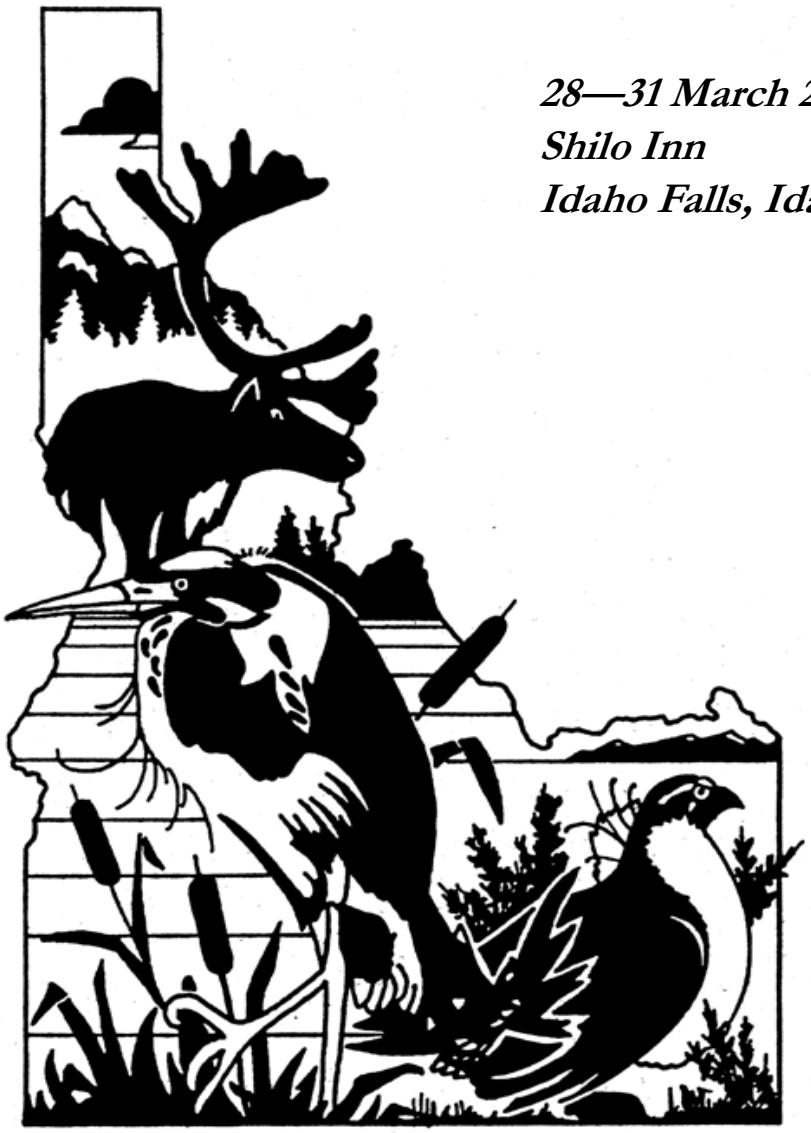
41st Annual Meeting of the

Idaho Chapter of the Wildlife Society



28—31 March 2011
Shilo Inn
Idaho Falls, Idaho

Concurrent Meetings/Workshops

- Idaho Partners in Amphibian and Reptile Conservation
- Idaho Bat Working Group
- Idaho Chapter of Partners in Flight

Program and Abstracts

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Meeting Introduction and Host City

Meeting introduction
The annual meeting of the Idaho Chapter of The Wildlife Society, will take place 28-31 March 2011 in Idaho Falls, Idaho. Participants are encouraged to register in advance by going to the on-line, secure registration page at the Chapter's website: http://www.ictws.org.

This year's meeting offers a diverse scientific program with a plenary session, symposium, contributed oral and poster presentations, social activities and the annual business meeting.

Host City — Idaho Falls, Idaho
Welcome to Idaho Falls!
Situated along the Snake River, our skyline consists of the majestic Teton Mountain Range, and in our backyard is the world's most famous park - Yellowstone National Park.

Suggestions for your visit:

- Visit the Museum of Idaho (http://www.museumofidaho.org; 208-522-1400) and see the current traveling exhibit, "Bodies." Containing about twenty human bodies in total, each exhibition uses real human bodies that have been preserved permanently by a process called "polymer preservation" so that they will not decay. The Museum is located at 200 N. Eastern Ave., near the intersection of Broadway and Yellowstone.
- Take a short hike.
- The North and South Menan Buttes in southeastern Idaho are two of the world's largest volcanic tuff cones. A BLM managed trail enables visitors to reach the rim of the north butte from the west side.
- The Deer Parks Wildlife Mitigation Unit is immediately west of the Menan Buttes.
- Check out other wildlife management areas north of Idaho Falls: Market Lake at Roberts, Mud Lake and the town of Mud Lake, and the Chester Wetlands near Saint Anthony.
- Fish for rainbow trout in the South Fork River. Rainbow trout fishing is open yearlong on the South Fork.
- Tour and discuss the wind tower projects east of Idaho Falls with local biologists.

Conference Venue

All conference activities and associated workshops will take place at the Shilo Inn, 780 Lindsay Boulevard, Idaho Falls, ID 83402. Phone: (208) 523-0088. *www.shiloinns.com*

Conference Contact
Jim Hayden - idahochaptertws@gmail.com; 208-651-6732 (cell)

Registration and Logistics

Registration fees include admission to all oral sessions, symposiums, concurrent workshops, coffee breaks, social activities, and the program and abstracts. In addition, fees include the banquet and a complimentary meeting gift. This year, ICTWS is offering free registration to all university students.

Registration Fees:

ICTWS	$100	full registration (includes social, banquet, and meeting gift)
	$ 75	retiree registration (includes social, banquet, and meeting gift)
	$ Free	student registration (includes social, banquet, and meeting gift)
	$ 30	extra banquet ticket
	$ 10	late registration fee – after March 14th

The registration desk will be open at the following times:

Monday	28 March	7:00 am – 12:30 pm
Tuesday	29 March	7:00 am – 1:30 pm
Wednesday	30 March	7:00 am – 1:30 pm

Messages, job postings, and volunteer opportunities
We will set up a message and job board next to the registration desk.

Parking
The Shilo Inn offers free parking in front of the hotel.

Lost And Found/Security
Please bring lost and found items to the Registration Desk.

Organizing Committee

Jim Hayden	Idaho Department of Fish and Game
Dave Musil	Idaho Department of Fish and Game
Colleen Moulton	Idaho Department of Fish and Game
Jon Dudley	USFS Rocky Mountain Research Station

Sponsors and Contributors to the 2011 Annual Meeting

We wish to thank the Idaho State Office of the Bureau of Land Management, the Morrison Knudsen Nature Center, Idaho Department of Fish and Game, Power Engineers, and Intermountain Aquatics, Inc. for sponsoring the annual meeting of the Idaho Chapter of The Wildlife Society. We also wish to thank the individuals, businesses, and organizations who provided special contributions or donated items for our raffle and silent auction.

The Committee would like to thank the awards committee (Kerry Reese, Jack Connelly, Tom Rinkes), Anna Owsiak and the paper awards committee, and all of the students and volunteers that helped with AV and other logistics.

Program At a Glance

Monday 28 March

Time	**River View Room**
08:00-12:00	Idaho Bat Working Group
13:00-17:00	Idaho Partners in Amphibian and Reptile Conservation

Tuesday 29 March

Time	**Idaho Falls/Pocatello Room**
08:00-08:20	Welcome - ICTWS President: Jim Hayden
08:20-10:50	ICTWS Plenary Session Keynote Speaker: Jim Martin Invited Speakers: Nina Chambers, Mike Scott, Ron Regan
10:50-12:00	Panel Discussion
12:00-13:30	LUNCH - on your own
13:30-15:30	Habitat Restoration, Classification, and Change
16:00-17:00	To The Point Session I
17:15-18:15	Business Meeting (*Proposed Bylaws Changes)*
18:00-21:00	Poster Session, Social, and Silent Auction - in **Boise Room**

Wednesday 30 March

Time	**Idaho Falls Room**	**Pocatello Room**
08:00-12:00	Nongame Wildlife Big Game	Game Birds Shrub/Steppe Wildlife
12:00-13:30	LUNCH - on your own or Climate Change Brown Bag	
13:30-17:30	Predators Humans and Wildlife	Sagebrush Steppe Restoration
18:00-21:00	Banquet and Raffle - in **Grand Teton Room** Banquet Speaker: Robert Inman	

Thursday 31 March

Time	**Idaho Falls Room**	**Pocatello Room**
08:00-10:00	To The Point Session II	Idaho Chapter of Partners In Flight
10:00-12:00		

Scientific Program

Locations
All symposia and general paper sessions will be held in two rooms in the Shilo Inn: the Idaho Falls and Pocatello Rooms.

