tremendous impacts on the Nation's natural environment and its biological diversity. The next 50 y could offer a remarkable opportunity to restore a broad array of ecological functions as these transportation projects reach the end of their design life and are re-designed to meet the growing needs of the 21st Century. Near term transportation priorities will likely continue to focus on safety, congestion/capacity issues, and environmental stewardship. Key considerations that will influence the restoration of highway projects include life cycle costs, climate change, energy, and increased needs for capacity. Underscoring all of these include livability, sustainability and affordability, and a range of intangibles that will challenge transportation planners and ecologists to address these diverse issues in a more integrated and cohesive manner. Integration of competing transportation values will be enhanced by larger scale planning and enhanced collaboration. Strategic conservation planning that includes an interconnected network of natural areas will provide valuable reference points for future transportation planning and land-use choices, and ensure ecological considerations are considered at the most appropriate scale and context. Successful implementation of such "conservation blueprints" will likely be those that are locally developed and sufficiently flexible to address short-term needs while strong enough to secure long-term goals.

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COMPARATIVE ECOLOGY OF THE WESTERN POND TURTLE ON TWO FORKS OF THE TRINITY RIVER, TRINITY COUNTY, CALIFORNIA, **Don T Ashton, Josée S Rousseau, Hartwell H Welsh, Jr.,** *USDA Forest Service, Pacific Southwest Research Station, Redwood Sciences Laboratory, 1700 Bayview Dr, Arcata, CA 95521;* **Jamie B Bettaso,** *US Fish & Wildlife Service, Arcata Office, 1655 Heindon Rd, Arcata, CA 95521.*

The Western Pond Turtle (*Actinemys marmorata*) is a habitat generalist, occurring in numerous habitats where surface water is available for a significant portion of the year. Despite its ability to survive in a variety of habitat types, this species is declining across much of its range, primarily due to habitat conversion and water resource management. Northern California harbors the majority of remaining robust populations, but even in remote areas, populations can be threatened by land and water use practices. To assess population impacts from damming, flow management, and subsequent river restoration efforts, we studied turtles on 2 forks of the Trinity River; one dammed and one free-flowing. Here we provide an overview of research conducted from 2005 to 2007, with reference to similar research from the same areas from 1991 to 1994. Where data were comparable across decades, we describe trends. We report on various population parameters between the 2 forks including riverine spatial dynamics, demographics, body size and condition. While population sizes appear to be relatively stable, several differences are attributable to management of the mainstem. Most notably, turtles on the dammed mainstem are considerably smaller than those of the same cohort on the free-flowing South Fork. Implications of smaller body size on population viability are discussed, providing direction for further research.

PHYLOGEOGRAPHY OF THE NORTH AMERICAN RED FOX: VICARIANCE IN PLEISTOCENE FOREST REFUGIA. **Keith B Aubry,** *USDA Forest Service, Pacific Northwest Research Station, 3625 93rd Avenue SW, Olympia, WA 98512; kaubry@fs.fed.us;* **Mark J Statham,** *University of California at Davis, VGL-Canid Diversity and Conservation Laboratory, One Shields Avenue/Old Davis Road, Davis, CA 95616; statham@ucdavis.edu;* **Benjamin N Sacks,** *California State University at Sacramento, Department of Biological Sciences, Sacramento, CA 95819 and University of California at Davis, VGL-Canid Diversity and Conservation Laboratory, One Shields Avenue/Old Davis Road, Davis, CA 95616; bnsacks@ucdavis.edu;* **John D Perrine,** *California Polytechnic State University, Biological Sciences Department, San Luis Obispo, CA 93407; jperrine@calpoly.edu;* **Samantha M Wisely,** *Kansas State University, Division of Biology, Ackert Hall, Manhattan, KS 66506; wisely@ksu.edu.*

Fossil, archaeological, and morphometric data suggest that indigenous Red Foxes (*Vulpes vulpes*) in North America were derived from vicariance in 2 disjunct refugia during the last glaciation: one in Beringia and one in the contiguous US. To test this hypothesis, we conducted a phylogeographic analysis of the North American Red Fox within its pre-settlement range. We sequenced portions of the mitochondrial cytochrome b (354 bp) gene and D-loop (342 bp) from 220 historical Red Fox specimens. Phylogenetic analysis of the cytochrome b gene produced 2 clades that diverged about 400,000-y-ago: a Holarctic and a Nearctic clade. D-loop analyses of the Nearctic clade indicated 3 distinct subclades; two that arose about 20,000-y-ago in the western mountains of the contiguous US and in eastern North America, and one that dates to about 45,000-y-ago that was more widespread in North America. Populations that migrated north from the southern refugium following deglaciation were derived from the colonization of North America during or prior to the Illinoian glaciation (300,000-130,000-y-ago); whereas populations that migrated south from the northern refugium represent a more recent colonization event during the Wisconsin glaciation (100,000-10,000-y-ago). Our findings indicate that Nearctic clade Red Foxes are phylogenetically distinct from their Holarctic counterparts, and reflect long-term isolation in 2 disjunct forest refugia during the Pleistocene. The montane lineage, which includes endangered populations, may be ecologically and evolutionarily distinct.

MERCURY CONTAMINATION IN LAMPREYS OF THE LOWER KLAMATH BASIN. **Jamie B Bettaso, Damon H Goodman,** *US Fish & Wildlife Service, Arcata Field Office, 1655 Heindon Road, Arcata, CA, 95521.*

Mercury has been linked to a host of lethal and non-lethal impacts on biological organisms. Impacts from mercury include immunosuppression, teratogenic effects, and endocrine disruption. Mercury, referred to as quicksilver by gold miners, was widely used in Northern California during the gold rush. High levels of mercury in the Trinity River led to health advisories for the consumption of fish

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in Trinity Lake. We investigate presence of mercury in long-lived filter feeders in the Klamath Basin, lamprey ammocoetes (*Entosphenus* spp.). In 2007, we sampled freshwater mussels (*Margaritifera falcata*) and lamprey ammocoetes from 3 paired locations in the Trinity River. In 2008, we sampled lamprey ammocoetes and sediment samples from 31 locations in the Klamath River and its tributaries. Twenty-four of the 31 (77%) batch sample sites had Total Mercury (THg) levels above 0.3 ppm, a level of concern set by the EPA for human consumption. At a single site where 31 individual ammocoetes were sampled and tested for THg, 28 of 31 (90%) were above 0.3 ppm. Adult lampreys were collected at the mouth of the Klamath with a partnership with the Yurok Tribe. Muscle fillets were examined for total mercury, as well as a subset of adult females examined for biodistribution of mercury in muscle fillets, liver, ovaries, and muscle biopsies. Twenty-three percent (5 of 21) of the muscle fillets tested had THg above 0.3 ppm. For the subset of adult females tested, the individual with the highest levels of THg for muscle fillet also had correspondingly high levels in the liver, ovaries, and the muscle biopsy. Considerations of future work with mercury levels in these unique species are discussed.

THERMOREGULATORY BEHAVIOR AND GROWTH CHARACTERISTICS OF WESTERN POND TURTLES ON THE REGULATED MAINSTEM TRINITY RIVER AND UNREGULATED SOUTH FORK TRINITY RIVER. **Jamie B Bettaso,** *US Fish and Wildlife Service, Arcata Field Office, 1655 Heindon Road, Arcata, CA 95521; jamie_bettaso@fws.gov;* **Donald T Ashton, Hartwell H Welsh, Jr.,** *US Forest Service, Redwood Sciences Laboratory, 1700 Bayview Drive, Arcata, CA 95521.*

The Western Pond Turtle (*Actinemys marmorata*) is a California State Species of Special Concern and listed as a Sensitive Species by the Oregon Department of Fish and Wildlife, as the species has been declining throughout its range. Understanding population specific life-history traits is necessary to make proper management decisions for those local populations. We have been monitoring Western Pond Turtles on the mainstem Trinity River near the Lewiston Dam and on the South Fork Trinity River near Willow Creek, California since 2003, to better assist managers in consideration of both restoration designs and possible flow management that may benefit this long-lived species. From 2005 to 2007, we combined the use of radio-telemetry and thermometers on the external carapace of turtles to better understand their thermoregulatory behavior relative to river temperatures on these 2 forks of the Trinity River. We also conducted a 3 summer field study with mark-recapture on each river to obtain population estimates and to glean information on demographic parameters such as age structure, sex-ratios, and growth curves. The mainstem Trinity River has a colder thermal regime in the summer due to hypolimnetic releases from the dam, resulting in both a change of that population's thermoregulatory behaviors and in their growth in this colder aquatic environment compared to the turtles on the South Fork Trinity River. We present the basking behaviors and growth of turtles under the age of 10 y, and contend that these 2 aspects of Western Pond Turtles are linked.