Oral Presenters
Please take note of your presentation date and time. Please note that all **general session** talks should be limited to 20 minutes total, whereas **To The Point** session talks should be limited to 10 minutes (including discussion). Respect other speakers and your audience by staying within your scheduled time. It is extremely important that we maintain this schedule, so that attendees can move amongst sessions. For **general session** talks, a brief (5 minute) period post-presentation should be left so members of the audience can ask a few questions. Take the time to practice so your delivery fits into the scheduled interval. Check with your session chair well in advance of the start of your session to make sure that you know where the tools are that you need for your talk (e.g., slide advance monitor, laser pointer) and how to use them. This is also the time to check and see if your PowerPoint presentation (ideally created and/or saved in Office 2007 format) runs properly on the projector and projection computer. Presentations should be uploaded no later than the break preceding your talk.

Posters
The poster session will be held on Tuesday, March 28, in the Boise Room. Poster displays should be set up before or during the Business Meeting. Tape to secure posters to the wall will be provided.

All authors should be at their posters and prepared to discuss their work from 18:00 to 20:00 on Tuesday evening. Posters must be removed after the social.

<u>Notice to all attendees</u>: As a courtesy to all presenters, we request that all attendees turn off all cellular phones while attending the symposia, meetings, or general sessions.

Plenary Session

Keynote: Jim Martin, Conservation Director, Berkley Conservation Institute, Oregon

Jim Martin retired after 30 years with the Oregon Department of Fish and Wildlife and now works as Conservation Director for the Berkley Conservation Institute, a branch of Pure Fishing. Pure Fishing is one of the largest fishing tackle companies in the World and is an industry leader in conservation advocacy. During his career with ODFW, Jim spent six years as Chief of Fisheries and three years as Salmon Advisor to Governor John Kitzhaber. Jim led the team that developed the Oregon Plan for Salmon and Watersheds, a state conservation plan to address Endangered Species and Clean Water issues in Oregon. Jim has a Bachelors Degree in Wildlife and Masters Degree in Fisheries from Oregon State University. Jim formerly held a courtesy appointment at OSU, where he taught Natural Resource Problem Solving in the Department of Fisheries and Wildlife. Jim is Chairman of the Board of the Theodore Roosevelt Conservation Partnership. He is a science and policy advisor for the Northwest Sportfishing Industry Assn. In 2005, Jim was inducted into the National Freshwater Fishing Hall of Fame in Hayward, Wisconsin.

Invited: Nina Chambers, Director of Research and Training, Sonoran Institute, Montana

Nina Chambers directs research and training for the Sonoran Institute. The mission of the Sonoran Institute is to inspire and enable community decisions and public policies that respect the land and people of western North America. The Sonoran Institute provides research and training to decision makers across the West to enhance conservation of public and private lands. Ms. Chambers has been with the Institute since 2000, and has been primarily engaged in large landscape, multi-jurisdictional, conservation partnerships. Her first degree is in wildlife biology from Michigan State University, and she received a MS from the University of Idaho from the Department of Resource Recreation and Tourism (now the Department of Conservation Social Sciences). Prior to joining the Sonoran Institute, Nina spent more than 12 years working in Latin America and the Caribbean on protected area management, wildlife conservation, and community engagement.

Invited: Mike Scott, Senior Scientist Leader, USGS Idaho Cooperative Fish and Wildlife Research Unit, University of Idaho

From 1974 to 1984, Dr. Scott served as a Research Biologist for the U.S. Fish and Wildlife Service at Mauna Loa Field Station, Hawaii Volcanoes National Park. This was his first assignment with the U.S. Department of Interior, the agency he continues to serve today as a Senior Scientist with the Biological Resources Division of the U.S. Geological Survey. From 1984 to 1986, he served as Project Leader of the Condor Research Center in Ventura, California. In 1986 he was appointed to the position he holds at present, Leader of the Idaho Cooperative Fish and Wildlife Research Unit in Moscow, Idaho, and Professor in the Department of Fish and Wildlife Resources at the University of Idaho. Dr. Scott has authored and co-authored more than 200 journal articles, books, book chapters, and monographs on topics as wide-ranging as reserve identification, selection and design, tuna schooling behavior, endangered species recovery, avian population estimation, and landscape approaches to conservation biology. He co-authored *Forest bird communities of the Hawaiian Islands: their dynamics, ecology, and conservation* (1986), which received The Wildlife Society's Best Monograph Award. Dr. Scott's professional

accomplishments have been recognized by the Society for Conservation Biology with both the Distinguished Achievement Award and the Edward T. La Roe III Memorial Award. He has received Distinguished and Meritorious Service Awards from the U.S. Department of Interior, a Twentieth Century Environmental Achiever Award at the Ninth Lukac's Symposium and the American Ornithologists' Union's Conservation Award. He is an elected fellow of the American Association for the Advancement of Science and the American Ornithologists' Union. Dr. Scott is a past President of both the Cooper Ornithological Society and the Pacific Seabird Group.

Invited: Ron Regan, Executive Director, Association of Fish and Wildlife Agencies

Ron Regan is the Executive Director for the Association of Fish and Wildlife Agencies. Ron first joined the Association's staff in May 2007 as the Resource Director. Prior to that, Ron spent over 25 years working for the Vermont Fish and Wildlife Department where he served as Deer Project Leader, Director of Wildlife, and Commissioner. Throughout his career, Ron has had a high level of leadership engagement with a variety of organizations including the Association of Fish and Wildlife Agencies, The Wildlife Society, the Atlantic Flyway Council, and the Northeast Wildlife Administrator's Association. Ron presently serves as the Chair of the Council to Advance Hunting and the Shooting Sports. Ron has a strong professional interest in the historical underpinnings of our profession and the future standing of state fish and wildlife agencies in terms of authority, identity, and relevance. He has co-authored two papers regarding the North American Model of Wildlife Conservation, both of which focus on state engagement, and has participated in a variety of reviews and panel discussions about the Model.

Idaho Chapter of The Wildlife Society Awards

The **Special Recognition Award** is intended to honor any person or group who has made an outstanding contribution within the state of Idaho to wildlife conservation, management, science, conservation education, the wildlife profession or to an area of endeavor species, community, ecosystem or region. Any person or group who has made such a contribution in the last 3 years is eligible for this award.

The **Charles E. Harris Professional Wildlifer Award** honors professionals in wildlife management. It is given to demonstrate outstanding contributions to Idaho's wildlife resources as appreciated by one's peers. The award is meant to recognize outstanding professional contribution and promote public understanding of significant wildlife management accomplishments in Idaho.

Scientific Program

MONDAY 28 MARCH

Idaho Bat Working Group
Chairs: Rita Dixon and Bill Doering
Location: River View Room

08:00-08:10 **Introduction and Welcome:** Rita Dixon and Bill Doering

08:10-08:30 **Shrub-steppe Conversion and Fragmentation**

08:30-09:30 **5-10 min Presentations (Member talks)**

09:30-10:30 **White Nose Syndrome Surveillance and Decontamination**
- Perspective from the WNS Front: David Kampwerth
- WNS Surveillance: Rita Dixon and Bill Doering
- WNS Decontamination: Rita Dixon and Bill Doering
- Implications to Idaho of existing and proposed petitions to list certain WNS affected bat species under ESA: Rita Dixon

10:30-10:45 **BREAK**

10:45-11:00 **Threats and Conservation Actions**
CMP/IUCN Taxonomy of Threats and Conservation Actions: Rita Dixon

11:00-11:15 **Wind Energy Development in Idaho:** Bill Doering

Idaho Partners in Amphibian and Reptile Conservation
Chairs: Bill Bosworth and Chuck Peterson
Location: River View Room

13:00-14:00 **Updates**
Past year's important news and developments, summary of Northwest PARC and national conservation news

14:00-14:30 **Current Projects**
Brief presentations and descriptions of recently completed, ongoing, and future projects

14:30-15:00 **Conservation Planning**
SWAP, NW ReGAP, IDFG databases - updates and timelines

15:00-16:00 **Amphibian and Reptile Monitoring**
Discussion about monitoring, collaborative opportunities, and resource needs

TUESDAY 29 MARCH

Idaho Chapter of The Wildlife Society
PLENARY SESSION
2050 Hindsight - What Will Professionals of the Future Wish We Had Done?
Chair: Jim Hayden
Location: Idaho Falls/Pocatello Room

08:00-08:20	Welcome: Jim Hayden, ICTWS President
08:20-08:50	**Keynote Address**: Jim Martin A Great Wave Rising: The Coming Crisis in North American Conservation
08:50-09:20	**Invited Speaker:** Nina Chambers Building Resilience: Strategies for Protecting Wildlife in Changing and Uncertain Conditions
09:20-09:50	**Invited Speaker:** Mike Scott Idaho's Conservation Landscape 2050: Different Settings, Different Players, Different Expectations?
09:50-10:20	**BREAK**
10:20-10:50	**Invited Speaker:** Ron Regan No Greater Issue: Model Relevance for State Fish and Wildlife Agencies of the Future
10:50-12:00	**Panel Discussion**
12:00-13:30	**LUNCH** - on your own

Idaho Chapter of The Wildlife Society
CONTRIBUTED PAPERS SESSIONS
Names of presenters are capitalized; those names with an * following their name are student presenters.

Habitat Restoration, Classification, and Change
Chair: David Ovard
Location: Idaho Falls/Pocatello Room

13:30-1350	**Pack River Delta Restoration Project in the Lake Pend Oreille Watershed.** KATHY COUSINS
1350-1410	**Improving aspen in eastern Idaho for wildlife through a collaborative working group.** AREN EDDINGSAAS

1410-1430 **Developing decision support systems for Idaho and the region: an overview of current efforts and an examination of the implications on future of wildlife management decision making.** GREGG SERVHEEN and G. Vecellio

1430-1450 **Animals live there so it is habitat, right? Defining habitat quality.** MARK HURLEY, G. Pauley, M. Hebblewhite, and P. Zager

1450-1510 **Idaho Comprehensive Wildlife Conservation Strategy Ver 2.0 - incorporating climate change.** LEONA SVANCARA

1510-1530 **Crisis in wildlife and a 12-step solution.** OZ GARTON

15:30-16:00 **BREAK**

To The Point Session I
Chair: Jim Hayden
Location: Idaho Falls/Pocatello Room

16:00-16:10 **The Upper Snake River Land Conservation Partnership.** KAREN RICE

16:10-16:20 **Wind development in Idaho and impacts to wildlife.** DAVE DEAN

16:20-16:30 **A review of studies to assess wind energy impacts on birds and recommendations for information exchange.** SYLVIA COPELAND

16:30-16:40 **Assessing the appropriate questions: a collaborative approach to evaluating seasonal movements and transient habitat (stopover habitat) used by migrating tree-roosting bat species**. BILL DOERING and B. Bosworth

16:40-16:50 **White-nose Syndrome disease surveillance in Idaho.** RITA DIXON and BILL DOERING

16:50-17:00 **Thrill Killers.** BLAKE PHILLIPS

Business Meeting

17:15-18:15 ICTWS Business Meeting in Idaho Falls/Pocatello

Social/Poster Session

18:00-21:00 Social, Silent Auction, and Poster Session in Boise Room
No host-bar/mixer & hors d'oeuvres

WEDNESDAY 30 MARCH (Concurrent Sessions)

Nongame Wildlife
Chair: Theresa Mathis
Location: Idaho Falls Room

08:00-08:20 **Impact of invasive annual plants on southern Idaho ground squirrel diets.** ERIC YENSEN, T. Tarifa, L. Borrelli, and L. Sepulveda

08:20-08:40 **Species designation of the Bruneau tiger beetle (*Cicindela waynei*) is supported by phylogenetic analysis of mitochondrial DNA sequence data.** C. Golberg, BILL BOSWORTH, D. Tank, and L. Waits

08:40-09:00 **Characterization of woodpecker habitat using airborne and satellite lidar derived forest structure metrics.** PATRICK ADAM*, L. Vierling, K. Vierling, E. Strand, and A. Hudak

09:00-09:20 **Gastropod intoxicology: one out of five snails prefers beer-baited cover board traps to un-baited control traps.** MICHAEL LUCID, S. Cushman, L. Robinson, B. Bosworth, and S. Cook

09:20-09:40 **Placing the keystones: elucidating interactions among woodpeckers and cavity-dependent species for improved vertebrate conservation and management.** K. Vierling, L. Vierling, B. Linkhart, P. Adam, JOCELYN AYCRIGG, J. Pollock, G. Sadoti, and J. Vogeler

09:40-10:00 **Market Lake Wildlife Management Area (WMA) lead shot study.** ALAN YONK

Game Birds
Chair: Shane Roberts
Location: Pocatello Room

08:00-08:20 **Factors influencing survival of native and translocated mountain quail in west-central Idaho and eastern Washington.** JOHN STEPHENSON, K. Reese, P. Zager, P. Heekin, P. Nelle, and A. Martens

08:20-08:40 **A method for estimating the population sex ratio of sage grouse from fecal DNA.** JEREMY BAUMGARDT*, C. Goldberg, K. Reese, D. Musil, E. Garton, J. Connelly, and L. Waits

08:40-09:00 **Greater sage-grouse fence collision: a multi-scale assessment of collision risk as a function of site and broad-scale factors.** BRYAN STEVENS*, K. Reese, J. Connelly

09:00-09:20 **Fences and greater sage-grouse: an experimental test of marking as a mitigation method to reduce collision risk in breeding areas.** BRYAN STEVENS*, K. Reese, J. Connelly, and D. Musil

09:20-09:40 **Mapping seasonal sage-grouse habitat using inductive models.** SONYA KNETTER and L. Svancara

09:40-10:00 **Examining greater sage-grouse nest predators, nest survival, and habitat features at multiple spatial scales.** ZACHARY LOCKYER*, P. Coates, M. Casazza, and D. Delehanty

10:00-10:30 **BREAK**

Big Game
Chair: Hollie Miyasaki
Location: Idaho Falls Room

10:30-1050 **Winter habitat selection by female mule deer: do changes in habitat spatially and temporally affect selection?** ERIC ANDERSON*, R. Long, J. Kir, R. Bowyer, P. Zager, and T. Thomas

10:50-11:10 **Migration corridors and winter range of pronghorn antelope of the Upper Snake River Plain.** SCOTT BERGEN and M. O'Sullivan

11:10-11:30 **Mountain sheep grazing of bluebunch wheatgrass in central Idaho.** JIM PEEK

11:30-11:50 **Evaluating the genetic distinctiveness of the Salmon River Drainage Bighorn Sheep and their connectivity to neighboring populations.** NATHAN BORG, L. Waits, P. Zager, and M. Mitchell

11:50-12:10 **Neonatal mortality of elk driven by climate, predator phenology, and predator diversity.** K. Griffin, M. Hebblewhite, PETE ZAGER, H. Robinson, S. Barber-Meyer, D. Christenson, S. Creel, N. Harris, M. Hurley, D. Jackson, B. Johnson, L. Mech, W. Myers, J. Raithel, M. Schlegel, B. Smith, C. White, and P. White.