THE EFFECTIVENESS OF VERTEBRATE PASSAGE AND PREVENTION STRUCTURES: A STUDY OF BOECKMAN ROAD IN WILSONVILLE. **Leslie Bliss-Ketchum,** *Environmental Science and Management Program, Portland State University, PO Box 751, Portland Oregon 97207;bliss.ketchum@gmail.com*; **Catherine de Rivera,** *Environmental Science and Management Program, Portland State University, PO Box 751, Portland Oregon 97207; derivera@pdx.edu;* **Kerry Rappold,** *City of Wilsonville, 29799 SW Town Center Loop E, Wilsonville, Oregon 97070; rappold@ci.wilsonville.or.us*

Roads fragment habitats and affect the stability and evolution of the surrounding wildlife community. Therefore, it is crucial to examine whether wildlife passage and prevention structures can effectively reduce road mortality while maintaining habitat permeability. Here we examine the effectiveness of the structures of a new (2008) road in the city of Wilsonville, Oregon, the Boeckman Road Extension, which included four types of passage structure and two types of prevention fencing into the road design. Our research evaluates the extent to which the species and numbers of animals using the passage structures are representative of the populations in the area and their movements at distance from the road. Motion detect cameras were used to assess large and medium animal movements along five transect parallel to the road. Mark recapture studies were conducted along transects to assess small movements. Results thus far show the bridge passage structure as most effective and ranked second to other structures for cost efficiency per animal passed. Frequently detected species show no obvious issues of road avoidance with 16 of the 20 detected species found using passage structures. These results provide information

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about the community-level effectiveness of different passage structure types and can help determine what types of passage structures are needed for similar species in similar habitats. Future research will include comparison with other roadways, the effects of artificial light on animal movements and population modeling to determine level of mortality through roadkill that would destabilize populations.

THE EFFECTS OF SEASONAL DRYING ON WESTERN POND TURTLE MOVEMENT ECOLOGY AND BODY CONDITION IN A NORTHERN CALIFORNIA RIVER. **Cheryl Bondi, Sharyn Marks,** *Humboldt State University, 1 Harpst St., Arcata, CA 95521; cbondi11@gmail.com.*

Many turtle species require aquatic and terrestrial habitats during different times in their life history. The status of many populations depends directly on the condition of both environments, as well as the connectivity between them. Identifying factors that prompt movements between the two, or conditions in which the aquatic environment is no longer suitable due to seasonal drying, can aid in predictions on migration timing. When water levels decline, turtles may respond in different ways, such as staying within remnant pools or estivation. Research on Western Pond Turtle (*Actinemys marmorata*) response to water declines is needed for conservation of this species. We used radio-telemetry to compare the seasonal movements of Western Pond Turtles inhabiting perennial and intermittent river reaches of the Mad River, California. In addition, we investigated the effects that seasonal drying may have on body condition of individuals. Turtles in the intermittent reach migrated from the river earlier than those in the perennial reach. As water levels dropped, turtles migrated to upland habitats to estivate by burying themselves beneath substrate and leaf litter. Despite turtles at the intermittent site returning to the river earlier in the spring, individuals spent significantly more time on land annually than those at the perennial site. Turtles at the intermittent site had lower body condition suggesting an ecological tradeoff between estivation and body size. These results can aid management in predictions of terrestrial occupancy in intermittent systems, as well as maintaining upland habitats that may be potential estivation sites.

RANGEWIDE OVERVIEW OF THE WESTERN POND TURTLE: DISTRIBUTION, TAXONOMY, ECOLOGY, AND CONSERVATION. **R Bruce Bury,** *US Geological Survey, Forest and Rangeland Ecosystem Science Center, 3200 SW Jefferson Way, Corvallis, OR 97331; buryb@usgs.gov.*

The Western Pond Turtle, *Actinemys* or *Emys* (formerly *Clemmys*) *marmorata*, occurs west of the Cascade crest from approximately Seattle, Washington, to the northern portion of Baja California. Although covering a relatively large linear range, turtles require freshwater and most frequent ponds, lakes or slow waters of rivers or streams. Its taxonomy appears complex and, at this time, the nearest relative is the European Pond Turtle, *Emys orbicularis*. There are now three clades (groups) in central California southward, and one clade in the Pacific Northwest. Growth rates are based on scute rings useful up to age 15, sometimes longer. Most turtles in the Central Valley of California grow twice as fast as turtles in the Northwest, but northern populations tend to be larger in overall shell size. Because of their longevity, turtles offer platforms to record changes in responses to environmental conditions. Field studies could compare growth curves, age to maturity, and maximum size of turtles between different decades. Yet, few studies ever are published. These population features are needed to better reveal effects of urbanization, land losses, and projected global climate change. Marked individuals also allow for estimates of population size and tracking of abundance trends over time. It is vital to not only archive locations and data on individuals in accessible files, but to also publish the results in the scientific literature.

LONG-TERM ECOLOGICAL COMPARISON OF THE WESTERN POND TURTLE:STATUS, LIFE HISTORY TRAITS AND 'REMARKABLE' LONGEVITY. **R. Bruce Bury,** *US Geological Survey, Forest and Rangeland Ecosystem Science Center, 3200 SW Jefferson Way, Corvallis, OR 97331; buryb@usgs.gov*

One of the longest biological studies on any vertebrate in western North America started with my marking Western Pond Turtles (*Actinemys marmorata*) in a northern California stream. As part of my graduate studies, I marked 600 turtles in 1968-1971. Occasional revisits continue to this day, adding another 400 marked turtles. The waterway as well as turtle abundance and growth rates have changed little over time. Few young are found due to their cryptic color, small size and habits of hiding. In 2008, we recaptured an adult female marked in 1968 when she was >15-y-old. Also, this turtle was in the same pool where she was first found 40 y earlier. Two other turtles were medium-sized turtles when marked in 1970. In 2009, one turtle hit a record of 41 y (marked in 1968). Approximately 15% of the population

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appears to persist >30 y of age and, perhaps, 5% are >50 y. This new information changes how we need to perceive turtle populations. Adults may persist for decades and many appear not to move far from natal sites. The Western Pond Turtle may prove useful as an indicator of projected global climate change or other perturbations. You can record turtle "health" by measuring annual growth increments. Losses of adult turtles in a population may require decades to be replaced. Future research and management on this turtle needs to recognize the remarkable longevity of this species.

OCCURRENCE AND DISTRIBUTION OF *BATRACHOCHYTRIUM DENDROBATIDIS* AT HIGH LATITUDES. **Tara Chestnut,** *Portland State University, Environmental Science and Management Department, and US Geological Survey, Oregon Water Science Center, PO Box 751, Portland, OR 97207; chestnut@pdx.edu, chestnut@usgs.gov*.

The amphibian pathogen *Batrachochytrium dendrobatidis* (*Bd*) is widespread and global in distribution, although it does not appear to be ubiquitous. Very little is known about *Bd* distribution and prevalence at high latitudes. *Bd* is predicted to have a low likelihood of occurrence in the boreal environment based on distribution models; however these models rely on detections from infected animals and do not include detections from environmental sampling or non-detections. *Bd* has been detected in amphibians to approximately 60 degrees north latitude in coastal areas of northern North America and Europe. Interior areas are largely unexplored. The goals of this work are to describe the present-day northern limits of *Bd* and evaluate *Bd* invasion pathways to novel environments in response to climate change.

CAN INVASIVE BULLFROGS (*LITHOBATES CATESBEIANUS*) PLASTICALLY ACCELERATE LARVAL DEVELOPMENT IN A DRYING ENVIRONMENT? **Megan Tetsuko Cook, Tiffany Sacra Garcia,** *Department of Fisheries and Wildlife, 104 Nash Hall, Oregon State University, Corvallis, OR 97331; Megan.Cook@oregonstate.edu; Tiffany.Garcia@oregonstate.edu.*

The American Bullfrog (*Lithobates catesbeianus*) has successfully invaded most of the western United States, negatively impacting native pond-breeding amphibians directly and indirectly through competition and predation. To develop effective management techniques, we need to understand the mechanisms contributing to the successful invasion of Bullfrogs in the Pacific Northwest. We hypothesize that this invasion success is due, in part, to plasticity in larval development rates and the use of ephemeral breeding habitats. In both its native and invasive ranges, Bullfrogs typically breed in permanent wetland habitat and larvae take at least one full year to reach metamorphosis. Preliminary studies from the southern Willamette Valley in Oregon, however, documented Bullfrog larvae in ephemeral wetland habitat metamorphosing in 4 mo. During summer and fall of 2009, we conducted a common garden mesocosm experiment to quantify larval development rate using individuals collected from ephemeral and permanent wetland habitats under 3 hydroperiod treatments. Understanding the mechanisms behind accelerated larval development in Bullfrogs is crucial to managing this invasive species in the Pacific Northwest. Although preliminary data analysis does not indicate a difference between treatment groups, this study provides a starting point for evaluating seasonal hydroperiod management, such as pond draining, as an effective method to control invasive Bullfrog populations.

A CASE STUDY IN THE USE OF ELK RELOCATION AS A MANAGEMENT TOOL. **Daniel Ethridge,** *Oregon Department of Fish and Wildlife, 1495 East Gregory Road, Central Point, OR 97502; dan.d.ethridge@state.or.us.*

The Roosevelt Elk (*Cervus elaphus roosevelti*) herd in lower elevation Jackson County has grown substantially in the past 15 y. Approximately 1000 elk now occupy low elevation agricultural lands and cause considerable damage to local orchards in addition to safety concerns along major roadways. Recreational hunting has failed to control the size of this herd, due primarily to limited public access. Due to heightened conflict and growing concern from the public, an effort was made to reduce the size of the Coker Butte herd in the area north of Medford, Oregon, which had grown to approximately 85 animals. Our objective was to remove enough elk from the area to reduce conflict through limited recreational hunting, damage hunts, and translocation. In the spring of 2006, one elk was captured and released with a VHS radio telemetry collar to monitor the herd's movement. Between 2006 and 2009, a total of 32 elk were captured and removed from the herd. Elk were captured using coral traps and tested for diseases and handled according to our animal health policy. An additional 28 elk were harvested from

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recreational and damage hunts. The elk herd was reduced from approximately 85 to 25 animals. Trapping and relocating elk is costly and time consuming, but appears to be effective for short term management, especially when combined with recreational and damage hunting.