Shrub/Steppe Wildlife
Chair: Dave Musil
Location: Pocatello Room

10:30-1050 **Wildlife responses to the 2007 Murphy Complex Fire.** ANN MOSER, B. Lowe, M. Remming, and M. Schwender

10:50-11:10 **Selection for vegetation types and anthropogenic structures by common**

ravens (*Corvus corax*) within a sagebrush-steppe ecosystem. KRISTY HOWE*, P. Coates, and D. Delehanty

11:10-11:30 **Nutritional and chemical factors shaping the "foodscape" of a dietary specialist herbivore, the pygmy rabbit.** AMY ULAPPA*, J. Forbey, L. Shipley, R. Kelsey, J. Rachlow, and A. Price

11:30-11:50 **Mapping the distribution of pygmy rabbits: how big is their range anyway?** JANET RACHLOW, M. Lonneker, L. Shipley, W. Bosworth

11:50-12:10 **LiDAR-derived height and canopy cover estimation of a sagebrush steppe community.** PAMELA BOND

12:00-13:30 **LUNCH -** on your own, or
Climate Change Brown Bag Luncheon

Predators
Chair: Pete Zager
Location: Idaho Falls Room

13:30-13:50 **How to trick a wolf: manipulating pack movements with biofencing.** DAVID AUSBAND and M. Mitchell

13:50-14:10 **Needle in the hay: developing wolf population monitoring techniques.** DAVID AUSBAND, M. Mitchell, C. Mack, and P. Zager

14:10-14:30 **Using hunter survey data to estimate wolf population sizes in the Northern Rocky Mountains.** BETSY GLENN, L. Rich, D. Ausband, M. Mitchell, J. Gude, C. Sime, C. Mack, and P. Zager

14:30-14:50 **A noninvasive genetic sampling approach for monitoring gray wolves in Idaho.** CARISSA STANSBURY*, D. Ausband, C. Mack, P. Zager, M. Mitchell, and L. Waits

14:50-15:10 **Will wolves eliminate elk and damage the integrity of Yellowstone National Park?** OZ GARTON

Sagebrush Steppe Restoration Session
Chair: Jeffrey Klausman and Alan Sands
Location: Pocatello Room

13:35-13:50 **Sage steppe restoration: a historical perspective.** ALAN SANDS

13:50-14:15 **Big sagebrush recovery following fire: what didn't work, how nature does it, and how we can do better next time** . ROGER D. BLEW

14:15-14:40	**Reclamation of sage brush landscapes disturbed by gas drilling activities.** RALPH SWIFT
14:40-15:05	**Restoring decadent CRP fields to productive plant mosaic.** PAUL FAULKNER
15:05-15:30	**Camas Refuge Project.** BRIAN WEHAUSEN
15:10-15:40	**BREAK**

Humans and Wildlife
Chair: Scott Robinson
Location: Idaho Falls Room

15:40-16:00	**Navigating the human landscape, a migratory ungulate perspective.** NICHOLAS SHARP*
16:00-16:20	**State Highway 21 wildlife underpass: protecting people, protecting wildlife.** KRISTA MULLER
16:20-16:40	**Multi-scale effects of forest roads on black bears.** BEN JIMINEZ*, M. Mitchell, and P. Zager
16:40-17:00	**Effects of residential development on cougar spatial ecology in Washington.** BRIAN KERTSON, B. Maletzke, M. Swanson, G. Koehler, R. Beausoleil, H. Cooley, and R. Wielgus
17:00-17:20	**Fernan Village, Idaho deer trapping: a community pilot project for dealing with urban wildlife.** MARK TAYLOR

Sagebrush Steppe Restoration Session
Chair: Jeffrey Klausman
Location: Pocatello Room

15:30-15:55	**From smooth brome to sage steppe – restoring wildlife habitat along Bitch Creek, Idaho.** JEFFREY KLAUSMAN
15:55-16:20	**Effects of mechanical sagebrush treatment and grazing exclusion on a Wyoming sagebrush community, Pahsimeroi Valley, Idaho.** J. Yeo and ALAN SANDS

Banquet

18:00-21:00	BANQUET in Grand Teton Room Awards Ceremony and Raffle
	Banquet Speaker: Robert Inman Moving Wolverine Conservation Forward in the 21st Century

THURSDAY 31 MARCH

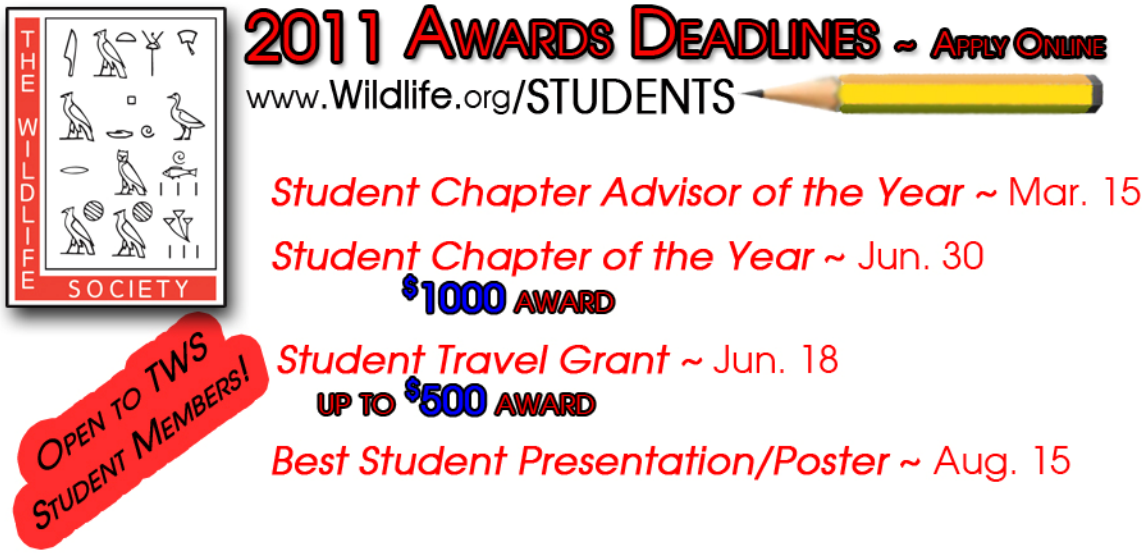
To The Point Session II
Chair: Dave Musil
Location: Idaho Falls Room

08:00-08:10	**Longevity of tiger beetle habitat restoration in Idaho: a preliminary assessment.** S. Bouffard, MIKE FISHER, K. Fothergill, and J. Krueger
08:10-08:20	**Monitoring elk in the desert: preliminary results.** RYAN LONG, T. Bowyer, and J. Kie
08:20-08:30	**Wildlife management issues in the wild land urban interface.** BECKY HAAG
08:30-08:40	**Sage grouse mitigation framework.** LARA ROZZELL
08:40-08:50	**Getting the most out of NAIP using JPeg2000.** LEONA SVANCARA
08:50-09:00	**Pivot tables and Slicers - save yourself some time.** LEONA SVANCARA
09:00-09:10	**How to use drugs: a spreadsheet approach.** WAYNE WAKKINEN
09:10-09:20	**Caribou Conundrums.** WAYNE WAKKINEN and JIM HAYDEN
09:20-09:30	**Value of deer.** GREG MILNER and G. Hompland
09:30-09:40	**Data sharing: the key to land conservation in the future.** MATTHEW LUCIA
09:40-09:50	**October velvet - new fashion trends in mule deer.** TOBY BOUDREAU
09:50-10:00	**Using VIE to mark day-old pheasants.** DAVID MUSIL
10:00-10:15	Closing Remarks: Jim Hayden

Idaho Partners In Flight
Chair: Jay Carlisle
Location: Pocatello Room

08:00-08:15	Introductions and Session Objectives: Jay Carlisle
08:15-08:30	History of Idaho Partners in Flight, Western Working Group, and Intermountain West Joint Venture: Jay Carlisle and Don Kemner

08:30-10:00	Idaho Bird Conservation Partnership - proposal and group discussion
10:00-10:15	**BREAK (TWS Closing Remarks)**
10:15-11:00	Integrated Monitoring by Bird Conservation Region Program: Beth Hahn
11:00-12:00	Group Discussion