THE ROLE OF PESTICIDES IN THE DECLINE OF AMPHIBIANS IN THE SIERRA NEVADA, CALIFORNIA. **Gary M Fellers, Patrick M Kleeman,** *US Geological Survey, Western Ecological Research Center, Point Reyes National Seashore, Point Reyes, CA 94956; gary_fellers@usgs.gov*

Contaminants appear to be playing a significant role in the decline of amphibians in California, especially in areas downwind of the Central Valley where application rates exceed 500,000 kg/y (active ingredient) for the 4 most commonly used compounds. Organophosphorus pesticides are now ubiquitous in the environment and are highly toxic to amphibians. We examined the toxicity of chlorpyrifos, malathion, diazinon, and their oxon breakdown products on *Rana boylii* (Foothill Yellow-legged Frog). Median lethal concentrations of the parent forms during a 96 h exposure were 3.00 mg/L (24 h) for chlorpyrifos, 2.14 mg/L for malathion, and 7.49 mg/L for diazinon. Corresponding oxons were 10 or 100 times more toxic than their parental forms. We conclude that environmental concentrations of these pesticides can be harmful to R. boylii. We also looked at chronic toxicity of 2 commonly used insecticides (chlorpyrifos and endosulfan) on larval *Pseudacris regilla* (Pacific Chorus Frog; aka Northern Pacific Treefrog) and *R. boylii*. Chlorpyrifos was 3 times as toxic to *R. boylii*. For endosulfan, *R. boylii* were >40 times as sensitive; all *R. boylii* exposed to concentrations >0.8 µg/L died before they metamorphosed. Each of the most commonly used compounds can be found in air, snow, or amphibian tissue. Parent compounds of the most commonly used pesticides are present in the Sierra Nevada in sufficient concentration to cause amphibian mortality. Our work adds to the increasing evidence that pesticides are harmful to amphibians that live in areas up to 100 km from pesticide application. Current research is looking at the impact of pesticides on the production of antimicrobial peptides which play a role in reducing susceptibility to infection by amphibian chytrid (*Batrachochytrium dendrobatidis*).

HABITAT RESTORATION INFLUENCE ON AMPHIBIAN ASSEMBLAGE STRUCTURE, WILLAMETTE MISSION STATE PARK, OREGON. **Rebbecca L Hill,** *Environmental Sciences, Oregon State University, Corvallis, OR 97301; rebbeccahill@yahoo.com*; **Brett Hanshew, Tiffany S Garcia,** *Department of Fisheries and Wildlife, Oregon State University, Corvallis, OR 97301; brett.hanshew@oregonstate.edu; tiffany.garcia@oregonstate.edu.*

Habitat restoration projects can impact amphibian communities in non-intuitive ways. A collaborative restoration effort in Willamette Mission State Park, which borders the Willamette River near Salem, Oregon, is one example of how reestablishing historical flood channels may detrimentally impact amphibian populations. The flood of 1861 moved the Willamette River to its current location, yet a remnant channel still divides the 1600-acre park. The channel inlet and outlet were blocked by dikes for agricultural production and the resulting water bodies provide ephemeral and permanent lentic habitats for amphibians. The objective of the restoration project is to restore natural riverine functions, hydraulic conditions, and geomorphologic processes by removing the dikes. This will reconnect the river with its natural floodplain and provide annual riverine flow through the park. The shift in available aquatic habitat from lentic to lotic is expected to change the park's amphibian biodiversity and species richness; therefore, we initiated a 5-y amphibian monitoring survey designed to track changes in species richness, habitat use, and relative abundance. Terrestrial survey techniques follow established protocol and aquatic survey methods have been hybridized from established lotic and lentic protocols to reflect the change in habitat type over time. We predict a reduction in available aquatic breeding habitat and consequently a decrease in amphibian abundance including: Northern Red-legged Frog (*Rana aurora aurora*), Northwestern Salamander (*Ambystoma gracile*), Rough-skinned Newt (*Taricha granulosa*), Northern Pacific Treefrog (*Pseudacris regilla*), American Bullfrog (*Lithobates catesbeianus*), and Long-toed Salamander (*Ambystoma macrodactylum*). However, we predict no change in terrestrial-breeding Oregon Ensatina (*Ensatina eschscholtzii*) populations.

THE COLLECTION AND CONTRIBUTION OF DATA TO THE AVIAN KNOWLEDGE NETWORK AND THE WESTERN HUMMINGBIRD PARTNERSHIP. **Karen Hussey,** *Klamath Bird Observatory, PO Box 758, Ashland, OR 97520; kfh@klamathbird.org*; **Josée Rousseau,** *Klamath Bird*

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Observatory and US Forest Service, Redwood Sciences Laboratory, 1700 Bayview Dr, Arcata, CA 95521; josee.rousseau@mail.mcgill.ca; **Michael Fitzgibbon,** *PRBO Conservation Science, 3820 Cypress Drive, Petaluma, CA 94954; mfitzgibbon@prbo.org*; **John D Alexander,** *Klamath Bird Observatory, PO Box 758, Ashland, OR 97520; jda@klamathbird.org.*

Hummingbirds are the feathered jewels of the migratory bird world, but receive relatively little attention from a conservation standpoint. There are indications that populations of at least some of the species are declining. In 2002, the Hummingbird Monitoring Network began addressing this GAP in avian conservation and in 2008, in conjunction with the US Forest Service, the Western Hummingbird Partnership (WHP) was created with the goal of addressing hummingbird conservation issues throughout western North America, and building a broader partnership to address these issues. The Klamath Bird Observatory-Redwood Sciences Laboratory Avian Data Center is identifying, describing and archiving existing hummingbird datasets through the Landbird Monitoring Network of the Americas (LaMNA). These data are being made available through a centralized web portal that is hosted by PRBO Conservation Science. This applied effort will be presented as an example of broader data archiving and distribution efforts that meet conservation science objectives put forth by Partners in Flight and the North American Bird Conservation Initiative. These objectives include making monitoring data available to inform conservation planning and implementation.

PLETHODONTID SALAMANDER MOVEMENT, SURVIVAL, AND RECAPTURE FREQUENCIES AT A MANAGED HEADWATER FOREST SITE IN THE OREGON COAST RANGE. **Matthew R Kluber,** *Department of Forest Ecosystems and Society, 321 Richardson Hall, Oregon State University, Corvallis, OR 97331; matthew.kluber@oregonstate.edu*; **Deanna H Olson,** *US Forest Service, Pacific Northwest Research Station, 3200 SW Jefferson Way, Corvallis, OR 97331; dedeolson@fs.fed.us.*

We are examining temporal and spatial patterns of terrestrial amphibian species abundances and individual movements in western Oregon managed headwater forest stands using artificial cover object (ACO) arrays. Using mark-recapture methods, we also are estimating the effects of species and seasonality on apparent survival rates and recapture probabilities. We captured, marked, and released over 300 individual salamanders during 18 site visits between 2006 and 2009. These captures were dominated by 3 plethodontid species: Ensatina (*Ensatina eschscholtzii*), Western Redback Salamander (*Plethodon vehiculum*), and Dunn's Salamander (*P. dunni*). We observed 64 animals move between ACOs at least once with most salamanders moving between adjacent ACOs (<5 m), and a maximum distance traveled being 31 m (Ensatina). Although total captures were evenly distributed between near-stream (<15 m from stream edge) and upslope arrays (>15 m), species distributions differed with distance from stream and most movement occurred in the near-stream arrays (<15 m). Using program MARK, we estimated that the annual apparent survival rate for our dominant species was 0.64 (95% CI = 0.57-0.71); however, recapture probabilities varied among species and between site visits. Our results have implications for the efficacy of forest management approaches to address ground-dwelling species with limited dispersal capabilities in headwaters; riparian corridors are frequently used by both semi-aquatic and upland species. Stream-to-ridgeline dispersal occurs, yet is less frequent, although our ACO design likely was restricted in its utility to fully monitor plethodontid salamander movements.

INTEGRATING CLIMATE CHANGE PREPARATION AMONG NATURAL AND HUMAN COMMUNITIES. **Marni E Koopman, Brian R Barr, Richard S Nauman, Cindy Deacon Williams, Jessica L Leonard, Dominick DellaSala,** *National Center for Conservation Science and Policy, 84 Fourth St, Ashland, OR 97520; marni@nccsp.org.*

Climate change presents an emerging challenge for conservation and land management organizations and agencies. In response to this challenge, a tsunami of papers on climate change adaptation has appeared in the scientific literature. These papers and other handbooks and symposia proceedings describe the available options that managers have in preparing species and landscapes for climate change. Yet rarely does the literature on climate change adaptation for natural resources express the importance of integrating resource adaptation strategies with climate change adaptation for people, nor does it explore the complexities inherent in that integration. As climate change progresses and the impacts to people become more severe, we run the risk of reactive measures that result in additional negative impacts to natural ecosystems (such as new dams, ecologically inappropriate forest thinning, new energy projects in

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sensitive locations, etc.). By planning now for climate change impacts to both people and ecosystems, we are able to develop strategies that benefit people and natural ecosystems (such as restoration of wetlands and floodplains that protect people from catastrophic floods, changes to zoning laws to move people away from floodplains and high fire risk areas, placement of energy developments away from areas of connectivity for wildlife, etc.). We have tested this process in 3 river basins of Oregon, and we are extending it into California and other areas as part of the ClimateWise program. These ClimateWise workshops have produced a number of interesting observations that can be useful to other preparation efforts.

SHORT-TERM RESPONSE OF PACIFIC GIANT SALAMANDERS TO TIMBER MANAGEMENT IN SOUTHWESTERN OREGON. **Niels Leuthold,** *Department of Forest Science, Oregon State University, Corvallis, OR 97331; niels.leuthold@oregonstate.edu;* **Michael J Adams,** *US Geological Survey, Forest and Rangeland Ecosystem Science Center, 3200 SW Jefferson Way, Corvallis, OR 97331; mjadams@usgs.gov*; **John P Hayes,** *Department of Wildlife Ecology and Conservation, University of Florida, Gainesville, FL 32611; hayesj@ufl.edu.*

Many previous studies have found a negative effect of timber management on stream amphibians, but the results have been highly variable and region specific. Most of these studies have been retrospective studies comparing stands of different ages, and focus on stands that were harvested under older management practices. Over the last 30 y timber management practices have changed substantially, yet little work examines if these changes alter the effects of timber management on stream amphibians. We examined the influences of contemporary forest practices on Coastal Giant Salamanders (*Dicamptodon tenebrosus*) as part of the Hinkle Creek paired watershed study. We used a mark-recapture analysis to estimate Coastal Giant Salamander abundance at 100, 1-m segments spread throughout the basin and then used extended linear models that accounted for correlation resulting from the repeated surveys at sites across years. Abundance was associated with substrate, but we found no evidence of a harvest effect. Our top model indicated each 10% increase in the proportion of the substrate that was small cobble or larger increased median density of Coastal Giant Salamanders 1.05 times. No individuals were detected at 30 to 47 sites each year. We used a Monte Carlo analysis to examine the effect of probabilistically assigning captures to sites where none occurred. The Monte Carlo analysis suggested that our results were not sensitive to missing captures at some sites. This study did not find evidence of a short-term effect of timber harvest at Hinkle Creek.

REINTRODUCING FISHERS (*MARTES PENNANTI*) TO OLYMPIC NATIONAL PARK: PROGRESS THROUGH YEAR 2. **Jeffrey C Lewis,** *Washington Department of Fish and Wildlife, 600 Capitol Way North, Olympia, WA 98501; lewisjcl@dfw.wa.gov*; **Patti J Happe, David J Manson,** *Olympic National Park, 600 E Park Ave, Port Angeles, WA 98362; Patti_Happe@NPS.gov, Dave_Manson@nps.gov;* **Kurt J Jenkins,** *US Geological Survey, Forest and Rangeland Ecosystem Science Center, Olympic Field Station, 600 E Park Ave, Port Angeles, WA 98362; Kurt_Jenkins@USGS.gov*

In 2008, we initiated a 3–y project to reintroduce the Fisher (*Martes pennanti*) to Olympic National Park on Washington's Olympic Peninsula. The Fisher had been extirpated in Washington as the result of historical over-trapping and loss and fragmentation of suitable habitat. In years 1 and 2 of the reintroduction, we translocated 49 Fishers (33F, 16M) from British Columbia and released them in Olympic National Park. Each Fisher was equipped with a radio-transmitter and relocated via aerial and ground telemetry. We examined movements, home range establishment, survival, and reproduction to evaluate reintroduction success. Preliminary results indicate that Fishers moved extensively following release, commonly traversing mountainous terrain, major rivers, and both managed and unmanaged forest landscapes of the Olympic Peninsula. Most males and females began limiting movements within a localized area after the breeding season, between June and September. Males released in year 1 increased their movements again during the breeding season in year 2. Ten (8F, 2M) of 18 Fishers released in year 1 survived 2 y, while 4 died, and the status of 4 others is unknown. Twelve (5F, 7M) of 31 released in year 2 have survived approximately 1 y, while 15 have died, and the status of 4 others is unknown. We documented 3 translocated females giving birth to at least 7 young; other translocated females may have also reproduced. The 3rd year of releases is underway and we expect to release as many as 45 additional Fishers in this final year of releases.

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ABUNDANCE AND BIOMASS OF ROCKY MOUNTAIN TAILED FROGS (*ASCAPHUS MONTANUS*) IN NORTHERN IDAHO STREAMS. **Kirk Lohman,** *USGS, Upper Midwest Environmental Sciences Center, 2630 Fanta Reed Road, La Crosse, WI 54603; klohman@usgs.gov.*

Tailed frogs are a common and conspicuous vertebrate in many forested streams in the Pacific Northwest. I conducted surveys for Rocky Mountain Tailed Frogs (*Ascaphus montanus*) at 6 sites in the Mica Creek drainage in northern Idaho during 1997-2000 and 2002-2009. My objectives were to monitor tailed frog tadpole abundance and assess annual and spatial variation in population density. Average total tadpole density ranged from a low of 1.88/m^2 in 2002 to a high of 14.06/m^2 in 2009. Densities were lowest in 1997-1998, 2002-2003, and 2008, and substantially greater in 1999-2000, 2004-2007, and 2009. Within years, tadpole densities varied greatly among sites, with high density sites exceeding low density sites by 10-fold or more. The relative abundance of tadpoles among sites was similar from year to year (for instance, sites with the highest and lowest densities in 1997 also tended to have the highest and lowest densities in subsequent years). Similar patterns were observed when comparing tadpole biomass among years and sites. Flow regime is likely a major determinant of tailed frog abundance. Tadpole numbers were depressed in years following large spring run-off and rain-on-snow events (1997, 2002, 2008), whereas greater densities were seen in years following extended periods without high flow events (1999-2000, 2004-2007).

THE HISTORICAL DEMOGRAPHY OF THE DESERT NIGHTSNAKE (*HYPSIGLENA CHLOROPHAEA*). **Edward A Myers, Robert E Weaver, Hugo Alamillo,** *School of Biological Sciences, PO Box 644236, Washington State University, Pullman, WA 99164; edward_myers@wsu.edu (EAM); weaver@wsu.edu (REW); halamillo@wsu.edu (HA).*

Hypotheses about the effects of glacial mass movement during the Pleistocene (0.01–1.8 mya) have proposed differential responses across taxa. One hypothesis suggests that much of the herpetofauna of the Great Basin would have kept a similar range distribution as what is seen today, while the vegetation changed from a desert scrub community to one dominated by pinyon-juniper woodlands. This hypothesis is in opposition to another prominent hypothesis that relies on more restricted distributional ranges within 'Mexican refugia' during this epoch. Given the heterogeneous effects during the Pleistocene, we set out to investigate the response of a clade of Hypsiglena to the recession of the Cordilleran ice sheet and look for evidence supporting either of the 2 prominent hypotheses. Using mtDNA markers and Bayesian Skyline Plots, we show that Hypsiglena chlorophaea experienced a decline in effective population size beginning 128 kya, and a subsequent growth in size 18 kya. This suggests southern regions were not refugia for this clade and that population growth happened earlier than expected.

INTERAGENCY FISHER CONSERVATION ASSESSMENT AND STRATEGY. **Interagency Fisher Biology Team, Bob Naney,** *Okanogan-Wenatchee National Forest, 24 West Chewuch Road, Winthrop, WA 98862; rnaney@fs.fed.us*; **Laura Finley (presenting),** *US Fish and Wildlife Service, 1829 South Oregon Street, Yreka, CA 96097; laura_finley@fws.gov.*

The West Coast Distinct Population Segment (DPS) of the Fisher (*Martes pennanti*) is warranted for protection under the Endangered Species Act. An interagency team of biologists from federal and state agencies, British Columbia Ministry of Environment and a Native American Tribe were assembled in 2005 to develop a conservation assessment and strategy for the Fisher. The assessment documents the current status of Fishers on the west coast, including a synthesis of habitat and an evaluation of threats. A conservation strategy is being developed based on the information provided in the assessment. The goals of the strategy are to provide recommendations to restore and/or maintain habitat conditions that can support Fishers, re-establish Fisher populations, and restore connectivity by creating and managing for resilient landscapes throughout the west coast assessment area. We will be presenting an outline of the information contained in the draft conservation assessment and a summary of the design and recommendations in the draft conservation strategy.

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THE MIGRATORY STATUS OF BLACK-TAILED DEER IN JOSEPHINE COUNTY. **Steven A Niemela,** *Oregon Department of Fish and Wildlife, 1495 East Gregory Road, Central Point, OR 97502; steve.a.niemela@state.or.us.*

Josephine County, Oregon limits rural subdivisions to 40 acres or larger on parcels below 2500 ft in elevation to protect the habitat of wintering Black-tailed Deer (*Odocoileus hemionus columbianus*). Despite this investment in habitat protection, information about the seasonal movements of deer in Josephine County is lacking. In 2005, we began a project to capture deer above 2500 ft in Josephine County during the summer, attach radio-collars, and monitor their movements with aerial telemetry. Over the next 4 y, we monitored 30 deer and observed a statistically significant decline in overall mean elevation for collared deer in 3 winters ($P < 0.05$), and a non-significant decline in a fourth. The mean elevation of collared deer was 3381 ft (n = 30, SE = 153) during the winter season, 881 ft higher than designated habitat. Sixteen percent of deer (n = 5) migrated at least 1000 ft lower in elevation and utilized designated winter range for a portion of the winter. Forty-six percent of deer (n = 14) moved at least 150 ft lower in mean elevation during the winter. However, 37% of deer (n = 11) made no seasonal migration and remained on summer range during winter despite considerable snowfall. Winter range appears to be an important habitat in Josephine County for a component of the deer herd. Decisions made by Josephine County to conserve or develop big game habitat will have important implications for many non-game species.