ADAM, PATRICK[1]*, L. Vierling[1], K. Vierling[1], E. Strand[1], and A. Hudak[2]. [1]University of Idaho, Moscow, Idaho 83844; [2]USFS Rocky Mountain Research Station, Moscow, Idaho 83844. ***CHARACTERIZATION OF WOODPECKER HABITAT USING AIRBORNE AND SATELLITE LIDAR DERIVED FOREST STRUCTURE METRICS.***

Biodiversity assessments are increasingly important components of effective ecosystem management plans. Woodpeckers are considered a keystone species whose presence has been shown to be indicative of overall forest bird diversity at the landscape scale. This relationship likely exists because woodpeckers can provide nesting and foraging resources for other avian species, where few or none would otherwise exist. However, different woodpecker species are sensitive to different forest structural conditions (e.g. minimum tree diameter). Current methods to identify specific locations of woodpecker presence rely on field observations which are time and resource intensive, and typically limited to the forest stand scale. Therefore, systematic assessments of potential woodpecker presence and overall forest bird diversity at broad scales require the use of remote sensing data. We used small footprint airborne lidar, large footprint satellite lidar from the Geoscience Laser Altimeter System (GLAS), and woodpecker field survey data to predict the presence of woodpeckers in a coniferous forest in northwestern Idaho. We conducted woodpecker surveys at 72 sites coincident with airborne and GLAS lidar footprints across six forest structural stages modeled using airborne lidar. Vertical (e.g. mean and maximum canopy height) and horizontal (e.g. canopy closure) forest structure were quantified from lidar derived metrics and used with published habitat preferences of six woodpecker species to predict their presence. Similar vegetation structural metrics derived from collocated airborne lidar were used to quantify the accuracy of GLAS lidar vegetation metrics. Results indicate that while six woodpecker species were present in four of six structural classes, there is strong evidence to suggest preference for forests characterized by young and mature multistory structure, as opposed to forests characterized by stand initiation or understory regeneration phases. Incorporating lidar-derived measurements of vegetation structure into bird habitat prediction is likely to improve information about 3-D canopy architecture and allow researchers to better understand interspecific avian interactions.

ANDERSON, ERIC D.[1]*, R. A. Long[1], J. G. Kie[1], R. T. Bowyer[1], P. Zager[2], and T. R. Thomas[2]. [1]Idaho State University, Pocatello, ID 83209; [2]Idaho Department of Fish and Game, 83712.
WINTER HABITAT SELECTION BY FEMALE MULE DEER: DO CHANGES IN HABITAT SPATIALLY AND TEMPORALLY AFFECT SELECTION?

We examined resource selection in relation to habitat change by mule deer, *Odocoileus hemionus*, on the Tex Creek winter range in southeastern Idaho, USA. We created a GIS-based map of habitat available to mule deer during 2 time periods, historical (1980s) and current (2007-2009), to document changes in habitat over time. We then modeled historical and current patterns of resource selection by mule deer during peak foraging times in winter. We documented an increase in grasslands and a decrease in agriculture associated with private landowners participating in the Conservation Reserve Program (CRP) over time. During winters with average to above average snow accumulation, mule deer selected agricultural fields for foraging. Juniper (*Juniperus* spp.) was highly selected during all years of study. In addition use × availability (a measure of relative value) of sagebrush steppe increased as availability of agriculture declined.

AUSBAND, DAVID and M.S. Mitchell, Montana Cooperative Wildlife Research Unit, Missoula, Montana 59812. ***HOW TO TRICK A WOLF: MANIPULATING PACK MOVEMENTS WITH BIOFENCING.***

Wolves (*Canis lupus*) use scent-marking to establish territories and avoid intraspecific conflict. We

hypothesized that human-deployed scent-marks could be used to manipulate wolf pack movements in Idaho. We deployed 64.7 km of biofence within 3 wolf pack territories during summer 2010. Location data from collared wolves showed little to no trespass of the biofence. Sign surveys at predicted rendezvous sites yielded little to no recent wolf use of exclusion areas. Lastly, a habitually depredating wolf pack was not implicated in any depredations. Our pilot test provides preliminary evidence that wolf movements can be manipulated using human-distributed scent-marks.

AUSBAND, DAVID[1]**,** M. S. Mitchell[1], C. Mack[2], and P. Zager[3]. [1]Montana Cooperative Wildlife Research Unit, Missoula, Montana 59812; [2]Nez Perce Tribe, McCall, Idaho 83638; [3]Idaho Department of Fish and Game, Lewiston, Idaho 83501.***NEEDLE IN THE HAY: DEVELOPING WOLF POPULATION MONITORING TECHNIQUES.***

We have devised a gray wolf (*Canis lupus*) population monitoring framework rooted in patch occupancy modeling and survey methods that have strong relationships to wolf abundance and distribution. We developed a habitat model that predicts the locations of rendezvous sites in Idaho and used the collected genetic samples to estimate pack size, abundance, and relatedness. Additionally, we developed an automated device that can detect wolves remotely. Lastly, we used rub stations to elicit roll responses and obtain hair samples. We suggest a monitoring framework based on occupancy modeling using data from a variety of sampling techniques can provide statewide estimates of wolf population size.

BAUMGARDT, JEREMY A.*, C. S. Goldberg, K. P. Reese, D. D. Musil, E. O. Garton, J. W. Connelly, and L. P. Waits, University of Idaho, Moscow, ID 83844. ***A METHOD FOR ESTIMATING THE POPULATION SEX RATIO OF SAGE GROUSE FROM FECAL DNA.***

Accurate estimates of sex ratio are often complicated by heterogeneity in behavior and physiology that exist between sexes such that most methods of sampling are biased. Analysis of non-invasive genetic samples offers an alternative method for estimating the sex ratio of a population that does not require capture or handling individuals. We used fecal pellets from 11 females and 7 males collected at 9 exposure times ranging from 0 to 124 days post defecation to examine how success and error rates for sex ID change in response to time. We also used simulation models to determine how many PCR replicates are needed and to evaluate the bias and precision of 3 sex-assignment criteria for estimating the population sex ratio for sage-grouse (Criterion 1: 2 Z/W results = female, 3 Z results = male; Criterion 2: 2 Z/W results = female, 2 Z results = male; Criterion 3: 1 Z/W result = female and 1 Z result = male). PCR amplification was relatively successful for fecal samples with $\leq$ 34 exposure-days and we did not detect a decrease in success with exposure-time during this period. Both Criteria 2 and 3 resulted in far less biased estimates of sex ratio under all simulated conditions than criterion 1. The least conservative assignment rules of Criterion 3 resulted in the largest proportion of the sample of both males and females assigned a sex, and the greatest probability of falsely assigning females as males. With 3 PCR replicates, the erroneous assignments seemed to offset the female biased PCR success, resulting in relatively unbiased sex ratio estimates with the greatest precision. With minor adaptations, the methods we outlined should be applicable to numerous species, adding to the limited number of existing tools for estimating population sex ratio.

BERGEN, SCOTT[1] and M. T. O'Sullivan[2]. [1]Wildlife Conservation Society, Pocatello, ID 83402; [2]Lava Lake Institute for Science and Conservation, Hailey, Idaho 83333. ***MIGRATION CORRIDORS AND WINTER RANGE OF PRONGHORN ANTELOPE OF THE UPPER SNAKE RIVER PLAIN.***

We studied pronghorn antelope from their summer range near the Pioneer Mountains (SE Idaho). Pronghorn antelope were fitted with radio-GPS collars to track their daily locations from Oct 2008 to Sept. 2009 and Sept 2009 to Aug. 2010. Radio-GPS collars were programmed to sample at a higher frequency (8/day) for fall and spring migration from and to summer range. In the fall of 2009 and 2010 collars released and GPS location data was collected from collars. We found that pronghorn were migrating to winter range that was previously unknown and their route had a consistent strong fidelity

across seasons and between years. When reaching the winter range pronghorn aggregate from several different summer ranges forming potentially the largest herd of pronghorn antelope occurring in Idaho (800 to 1,200 individuals). From winter location data garnered, we conducted a resource selection probability function model testing stewardship, anthropogenic, and vegetation characteristics from our first year of location data (2009). The RSPF model was then validated to see how well it explained the 2nd year winter locations (2010). RSPF model results from the characterize of winter range also could indicate where potential migration routes occur for this migratory species and efforts to test this are being conducted in our third year of deploying GPS/VHF collars on pronghorn antelope of the Upper Snake River Plain (Feb 2011 – Nov 2011). The conservation of wildlife corridors is a recent topic of interest to Federal and State stewards as the region faces new development pressures associated with energy transmission and production, and increased interest in mining rare earth elements prevalent in the high divide region.