UP AND OVER: HEADWATER LINKAGE AREAS EXTEND RIPARIAN RESERVES OVER RIDGELINES TO INTEGRATE FISH AND AMPHIBIAN CONSERVATION IN FORESTED LANDSCAPES. **Deanna H Olson, Kelly M Burnett,** *US Forest Service, Pacific Northwest Research Station, 3200 SW Jefferson Way, Corvallis, OR 97331; dedeolson@fs.fed.us.*

In the US Pacific Northwest, streams in wet temperate forests are habitat for several species of concern including salmonid fishes and amphibians. Several amphibian species are found in and along small headwater streams. These streams can be sources of wood, boulders, and spawning gravel, important attributes of salmon habitat downstream. Our studies have addressed these species habitat associations and designs for habitat management. Riparian reserves appear to be an effective management provision along the aquatic continuum, but are often not extended into headwaters and do not address amphibian habitats outside riparian corridors. We developed alternatives for headwater linkage areas aimed at managing headwater debris-flow-prone areas for downstream fish habitat attributes, and overland connectivity for amphibians. Criteria for linkage area selection included landscape-, drainage basin-, and forest stand-scale considerations such as locations of target species, land ownership patterns, total number of links established, connectivity among discrete major river basins, and climate change predictions. Placement of linkages also could emphasize discrete large watersheds having no downstream aquatic connectivity, and in particular, headwater "triads" where 3 discrete watersheds join at the headwaters; there are 23 such areas in the Oregon Coast Range Province. At smaller spatial scales, we modeled 1 linkage area connecting adjacent 7th–field watersheds (HUCs) for the Oregon Coast Range Province, which yielded connectivity of approximately 15% of the headwater streams and approximately 5000 links. Although proposed linkage areas target headwater species by design, the resulting web of connection across the landscape would be expected to benefit numerous forest-dependent species.

AN UPDATE ON WHITE NOSE SYNDROME AND WHAT WE CAN DO TO PREPARE. **Pat Ormsbee,** *Willamette National Forest, USDA Forest Service, 3106 Pierce Parkway, Suite D, Springfield, OR 97477; pormsbee@fs.fed.us.*

White Nose Syndrome (WNS) has decimated hibernating colonies of bats in the eastern US. In 2006, bats were first observed leaving a hibernaculum in-mass during daylight in the cold of March in Albany County, New York. By 2009, WNS had spread to 9 states and resulted in colony mortalities of 80-100%. Scientists have struggled to identify the cause of the aberrant behavior, starvation, and deaths attributed

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to WNS. Through extensive collaborative investigations by state, federal, and private scientists, a newly described psychrophilic (cold-loving) fungus colonizing the skin of bats has been targeted as the primary causal agent. The fungus, *Geomyces destructens*, thrives between 5-10°C, a temperature range that also is typical of bat hibernacula. While the presence of WNS in the US is currently restricted to the east, human awareness, modified behavior, and preparation are critical in slowing the inevitable spread and reducing the devastating effects of WNS.

FIELD OBSERVATIONS OF OVIPOSTION AND EARLY DEVELOPMENT OF THE COASTAL TAILED FROG (*ASCAPHUS TRUEI*). **Amber F Palmeri-Miles,** *Central Washington University, 400 E University Way, Ellensburg, WA 98926; palmeria@cwu.edu;* **Keith A Douville, Julie A Tyson, Kristen D Ramsdell, Marc P Hayes,** *Washington Department of Fish and Wildlife, 600 Capitol Way North, Olympia, WA 98501; Marc.Hayes@dfw.wa.gov.*

Knowledge of tailed frog oviposition sites, always concealed in streambeds, is limited. What is known is based on opportunistic discoveries during the examination of instream substrates. These haphazard discoveries have resulted in encountering various stages of clutch development, but have never involved field observation of oviposition. Here we report the 1st field observation of oviposition by tailed frogs and provide selected data on early development. Our observations were made on Miller Creek on the eastern Olympic Peninsula. During rubble-rouse sampling for stream-associated amphibians on 29 July 2008, we rolled a large boulder beneath which 4 adult female *Ascaphus truei* and 183 *A. truei* eggs were found. One female was actively laying eggs. To help gauge development, we revisited this site 9 times through embryonic and post-hatching development, and placed 7 eggs in an instream enclosure simulating streambed conditions. High resolution examination of a photograph indicated that oviposition was communal; we estimated that 3 egg masses with 70, 68, and 47 eggs were laid on the same rock with a fourth mass of 24 eggs located <1 m downstream. Our data on embryonic and early larval development agree closely with the laboratory data of Brown (1975, Comp. Biochem. Physiol. 50A:397-405). We recorded a similar decline in growth rate during early larval development that may reflect the transition from the lipid-and-protein-rich yolk diet of hatchlings to the less nutritious diet of diatoms and detritus of actively feeding young larvae. We provide a perspective for reconsidering the concept of communal oviposition.

MONITORING WILDLIFE RESPONSES TO RESTORATION PROJECTS. **David Pilliod,** *US Geological Survey, Forest and Rangeland Ecosystem Science Center, 970 Lusk Street, Boise, ID 83706; dpilliod@usgs.gov.*

Natural resource managers are often asked to assess potential effects of proposed restoration projects on wildlife populations, yet these data are often lacking. I describe some of the challenges of monitoring wildlife responses to restoration projects using insights from 2 stream studies conducted in central Idaho. The 1st study investigated the effects of prescribed fire on stream amphibians and invertebrates and found no differences in taxa density from before to after the treatment when compared with reference populations in untreated streams. The 2nd study examined amphibian and invertebrate responses to 2 post-mining stream restoration projects and preliminary findings indicated that taxa responses were dependent on restoration characteristics and post-restoration natural disturbances. Together these studies illustrate the importance of pre- and post-restoration data, data from untreated reference areas, and characteristics of restoration activities and post-treatment conditions for obtaining reliable information about wildlife responses to restoration projects.

MOVEMENT PATTERNS OF WESTERN POND TURTLES ON THE CARRIZO PLAIN ECOLOGICAL RESERVE, CALIFORNIA. **David Pilliod,** *US Geological Survey, Forest and Rangeland Ecosystem Science Center, 970 Lusk Street, Boise, ID 83706; dpilliod@usgs.gov*.

I used radio-telemetry to track the terrestrial movements and seasonal habitat use patterns of Western Pond Turtles (*Actinemys marmorata*) near 2 ponds at the Chimineas Unit of the Carrizo Plain Ecological Reserve, California. Sixty-nine turtles were captured in September 2005 and 9 turtles (3 male, 6 female) weighing >300 g were selected for external radio-transmitter attachment. All turtles moved away from the ponds as water levels receded in the fall, resulting in periods of terrestrial winter estivation ranging from 62 to 259 d. The movement patterns of individual turtles varied, but ranged from 933 to 1956 m

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over the 448-d study. On average, turtles traveled a maximum distance of 130-250 m from the pond into oak and chamise chaparral habitats. These findings demonstrate the importance of terrestrial habitats for pond turtles in this part of their range, and suggest that a protective buffer of at least 250 m around ponds may be necessary to protect the habitats of these turtles.

TAXONOMIC CHALLENGES IN MAPPING THE DISTRIBUTION OF AMPHIBIAN CHYTRIDIOMYCOSIS: WHO'S WHO, OR WHERE IN THE WORLD IS *HYLA GEOGRAPHICA*?
Kathryn L Ronnenberg, Deanna H Olson, *US Forest Service, Pacific Northwest Research Station, 3200 SW Jefferson Way, Corvallis, OR; kronnenberg@fs.fed.us; dedeolson@fs.fed.us*; **Jon Bielby,** *Zoological Society of London, London, NW1 4RY UK*; **Matthew Fisher,** *Department of Infectious Disease Epidemiology, St Mary's Hospital, Imperial College, London, W2 1PG UK.*

As part of the Global *Bd* (*Batrachochytrium dendrobatidis*) Mapping Project, tracking the occurrence of amphibian chytridiomycosis, we examined taxonomic patterns of infection at the family level as well as geographic distribution. For these correlations to be robust, we wanted to use the most meaningful classification, based on the best-known genetic relationships among species. This work has been complicated by the drastic changes in amphibian taxonomy between 2005 and the present. Taxonomic research is published in a wide variety of journals, and online resources may be outdated or may not index by synonymy, so tracking down a species' current name and classification can be a challenge. This concern is not unique to amphibians, as witness the changes among the group formerly known as reptiles. Painstaking taxonomic detective work determined that of 768 species of anurans sampled, 288 have changed family, genus, or species name since reported, based on the American Museum of Natural History's Amphibian Species of the World online database. This compares to 6 of 108 caudates, though changes are picking up speed among salamanders as well. *Bd* has been detected in 32 of 37 anuran and 5 of 8 caudate families sampled. Randomization tests revealed that *Bd* occurrence was higher than random infection would predict among 7 anuran and 2 caudate families, and lower than would be predicted among 6 anuran families and 1 caudate family. We will be updating these analyses to include species added since 2008. And *Hyla geographica*? Still among the Hylidae, but it's now *Hypsiboas geographicus*.

NORTH AMERICAN MONTANE RED FOXES: EXPANSION, FRAGMENTATION, AND THE ORIGIN OF THE SACRAMENTO VALLEY RED FOX,
Benjamin N Sacks, Mark J Statham, *California State University at Sacramento, Department of Biological Sciences, Sacramento, CA 95819 and University of California at Davis, VGL-Canid Diversity and Conservation Laboratory, One Shields Avenue/Old Davis Road, Davis, CA 95616; bnsacks@ucdavis.edu; statham@ucdavis.edu;* **Keith B Aubry,** *USDA Forest Service, Pacific Northwest Research Station, 3625 93rd Avenue SW, Olympia, WA 98512; kaubry@fs.fed.us;* **John D Perrine,** *California Polytechnic State University, Biological Sciences Department, San Luis Obispo, CA 93407; jperrine@calpoly.edu*; **Samantha M Wisely,** *Kansas State University, Division of Biology, Ackert Hall, Manhattan, KS 66506; wisely@ksu.edu*; **Heiko U Wittmer,** *University of California at Davis, Department of Wildlife, Fish, and Conservation Biology, Davis, CA 95616; huwittmer@ucdavis.edu*; **Marcelle Moore,** *California State University at Sacramento, Department of Biological Sciences, Sacramento, CA 95819 and University of California at Davis, VGL-Canid Diversity and Conservation Laboratory, One Shields Avenue/Old Davis Road, Davis, CA 95616; mmmt04@sbcglobal.net.*

We explore the recent history of native southwestern North American Red Foxes (*Vulpes vulpes*) and their relationships to newly established populations of phylogenetically divergent nonnative Red Foxes. Red Foxes occurred historically in the upper montane/subalpine zones of the Rockies, Cascades, and Sierra Nevada mountains, and collectively compose an evolutionarily and ecologically distinct lineage. Although several non-native lowland populations have recently been established in the West, 1 population, which predates fur farming and inhabits the anomalous desert-like Sacramento Valley, has unknown origins. We employed fast- and slow-mutating mitochondrial markers and nuclear markers to show that the Sacramento Valley Red Fox, while ecologically distinct from montane Red Foxes, is nonetheless of the same lineage and probably native to its current range. Comparison of historical and modern samples revealed a reduction over the past century in connectivity among all southwestern native populations and indicated declines in genetic diversity within some of these Red Fox populations. Lastly, we assess displacement and hybridization between the Sacramento Valley Red Fox and a parapatric, phylogenetically distinct non-native Red Fox population.

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THE ORIGIN OF PUTATIVE NONNATIVE RED FOXES IN THE CONTIGUOUS UNITED STATES: TRANSLOCATIONS OR NATURAL RANGE EXPANSIONS? **Mark J Statham, Benjamin N Sacks,** *California State University at Sacramento, Department of Biological Sciences, Sacramento, CA 95819 and University of California at Davis, VGL-Canid Diversity and Conservation Laboratory, One Shields Avenue/ Old Davis Road, Davis, CA 95616; statham@ucdavis.edu; bnsacks@ucdavis.edu*; **Keith B Aubry,** *USDA Forest Service, Pacific Northwest Research Station, 3625 93rd Avenue SW, Olympia, WA 98512; kaubry@fs.fed.us;* **John D Perrine,** *California Polytechnic State University, Biological Sciences Department, San Luis Obispo, CA 93407; jperrine@calpoly.edu*; **Samantha M Wisely,** *Kansas State University, Division of Biology, Ackert Hall, Manhattan, KS 66506; wisely@ksu.edu.*

Prior to European settlement, the Red Fox (*Vulpes vulpes*) inhabited primarily boreal areas of Alaska, Canada, and high-elevation areas of the US western mountains. Today, Red Foxes occur in many parts of the continent where they are considered to have been absent historically. Here, we report on a genetic investigation of the origins of several of these post-European populations. First, we assess modern populations in the eastern US, which are thought to have originated from introductions from Europe during the 1700s. Next, we examine the origins of several populations that became established in the Midwest and western US during the 20th century. We carried out genetic analyses on mitochondrial DNA from >100 Red Fox specimens from putative nonnative populations within the contiguous US and compared them with native North American populations, and to populations from Europe and Asia. Contrary to conventional wisdom, no descendants of European foxes were identified on the eastern seaboard or elsewhere in the US. Red Foxes from the eastern seaboard were found to be closely related to the eastern Canadian population (ΦST, cytochrome *b* = 0.06, D-loop = 0.05). The Midwest population was mixed in nature, with haplotypes in common with neighboring Eastern populations and also ones found in association with fox fur farms. Populations in the San Joaquin Valley of California, in low-elevation Washington and northeastern Utah were derived from translocated individuals, while populations in portions of Oregon, Idaho, and Nevada were closely related to their montane neighbors.

BIRD COMMUNITIES OF THE ASHLAND WATERSHED: BASELINE RESULTS INFORM LAND MANAGEMENT PLANNING. **Jaime L Stephens, John D Alexander,** *Klamath Bird Observatory, PO Box 758, Ashland, OR 97520; jlh@klamathbird.org; jda@klamathbird.org.*

Historically, fire played an important role in maintaining coniferous forests of southwestern Oregon. The Rogue River-Siskiyou National Forest has proposed the Ashland Forest Resiliency project to restore health and fire resiliency to ecosystems of the Ashland Watershed. This study is being implemented to assess the effect of the forest resiliency treatments on bird abundance and community composition. We used standardized bird and vegetation monitoring methods to survey birds during breeding and migration/wintering seasons. We present results from 3 y of pre-treatment monitoring that relates the existing bird community to current forest conditions within the watershed as they relate to vegetation composition and structure. Baseline results considered within the context of both Partners in Flight (PIF) bird conservation plans and information about bird community response to the Quartz Fire, which burned in an adjacent watershed, were used to predict the near and mid-term response of a select group of species to the ecological changes that may result from fuels reduction efforts in the Ashland Watershed. The occurrence of a variety of PIF coniferous forest focal species in the Ashland Watershed indicates that a variety of conditions that are considered important for the conservation of coniferous forest birds occur in the watershed. These baseline results have informed land management planning documents and future monitoring will be implemented through an adaptive management framework.

WILDLIFE CONFLICT IN SOUTHWEST OREGON. **Rosemary Stussy,** *Oregon Department of Fish and Wildlife, 1495 East Gregory Road, Central Point, OR 97502 rosemary.j.stussy@state.or.us.*

Oregon Department of Fish and Wildlife's Rogue Watershed District in southwest Oregon receives more wildlife complaints than any other district in the state (mean = 1461, SE = 96). For the last 7 y, we kept a wildlife complaint database and recorded wildlife sightings and conflict. We used simple linear regression to examine trends in wildlife complaint data over time. Because the human population in the district has grown substantially in the last 7 y, we expected to see a significant increase in total wildlife complaints; however, the increase we observed was not statistically significant ($P = 0.14$, $R^2 = 0.38$). We received complaints on over 80 species of wildlife, but Cougar (*Puma concolor*), Black Bear (*Ursus*

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americanus), Raccoon (*Procyon lotor*), Black-tailed Deer (*Odocoileus hemionus columbianus*), and Roosevelt Elk (*Cervus elaphus roosevelti*) were the species of most concern. Elk and Raccoon complaints increased significantly over the 7-y period (P = 0.00, R^2elk= 0.93, R^2raccoon = 0.84); but the increases observed in bear and deer complaints were not significant (P = 0.43), nor was the decline in Cougar complaints (P = 0.43). In an attempt to resolve wildlife conflict in the district, we have increased our efforts at public education on conflict prevention, attempted administrative removal of Cougars, implemented an elk damage tag program, and banned relocation of nuisance wildlife.

SHORT-TERM IMPACTS OF FUEL MANAGEMENT ACTIVITIES ON FISHERS IN THE WESTERN UNITED STATES. **Craig Thompson, Kathryn Purcell,** *USDA Forest Service Pacific Southwest Research Station, 2081 East Sierra Avenue, Fresno, CA 93710; cthompson@fs.fed.us; kpurcell@fs.fed.us.*

Across the western United States, Fisher (*Martes pennanti*) populations are highly fragmented and sub-populations are considered to be at risk of local extinction. As a result of their sensitive status and perceived reliance on dense forest structure, Fisher conservation is at the heart of many of the ongoing legal challenges to national forest and park fire management plans throughout the west. There are, however, almost no data available on their response to fire or fuels treatments, so much of the associated analyses and challenges are based on anecdotes and/or speculation. To begin addressing this gap and better inform management decisions, we are currently monitoring the short-term response of Fishers to fuel management activities at 5 locations in Oregon and California. Using new GPS collar technology we are recording at least 6 mo of pre-treatment data on Fisher habitat use in areas slated for fuel reduction in spring and summer 2010. Due to the shorter lifespan of the collars, animals will be recollared in summer 2010 and followed for at least 6 mo post-treatment. Comparisons of pre- and post-treatment data will reveal any immediate changes in animal behavior and habitat use associated with treatment actions. Here, we present the study outline and objectives as well as preliminary data on Fisher habitat use.

THE ROLE OF WILDLIFE FORENSICS IN CONSERVATION AND LAW ENFORCEMENT. **Pepper W Trail,** *National Fish and Wildlife Forensics Laboratory, 1490 East Main Street, Ashland, OR 97520; pepper_trail@fws.gov.*

Wildlife forensics applies scientific methods and investigative techniques to questions involving protected species and the law. The National Fish and Wildlife Forensics Laboratory, a facility of the US Fish and Wildlife Service located in Ashland, Oregon, is the world's only full-service wildlife crime lab. Its mission is to provide forensic support for enforcement of federal conservation laws, including the Endangered Species Act, the Migratory Bird Treaty Act, and the Convention on International Trade in Endangered Species (CITES). This talk will provide an overview of the work of the Laboratory's 6 analytical sections: pathology, morphology, genetics, chemistry, criminalistics, and digital evidence. The Laboratory receives approximately 500 cases/y, submitted by Special Agents and Wildlife Inspectors in the Fish and Wildlife Service Office of Law Enforcement; often working in cooperation with state agencies as well as the National Park Service, Bureau of Land Management, and other federal agencies. Examples of Forensics Laboratory work on several high-profile wildlife conservation issues in the Pacific Northwest will be presented. These include the protection of recovering Gray Wolf (*Canis lupus*) populations, hybridization between Barred (*Strix varia*) and Spotted Owls (*Strix occidentalis caurina*), the taking of Bald (*Haliaeetus leucocephalus*) and Golden Eagles (*Aquila chrysaetos*) for their feathers, and the trade in bear bile.