BOSWORTH, WILLIAM, B. Waterbury, M. Lucid, J. Sauder, and L. Svancara. Idaho Department of Fish and Game, Boise, Idaho, 83707. ***CHARISMATIC MICROFAUNA: LOOKING OUT FOR THE LITTLE ONES***.

The Idaho Comprehensive Wildlife Conservation Strategy (CWCS) identifies 103 invertebrate animals among the 229 Species of Greatest Conservation Need. These invertebrates represent members of 2 phyla (Arthropoda and Mollusca) selectively evaluated for inclusion in this list of conservation targets. All invertebrate SGCN are restricted in distribution, and most are ecologically specialized. Nevertheless, with the exception of the few aquatic gastropods federally listed under the Endangered Species Act, invertebrates have not traditionally been high-profile conservation targets in resource management programs. Since development of CWCS, IDFG has contributed to invertebrate conservation in collaboration with conservation partners and resource management agencies. Projects have included survey and inventory to better understand status and conservation priorities, ecological studies to evaluate habitat requirements and management needs, and information synthesis to support the resource management decision-making process.

BOND, PAMELA*, Idaho State University-Boise Center Aerospace Lab, Boise, Idaho 83638. ***LIDAR-DERIVED HEIGHT AND CANOPY COVER ESTIMATION OF A SAGEBRUSH STEPPE COMMUNITY.***

Light Detection and Ranging (LiDAR) and multispectral imagery are useful tools for studying sagebrush steppe vegetation. My research explored the utility of LiDAR data and LiDAR Landsat 5 Thematic Mapper data fusion for classifying the shrub communities of a sagebrush steppe ecosystem, encompassed by the USDA ARS Reynolds Creek Experimental Watershed in southwestern Idaho. Specifically, the objectives of this research were to: 1) quantify the correlation between field-based and LiDAR-derived shrub heights, and 2) determine if LiDAR-derived vegetation heights can be used to classify the varying community types within a sagebrush steppe ecosystem, 3) determine if LiDAR data can be used to estimate canopy cover, and 4) determine if LiDAR and Landsat 5 TM data fusion improves canopy cover estimations. Accurate maps of sagebrush steppe shrub species, such as low sage, big sage, and bitterbrush, based on height and cover classification would a powerful tool for making management decisions.

BORG, NATHAN[1], L.Waits[2], P. Zager[3] and M. Mitchell[4]. [1]University of Montana; [2]University of Idaho; [3]Idaho Department of Fish and Game; [4]University of Montana. ***EVALUATING THE GENETIC DISTINCTIVENESS OF THE SALMON RIVER DRAINAGE BIGHORN SHEEP AND THEIR CONNECTIVITY TO NEIGHBORING POPULATIONS.***

Rocky mountain bighorn sheep (Ovis canadensis canadensis) were historically abundant in Idaho but currently, population levels remain low. Bighorn Sheep (BHS) in the Salmon River drainage are

considered one of Idaho's only remaining native sheep populations because they were never completely extirpated from their historic range. In addition, there has been little or no genetic influence via translocation of sheep from outside the drainage potentially making this BHS population genetically unique to Idaho. Contrastingly, surrounding populations to the west and east were extirpated or severely reduced and have subsequently been reintroduced or heavily augmented through use of translocations from Canada and several western states. There is presumed to be some degree of population connectivity between the Salmon River sheep and surrounding areas but to date, this has not been investigated using genetic data. To assess the genetic distinctiveness of Salmon River bighorns and their connectivity to other populations, we have collected genetic data from 15 nuclear DNA microsatellite loci for 256 BHS using blood and horn shaving samples across a 33,786 km^2 study area in central Idaho. The number of BHS genetic groups will be determined using Bayesian clustering algorithms and the degree of connectivity between populations will be examined using Fst and assignment tests.

COUSINS, KATHERINE[1], Ducks Unlimited, and Avista Corporation. [1]Idaho Department of Fish and Game, Coeur d'Alene, Idaho 83814. ***PACK RIVER DELTA RESTORATION PROJECT IN THE LAKE PEND OREILLE WATERSHED.***

The Pack River Delta Restoration Project was mostly funded by a North American Wetlands Conservation Act grant awarded to Ducks Unlimited, and with funds from the Idaho Department of Fish and Games' Habitat Improvement Project, Avista Corporation, Bonneville Power Administration, and two local donors. Hundreds of volunteers also participated by planting shrubs and herbaceous vegetation. The goal of the project was to increase geomorphic and vegetative diversity in the Pack River delta lost to past anthropogenic land-use practices and alterations to the hydrology of Lake Pend Oreille by the Albeni Falls dam. This was accomplished with the creation of eight islands and a variety of engineered log structures, breakwaters and soil bioengineering. Construction of the project began December 1, 2008, and was completed on March 18, 2009. The final herbaceous plantings were completed by mid-August 2009. Overall, almost all engineered structures that were attempted worked very well. The engineered log structures appeared to have all performed well in that they stayed in place and reduced surface wave action during full summer pool. The coir blankets tended to have a positive effect on plant growth by protecting soil and seed. Only two small areas less than ten feet in width on two bank full benches were rebuilt in December 2009. Over the past year, waterfowl, including swans were frequenting the ponds created by the borrow areas. It was found that the willow fascines on several bank full bench areas did not return results compared to the overall effort and amount of material used. In these cases the tops of the bank full benches needed to be at least five inches higher. After the second growing season, it was found that about 74% of nursery stock survived and 71% of all willow cuttings. Over 11,000 woody plant recruits were counted with the majority being black cottonwood seedlings.

EDDINGSAAS, AREN. Shoshone-Bannock Tribes Fish and Wildlife Department, Fort Hall, Idaho 83203. ***IMPROVING ASPEN HABITAT IN EASTERN IDAHO FOR WILDLIFE THROUGH A COLLABORATIVE WORKING GROUP.***

Aspen (*Populus tremuloides*) vegetation communities are recognized for their high plant and animal diversity. Aspen communities are in decline across the intermountain west due to fire suppression, overbrowsing, and natural succession. To combat this decline and improve wildlife habitat in eastern Idaho the Eastern Idaho Aspen Working Group was formed in 2006. Comprised of the various regional land managers, concerned non-governmental organizations, and interested public the goal of the working group is to help guide strategies for addressing the expressed goals of education, proper aspen site management, and project identification which have public trust and support. To this end the working group has developed, through a collaborative process, products and relationships between members to assist in scientifically based aspen management and restoration. Through this collaborative process all interested parties have had a voice resulting in greater support for aspen management and

restoration in eastern Idaho. The working group has developed qualitative assessment and quantitative monitoring protocols which have been used by multiple agencies to assist in aspen management. The hope is that use of these methods will become widespread in eastern Idaho allowing for a better understanding of aspen communities and their response to management at a regional level. The working group has also outlined general guidelines for aspen restoration which is being used to assist in the development of aspen management and restoration projects in the region. The working group hopes that through the use of monitoring methods and management principles developed through collaboration that resulting management and restoration activities will be scientifically sound and have greater support leading to more on the ground action benefiting aspen stands and associated wildlife.

GARTON, EDWARD O. (OZ). University of Idaho, Moscow ID 83844. ***CRISIS IN WILDLIFE AND A 12-STEP SOLUTION.***

There is a crisis in wildlife biology and management. Our practice of the scientific method is broken! Scientific progress depends on a partnership between reasoning and investigation processes. I propose a 12-step program for recovering naturaholics to re-establish that partnership.