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BEHAVIORAL RESPONSES TO POTENTIAL PREY THROUGH CHEMORECEPTION BY THE SHARP-TAILED SNAKE (*CONTIA TENUIS*). **Robert E Weaver, Kenneth V Kardong,** *School of Biological Sciences, Washington State University, Pullman, WA 99164; kkardong@wsu.edu*

The Sharp-tailed Snake (*Contia tenuis*) is a small (usually <30 cm total length), cryptic species found along the west coast of the United States and north into southwestern British Columbia. Because of its secretive nature, little is known about its behavioral ecology. We tested behavioral responses of 13 adult *C. tenuis* collected from a site in eastern Washington to potential invertebrate prey odors. We presented snakes with 2 control odors (water, cologne) and 2 possible invertebrate prey odors (earthworm, slug). Overall, there was a significant difference in both the time-to-first-tongue flick (latency) and mean tongue flick rate (number of tongue flicks/60 s trial) for the odors tested. The mean latency period was 6.0 ± 1.87 s for earthworm and 4.1 ± 1.57 s for slug. The mean tongue flick rate for earthworm and slug was 13.8 ± 4.09 flicks/s and 39.7 ± 15.79 flicks/s, respectively. These results support prior claims of a preference for slugs by *C. tenuis*. This preference for slugs may also explain the presence of *C. tenuis* in areas of anthropogenic disturbances with an abundance of slugs.

ANALYSIS OF POPULATION DATA OF WESTERN POND TURTLES IN SOUTHERN OREGON. **Simon N Wray,** *Oregon Department of Fish and Wildlife, 61374 Parrell Road, Bend, OR 97702; simon.n.wray@state.or.us*; **R Bruce Bury,** *US Geological Survey, Forest and Rangeland Ecosystem Science Center, 3200 SW Jefferson Way, Corvallis, OR 97331; buryb@usgs.gov;* **David J Germano,** *Department of Biology, California Sate University, Bakersfield, CA 93311-1022; dgermano@csub.edu.*

We report on the abundance and life history characteristics of Western Pond Turtles (*Actinemys marmorata*) from 12 sites in southwestern Oregon. We obtained data between 1992 and 2008 with most sites visited twice but 2 for 16–17 y. Results showed that sex ratios were either even or slightly female biased at all but 2 sites. For the same shell length, females were heavier than males and this reflects the greater dome-shape of the adult female shell compared to adult males. All sites included fairly equal numbers of adults and juveniles. We obtained high recapture success at the 2 sites with 16 and 17 y of data, where population estimates averaged 68 and 436 turtles, respectively. The lower estimate was at a pond of much smaller size. We found a remarkable trend at the site with the longest study: the percentage of juveniles decreased through time and the population size structure became more adult-biased. This reduction in juveniles may represent influence or effects of: (1) recent introduction of American Bullfrogs (*Lithobates catesbeianus*) that may eat some hatchlings; (2) location of nests by other predators; (3) severe competition for food resources in the ponds; and (4) stochastic events because the ponds are totally dry is some years. Specific research is needed to tease out the contribution of these possible factors. Further sampling could develop the 12 sites into an effective monitoring program to track viability and status of this turtle in southwestern Oregon.

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AN INTERACTIVE INTERNET WEBSITE FOR ARCHIVING AND RETRIEVING DATA ON FOREST CARNIVORE SURVEYS IN THE PACIFIC STATES. **Keith B. Aubry, Catherine M. Raley,** *USDA Forest Service, Pacific Northwest Research Station, 3625 93rd Avenue SW, Olympia, Washington 98512; kaubry@fs.fed.us and craley@fs.fed.us;* **Fredrick V. Schlexer,** *USDA Forest Service, Pacific Southwest Research Station, 1700 Bayview Avenue, Arcata, California 95521; rschlexer@fs.fed.us*

We recently developed an interactive internet website that provides current and future biologists with a permanent archive and retrieval system for data obtained from standardized forest carnivore surveys conducted anywhere in Washington, Oregon, and California. This tool is now available for professional use. Data on all survey efforts are included, regardless of their success or failure to detect target species, because both positive and negative results provide useful information for the conservation of Fishers and American martens. The website is also designed to provide a permanent archive and retrieval system for all verifiable records of the 5 forest carnivores of greatest conservation concern in the Pacific states: Canada Lynx (*Lynx canadensis*), Wolverine (*Gulo gulo*), Fisher (*Martes pennanti*), coastal Marten (*Martes americana*) (west of Interstate Highway 5), and Mountain Red Fox (*Vulpes vulpes*) (>3,000 ft. elev.). Thus, interested users will be able to generate reliable and up-to-date distribution maps at any spatial scale for these 5 taxa that are based solely on physical evidence of their occurrence. Due to their inherent unreliability, no anecdotal records of any kind are included in the website database. The poster will introduce potential users to the website, and explain its layout and design, the content of its database, and its functionality.

THE EFFECTIVENESS OF VERTEBRATE PASSAGE AND PREVENTION STRUCTURES: A STUDY OF BOECKMAN ROAD IN WILSONVILLE. **Leslie Bliss-Ketchum,** *Environmental Science and Management Program, Portland State University, PO Box 751, Portland Oregon 97207;bliss.ketchum@gmail.com*; **Catherine de Rivera,** *Environmental Science and Management Program, Portland State University, PO Box 751, Portland Oregon 97207; derivera@pdx.edu*; **Kerry Rappold,** *City of Wilsonville, 29799 SW Town Center Loop E, Wilsonville, Oregon 97070; rappold@ci.wilsonville.or.us*

See presentation abstracts.

GEOSPATIAL MODEL OF AMPHIBIAN MOVEMENT ACROSS THE I-90 SNOQUALMIE PASS CORRIDOR OF THE CENTRAL WASHINGTON CASCADES. **Brandon Fessler, Jennifer Lipton, and R. Steven Wagner,** *Central Washington University, 400 E University Way, Ellensburg, Washington 98926; fesslerb@cwu.edu; liptonj@cwu.edu; wagners@cwu.edu*

High traffic roads have been identified as a significant barrier to movement and a source of mortality for amphibian populations. The Snoqualmie Pass East Project is currently underway to improve road safety and ecological connectivity within a 15-mile corridor of Interstate 90, between Hyak and Easton, Washington. We developed a geospatial model to predict the permeability of amphibians across the interstate. The model used species distribution, life history, and movement data (e.g., radiotelemetry and PIT tag) based on field studies and historical studies with respect to habitat features to estimate probability of use of current and proposed crossing structures. A fine-scale landscape model and field data allowed metrics for connectivity to be determined through various tests based on patch complexity, area, adjacency, cost-distance weighting. Focal species included the Northwestern Salamander (*Ambystoma gracile*), Western Toad (*Anaxyrus [=Bufo] boreas*), and Coastal Giant Salamander (*Dicamptodon tenebrosus*). This model provides a context for assessment of ecological connectivity and highlights monitoring efforts and life history data needed to make more accurate predictions of roadway movements.

OREGON SPOTTED FROGS AT PARSNIP LAKES IN THE CASCADE-SISKIYOU NATIONAL MONUMENT. **Steven A. Godwin,** *Bureau of Land Management, 3040 Biddle Road, Medford, Oregon 97504; Steve_Godwin@blm.gov*

A population of Oregon Spotted Frogs (*Rana pretiosa*) is located at Parsnip Lakes in the Cascade Siskiyou National Monument. Oregon Spotted Frogs have experienced significant losses in habitat from their historic range. Currently listed by the Bureau of Land Management as a "Bureau Sensitive" species, the Oregon Spotted Frog is a candidate for listing under the Endangered Species Act. A Site Management Plan is in the process of being prepared for the Parsnip Lakes site. This plan is intended to aid in the persistence of this species at this site.

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2008 WESTERN POND TURTLE CENSUS, CAPTURE AND MARKING IN SOUTHWESTERN OREGON. **Steven A. Godwin,** *Bureau of Land Management, 3040 Biddle Road, Medford, Oregon 97504; Steve_Godwin@blm.gov*; **Robert S. Hogg,** *University of Maine, Orono, Maine; robert.hogg@umit.maine.edu*

The Western Pond Turtle *Actinemys marmorata* is currently listed as a species of concern by the U.S. Fish and Wildlife Service, and the species is classified as Bureau Sensitive by the Bureau of Land Management (BLM). The BLM manages the Cascade-Siskiyou National Monument and has identified habitat with confirmed populations residing within the Jenny Creek Watershed. Visual surveys and mark-recapture efforts were last conducted in 1998, and to assess the current status of the sensitive species, three historic sites were revisited during a seven-week study through the summer of 2008. The "Jenny Power" site revealed a robust population with a strongly biased 3F:1M sex ratio. A majority of the sampled population was estimated to have recently attained sexual maturity, with a few juveniles approaching maturity, and the oldest adults estimated to be in the prime of their reproductive capabilities. Turtles were sparingly observed at the other sites and trapping efforts produced no captures for continued mark-recapture monitoring. Low capture rates and the observed presence of the highly predacious invasive American Bullfrog *Lithobates catesbeianus* present concerns for the continued success of the region's only native turtle, and despite the vigorous demographic population structure at "Jenny Power," continued monitoring remains warranted.