GARTON, EDWARD O. (OZ). University of Idaho, Moscow ID 83844. ***WILL WOLVES ELIMINATE ELK AND DAMAGE THE INTEGRITY OF YELLOWSTONE NATIONAL PARK?***

Can scientists forecast the future? Will we use their forecasts to make the right decisions? Will our beliefs affect what we see happening? The reintroduction of wolves to Yellowstone National Park and River of No Return Wilderness in Central Idaho and wolves' rapid population growth have become a flash-point for disagreements amongst people passionately valuing natural systems and their resources in different ways. I was asked by the National Park Service in 1989 to forecast the impact on the Northern Yellowstone elk herd of a wolf reintroduction to Yellowstone National Park. Let's look briefly at the basis for those forecasts, the results of the reintroduction, its success and use this interesting story to address these 4 questions.

GLENN, BETSY[1], L. Rich[1], D. Ausband[1], M. Mitchell[1], J. Gude[2], C. Sime[2], C. Mack[3], and P. Zager[4]. [1]Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT 59812; [2]Montana Fish, Wildlife, and Parks, Helena, MT 59620; [3]Nez Perce Tribe, P.O. Box 305, Lapwai, Idaho 83540; [4]Idaho Department of Fish and Game, 600 S. Walnut Street, Boise, Idaho 83707. ***USING HUNTER SURVEY DATA TO ESTIMATE WOLF POPULATION SIZES IN THE NORTHERN ROCKY MOUNTAINS.***

Reliable knowledge of the status and trend of carnivore populations is critical to their conservation. In the Northern Rocky Mountains, wildlife managers need a time- and cost-efficient method for monitoring the large, growing population of gray wolves (*Canis lupus*) at a state-wide scale. We explored how hunter survey data could be incorporated into multi-year patch occupancy models to estimate the abundance and distribution of wolf packs, wolves, and breeding pairs in Montana for 2007- 2009. We used hunter observations of wolves to estimate the probability that a given landscape patch was occupied by a wolf pack, and used additional data/models in combination with occupancy model output to provide estimates of total number of wolves and number of breeding pairs. Our modeling framework also allowed us to examine how geographic and ecological factors influenced occupancy and detection of wolf packs. Our models provided estimates of number of packs, number of wolves, and number of breeding pairs that were within 20% of Montana Fish, Wildlife, and Parks minimum counts for 2007-2009. We are currently developing a similar modeling approach for Idaho and will present a summary of our progress to date. We believe that patch occupancy models based on hunter surveys offer promise as a method for accurately monitoring elusive carnivores at state-wide scales in a time- and cost-efficient manner.

Goldberg, C. S.[1], WILLIAM R. BOSWORTH[2], D. C. Tank[3], and L. P. Waits[1]. [1]Department of Fish and

Wildlife Resources, University of Idaho, Moscow, ID, 83844; [2]Idaho Data Conservation Center, Idaho Fish and Game, Boise, ID, 83712; [3]Department of Forest Ecology and Biogeosciences, University of Idaho, Moscow, ID, 83844. S***PECIES DESIGNATION OF THE BRUNEAU TIGER BEETLE (CICINDELA WAYNEI) IS SUPPORTED BY PHYLOGENETIC ANALYSIS OF MITOCHONDRIAL DNA SEQUENCE DATA.***

Appropriate resource management decisions depend on accurate and robust taxonomic designation. Tiger beetles on the Bruneau dune field in southern Idaho have recently been described as Bruneau tiger beetles (*Cicindela waynei*), a separate species from the Saint Anthony Dunes tiger beetle (*C. arenicola*), based on morphological characteristics. However, morphological characteristics have sometimes been misleading in tiger beetle taxonomy. To determine if mitochondrial sequence data supported the species designation of *C. waynei*, we analyzed 1751 base pairs of mitochondrial DNA sequence from 147 tiger beetles collected from throughout the range of both *C. arenicola* and *C. waynei.* Maximum-likelihood phylogenetic analysis indicated monophyly for *C. waynei* on a short branch nested within *C. arenicola* (81% bootstrap support). The lack of reciprocal monophyly for this clade is consistent with this species as a member of an evolutionary front where speciation occurs at a rapid rate. Mitochondrial sequence data supports the species designation of *C. waynei*, emphasizing the need to determine appropriate management for this species and its restricted habitat.

Griffin, K., M. Hebblewhite, PETE ZAGER, H. R. Robinson, S. Barber-Meyer, D. Christenson, S. Creel, N. Harris, M. Hurley, D. Jackson, B. Johnson, L. D. Mech, W. L. Myers, J. Raithel, M. Schlegel, B. Smith, C.G. White, and P. J. White. Idaho Department of Fish and Game, 3316 16th Street, Lewiston, ID 83501.
NEONATAL MORTALITY OF ELK DRIVEN BY CLIMATE, PREDATOR PHENOLOGY, AND PREDATOR DIVERSITY.

Understanding the interactions among predators and between predation and climate is critical to understanding mechanisms for compensatory mortality. We used data from 1,999 radio-marked neonatal elk (*Cervus elaphus*) calves from 12 populations in the northwestern United States to test whether interactions of predation and climate resulted in compensatory mortality. Across the entire northwestern U.S., neonatal elk survival to 3 months declined following hotter previous summers and was positively influenced by May precipitation, especially as the number of predator species increased. Mortality hazard increased as the number of predator species increased from 3 to 4, but not as much from 4 to 5 predators. As the number of predator species increased, mortality by cougars (*Puma concolor*) decreased, yet predation by bears (*Ursus* spp.) increased. Only bear predation affected neonate survival in an additive manner, and peaked earlier than other predators. Therefore, the phenology of additive predation by bears may render later mortality compensatory as calves age. Wolf (*Canis lupus*) predation was an unimportant, and largely compensatory, source of mortality for elk calves from birth through 3 months of age. Functional redundancy and interspecific competition among predators combined with the interactive effects of climate on vulnerability to predation to drive compensatory mortality of neonatal elk calves. The exception was the strongly additive nature of bear predation. These results suggest that effects of predation by recovering wolf populations on neonatal (≤ 3 months old) elk survival, a contentious issue for management of elk populations, may be less important than the composition of the predator community. We suggest that future studies synthesize overwinter calf survival and adult survival datasets to test the relative roles of predation and weather in the annual population dynamics of elk.

HOWE, KRISTY*, P. Coates and D. Delehanty. Idaho State University, Pocatello, Idaho 83204.
SELECTION FOR VEGETATION TYPES AND ANTHROPOGENIC STRUCTURES BY COMMON RAVENS (CORVUS CORAX) WITHIN A SAGEBRUSH-STEPPE ECOSYSTEM.

Human-made structures in sagebrush ecosystems can increase Common Raven (*Corvus corax*) populations by providing food and nesting resources. This is cause for concern because ravens are important nest predators of sensitive species, including Greater Sage-Grouse (*Centrocercus urophasianus*).

During 2007 – 2009, we conducted raven surveys (n = 710) and located raven nests (n = 97) in southeastern Idaho. We conducted two resource selection analyses (available-use), first identifying habitat associations of all ravens and then focusing on nesting individuals. At sampling points (nests, surveyed, and random), we measured variables at multiple spatial scales (GIS; scales, 102.1, 660.5, 4048.9 ha), including vegetation type (e.g., annual grassland) and anthropogenic resources (e.g., transmission lines). We compared multiple models (hypotheses) using an information-theoretic approach. The most parsimonious models included transmission lines, facilities, and non-native grasslands. For every 1 km increase in distance to transmission lines and facilities, the odds of raven presence decreased by 9.3% and 4.5%, respectively. Also, for every 10 ha increase of non-native grasslands (660.5 ha scale), the odds of raven presence increased by 2.7%. In post hoc analyses, the odds of raven presence increased with greater edge length of big sagebrush (*Artemisia tridentata* spp.) and non-native grassland. We found greater odds of nesting with decreased distance to transmission line and increased amount of vegetation type edge (102.1 ha scale). These findings contribute to our understanding of raven expansion into rural environments and could be used to make better-informed conservation decisions, especially in the face of increasing renewable energy development.