SMALL SCALE PRODUCTION OF CAPTIVE NORTHERN LEOPARD FROGS FOR CONSERVATION AND REINTRODUCTION PROGRAMS. **Erim Gomez and Rodney Sayler,** *Department of Natural Resource Sciences, Washington State University, Pullman, Washington 99164-6410; erimgomez@gmail.com*

Northern Leopard Frogs (*Lithobates pipiens*) have declined or are locally extinct in much of their former western U.S. range. In Washington, only one state-endangered population exists in the Potholes region by Moses Lake. We studied behavior and captive breeding of these endangered leopard frogs from 2006–09 to develop small-scale production techniques to support local and regional conservation and reintroduction programs. We developed captive rearing methods that: 1) increased tadpole size at metamorphosis, 2) produced high overwinter survival in either outdoor tanks, or climate controlled, indoor settings, 3) enhanced foraging success on natural insect foods in summer, 4) achieved high growth rates and large body mass for two and three-year-old adults ($\bar{x}$ = 93.4±10.4 g, range 80 - 112), 5) reduced the incidence of disease, and 6) resulted in successful breeding (6 egg masses) in captivity in either small (4.3 m^2) artificial ponds or small natural ponds. Overwintering frogs lost about 18% of body weight during five months of largely underwater dormancy, while first-year frogs kept and fed in climate-controlled wintering facilities continued to grow. We are currently experimenting with extending the period of body growth and shortening winter dormancy to induce captive breeding in their first spring by one-year-old leopard frogs. Our captive-rearing program now has resulted in the first locally introduced population of northern leopard frogs in Washington and demonstrates that small scale captive rearing is relatively inexpensive and produces large adults exhibiting high fecundity.

FOOD HABITS OF THE FISHER IN THE CASCADE RANGE OF SOUTHERN OREGON. **Catherine M. Raley and Keith B. Aubry,** *USDA Forest Service, Pacific Northwest Research Station, 3625 93rd Avenue SW, Olympia, Washington 98512; craley@fs.fed.us and kaubry@fs.fed.us*

The food habits of Fishers (*Martes pennanti*) are an integral component of their habitat ecology that may provide important insights for ongoing conservation efforts. From 1995 to 2001, we conducted a radio-telemetry study of Fisher ecology on the west slope of the Cascade Range in southern Oregon. Prey remains found at den, rest, and kill sites included Steller's Jay (*Cyanocitta stelleri*), Pileated Woodpecker (*Dryocopus pileatus*), Hairy Woodpecker (*Picoides pilosus*), Common Flicker (*Colaptes oratus*), Ruffed Grouse (*Bonasa umbellus*), Turkey (*Meleagrus gallopavo*), Snowshoe Hare (*Lepus americanus*), Brush Rabbit (*Sylvilagus bachmani*), California Ground Squirrel (*Spermophilus beecheyi*), Douglas' Squirrel (*Tamiasciurus douglasii*), Northern Flying Squirrel (*Glaucomys sabrinus*), Dusky-footed Woodrat (*Neotoma fuscipes*), Virginia Opossum

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(*Didelphis virginiana*), Striped Skunk (*Mephitis mephitis*), Porcupine (*Erethizon dorsatum*), Bobcat (*Lynx rufus*), Black-tailed Deer (*Odocoileus hemionus*), and Elk (*Cervus elaphus*). We also identified prey remains in 387 scats (303 from 11 females, and 84 from 8 males) collected at trap, den, and rest sites. Mammals were the most frequent food item in fisher scats (83% of scats); 28% of the scats contained remains of birds, 26% contained insects, 14% contained berries or mast, and 7% contained reptiles. Our results indicate that male and female Fishers in Oregon have divergent foraging strategies, whereby males often forage on larger prey species than females. This may reflect the larger size of males, or it could be related to the need for denning females to kill prey that can easily be carried back to the den and consumed by kits. There also appear to be regional differences in prey selection; Fishers in California generally foraged on smaller prey items than those in Oregon. These findings may also be related to body size, as California fishers are smaller than the reintroduced Fishers we studied in Oregon.

FISHER SURVEYS IN THE SW OREGON POPULATION GAP AND NEW BLACK BEAR RESISTANT TECHNIQUES. **Jeff Stephens,** *Medford District, USDI Bureau of Land Management, 3040 Biddle Road, Medford, Oregon 97504; jeff_stephens@blm.gov*

For the past 10 years the Medford District BLM has been surveying for fisher (*Martes pennanti*) in SW Oregon using photographic bait station methods. Originally, our focus was on the population gap between the extant Klamath population and the reintroduced south Cascade population and whether Interstate 5 represents a potential impermeable barrier. Recently, we have directed some of our survey effort to expanding the known fisher range across the district, while also utilizing hair snares and scat detection dogs to obtain genetic samples. Surveying higher elevation sample units later in the season has presented some interesting challenges. Most notably, trying to limit damage to the camera set by black bears (*Ursus americanus*) and reduce the associated survey costs.

DIFFERENTIAL RESPONSE TO ULTRAVIOLET-B RADIATION IN LONG-TOED SALAMANDERS (*AMBYSTOMA MACRODACTYLUM*) ACROSS AN ELEVATIONAL GRADIENT. **Lindsey L. Thurman and Tiffany S. Garcia,** *Department of Fisheries and Wildlife, Oregon State University, lindsey.thurman@oregonstate.edu*

Declines in amphibian populations on a global scale have been attributed to numerous and often synergistic factors, such as invasive species, pathogens, contaminants, and ultraviolet-B (UV-B) radiation. The impacts of these stressors are often dependent on geographical location and species. Recent studies have shown resistance to UV-B damage to be highly species specific, thus it can be hypothesized that variation also occurs between populations of a single species. High elevation populations of the Long-toed salamander (*Ambystoma macrodactylum*), a species that occupies habitats across a wide elevational rage, may encounter higher UV-B radiation levels relative to low elevation populations and these levels are predicted to increase in association with continued ozone depletion. Anecdotal evidence indicates population differences in physiological UV-B repair mechanisms and oviposition site choice. We hypothesize that high elevation long-toed salamanders have adapted to high UV-B exposure rates with increased photolyase activity, a photoreactivating enzyme that repairs radiation-induced damage to DNA. We propose to quantify population differences using an acid hydrolysis of radiolabeled DNA samples taken from populations across a 3,000 ft elevational gradient. Long-toed salamander females at low altitudes lay eggs on various substrates in relatively turbid water, while at high altitudes eggs are often laid singly under rocks. We propose to survey both high and low elevation ponds to quantify oviposition choice and physical habitat characteristics. We hypothesize that differences in oviposition site choice are correlated with UV-B radiation levels. Results from this analysis will further the understanding of populations' ability to cope with anthropogenic pressures associated with ozone depletion and climate change.

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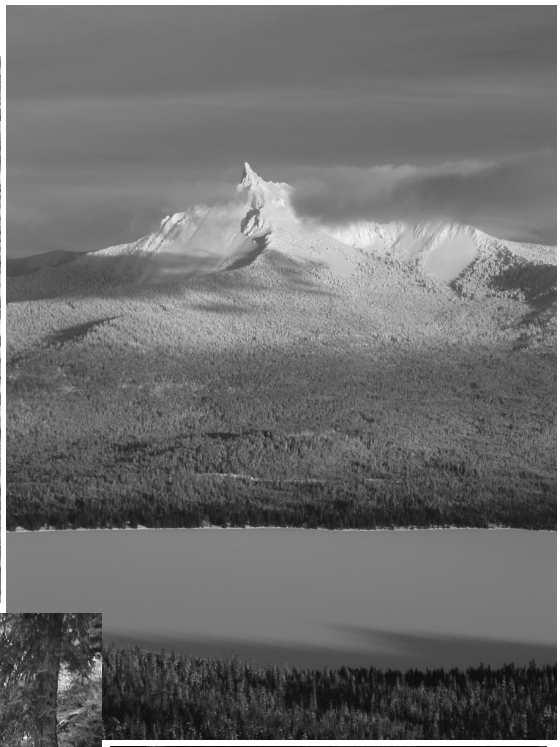
THE ROLE OF THE NORTHERN POCKET GOPHER IN PRIMARY SUCCESSIONAL LANDSCAPES AT MOUNT ST. HELENS. **Raymond P. Yurkewycz,** *Washington State University-Vancouver, Environmental Science Program, 14204 NE Salmon Creek Avenue, Vancouver, WA 98686; raymond.yurkewycz@email.wsu.edu*

The Northern Pocket Gopher (*Thomomys talpoides*) has been shown to strongly influence ecosystem dynamics in western North America through mound building and herbivory, resulting in altered plant communities and biogeochemical processes. Pocket gophers colonized the Pumice Plain of Mount St. Helens in 1992, 12 years after the 1980 eruption, and have expanded their population since that time. The objectives of the research are to determine the effects of pocket gophers on plant community diversity and soil nutrient flux in a primary successional system. I compared plant species percent cover and abundance on mounds, near mounds and in undisturbed areas. I also created artificial gopher mounds and compared rates of soil CO_2, NO_3-N, NH_4-N, and PO_4-P flux between artificial mounds and undisturbed areas. Gopher mounds exhibited decreased species density and richness compared to near-mound and undisturbed areas. Older artificial gopher mounds (one year old) exhibited decreased rates of soil CO_2 flux compared to undisturbed areas, while recently created mounds (2 weeks old) showed no difference in soil CO_2 flux rates. Additionally, there was no difference in NO_3-N, NH_4-N, and PO_4-P flux rates between artificial mounds and undisturbed areas. These results indicate that gopher disturbances create conditions that are suitable for a subset of plants found in the surrounding community. They also suggest that the relationship between gopher disturbance and soil nutrient fluxes are likely mediated by interactions with plant communities and soil microbe assemblages.

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