HURLEY, MARK A.[1], M. Hebblewhite[2], and P. Zager[3]. [1]Idaho Department of Fish and Game, P. O. Box 1336, Salmon, ID 83467; [2]Wildlife Biology Program, College of Forestry and Conservation, University of Montana, Missoula, Montana, 59812; [3]Idaho Department of Fish and Game, 3316 16th Street, Lewiston, ID 83501. ***ANIMALS LIVE THERE SO IT IS HABITAT, RIGHT? DEFINING HABITAT QUALITY.***

Habitat was defined by Sinclair as "a suite of resources and environmental conditions that determine the presence, survival, and reproduction of a population". Whether you define habitat in this fashion or based on vegetative characteristics alone, a basic premise must include positive population growth rate in some years. In practice wildlife and habitat managers may focus on improving vegetative quality of habitat. To quantify and target habitat improvement, levels of resource selection are often viewed as a measure of habitat quality, higher selection = higher quality, without linking the area in question to animal vital rates (eg. survival, fecundity, growth rate). Competition, predator effectiveness, and weather are integral components of habitat quality that are often ignored but may, in some cases, be more important than vegetative quality alone. Individual behavior and avoidance of predation may cause ungulates, such as mule deer, to select habitats in a manner that is inconsistent with nutritional carrying capacity alone, leading to a lower density than predicted by a purely nutritional model. As an example, we predicted survival of neonatal mule deer fawns based on coyote resource selection to illustrate how habitat quality may be compromised by predation risk. We monitored survival of neonatal fawns 1998-2002 and conducted scat transects to index coyote populations. We used resource selection modeling to estimate probability of coyote presence and used this metric as a covariate in proportional hazards models of neonatal mule deer mortality. Coyote use was significantly related to neonate mortality suggesting a population sink in some frequently used habitats. In this situation, coyote caused mortality actually increased as the population increased suggesting a density dependent reduction in per capita vital rates had occurred far below nutritional carrying capacity. Understanding the components of habitat quality will provide more realistic expectations of population growth and ultimate population size of individual species.

JIMENEZ, BENJAMIN S.*[1], M. S. Mitchell[1], P. Zager[2]. [1]Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT 59812; [2]Idaho Fish and Game, Lewiston, Idaho 8501. ***MULTI-SCALE EFFECTS OF FOREST ROADS ON BLACK BEARS.***

The black bear (*Ursus americanus)* population within the Coeur d'Alene River watershed of northern Idaho is exposed to high hunting and recreational pressure facilitated by a dense network of gravel and paved forest roads. Bears are hunted using bait and dogs in spring and fall, and non-lethal pursuit with dogs is allowed during a summer season. To understand the effects of forest roads black bear behavior

we used data collected from 28 adult bears fitted with Global Positioning Systems (GPS) collars from June 1 2007 through the fall of 2008. We used locations acquired at 20 minute intervals to assess habitat selection and activity patterns of males and females at home range (2nd order) and within home range (3rd order) scales, both annually and seasonally. We tested the hypotheses that black bears 1) will show no response to road density in 2nd order habitat selection in areas of relatively consistent road density, 2) will show a functional response to roads in 3rd order habitat selection, i.e. use of habitat near roads will be inversely proportional to traffic volume, 3) show seasonal shifts in activity patterns and movement rates in proximity to roads. To assess fine scale habitat selection and movement patterns, as well as the influence of roads, we used matched case-control logistic regression analysis, where available habitat was defined by movement rates of a given animal. We also calculated average movement rates of bears throughout the year to see if activity patterns changed seasonally as well as in response varying traffic volumes. Avoidance of areas containing primary food sources or increased activity and energy expenditure may have profound consequences for bears. Understanding how traffic volume and road density influences habitat selection and movement patterns can therefore play an important role in management of the species.

KERTSON, BRIAN N.[1], B. T. Maletzke[2], M. E. Swanson[3], G. M. Koehler[4], R. A. Beausoleil[5], H. S. Cooley[2], and R. B. Wielgus[2]. [1]School of Forest Resources, College of the Environment, University of Washington, Seattle, WA, 98195; [2]Large Carnivore Conservation Lab, Department of Natural Resources, Washington State University, Pullman, WA, 99164; [3]Department of Natural Resources, Washington State University, Pullman, WA, 99164; [4]Washington Department of Fish and Wildlife, 2218 Stephanie Brooke, Wenatchee, WA, 98801; [5]Washington Department of Fish and Wildlife, 3515 State Highway 97A, Wenatchee, WA, 98801. ***EFFECTS OF RESIDENTIAL DEVELOPMENT ON COUGAR SPATIAL ECOLOGY IN WASHINGTON.***

Residential development creates significant challenges for managing and conserving large carnivores stemming from loss of habitat and increased proximity to human populations. Cougar (*Puma concolor*) use of residential areas and interactions with people are a growing management concern, but little is known of their spatial ecology in wildland-urban environments. We used utilization distributions (UD) and county tax parcel data to quantify and compare use of residential areas at multiple scales to investigate the relationship between residential development and cougar spatial ecology in Washington. We used Weibull functions and a lacunarity analysis to examine how different levels and patterns of residential development influences cougar use of these areas and reported levels of cougar-human interaction. Cougar UDs encompassed predominantly undeveloped parcels at both the hectare (mean = 98.09%, SD = 3.12, n = 102) and km^2 (mean = 81.59%, SD = 15.60, n = 102) scales as cougars decreased use as residential densities increased. Lower use of residential areas at the hectare scale showed use of undeveloped, suitable habitat within the matrix of residential development. Cougar movements in eastern Washington study areas occurred in areas with residential densities ≤ 55.2 residences/km^2 whereas for western Washington it was ≤ 846.0 residences/km^2. Cougars minimized use where residential densities exceeded these thresholds. Increasing amounts of forested habitat and human population size increased the number of reports, but both factors explained < 50% of observed variability in annual cougar incident report levels (Forest: R^2 = 30.5%, Population: R^2 = 44.3%). Diffuse, low density development (i.e., exurban) can increase cougar proximity to residences and may increase cougar report levels. Wildlife managers looking to reduce use of residential areas and interactions should account for cougar spatial ecology and human distribution and explore collaborations with development and landscape planners to cluster residential development at urban densities (> 10 residences/ha).

KNETTER, SONYA, L. Svancara, and W. Bosworth. Idaho Department of Fish and Game, Boise, ID 83707. ***MAPPING SEASONAL SAGE-GROUSE HABITATS USING INDUCTIVE MODELS.***

In 2000, state and federal agency partners in Idaho collaborated to develop the Idaho Sage-grouse Habitat Planning Map, based largely on expert, local biologist opinion, as an aid to conservation

planning for the species. Over time, this map has been updated through collaboration among Idaho BLM, Idaho Department of Fish and Game and other partners and refined with wildfire polygons and vegetation treatments, improving its utility and accuracy. However, due to its inherent lack of resolution, the applicability of the existing map is limited to broad scale uses. With improved mapping products, models, and tools, it is now practical to develop a "next generation" sage-grouse habitat map that is empirically driven and considers seasonal requirements. We use a 2-tiered, correlative modeling approach (Maxent) based on radio telemetry locations and several environmental predictor variables. At a coarse scale we characterize potential sage-grouse distribution in Idaho based on climate variables. We then incorporate topography, land cover, and fire data at a finer resolution to produce realized seasonal habitat distributions. Models are assessed by overlaying independent observation datasets, local working group seasonal habitat maps, and the current Habitat Planning Map. The modeling framework can facilitate future updates and analyses including climate change.

LOCKYER, ZACHARY B.*[1], P. Coates[2], M. Casazza[2], and D. Delehanty[1]. [1]Idaho State University, Pocatello, ID, 83201; [2]United States Geological Survey (USGS), Dixon, CA, 95620. ***EXAMINING GREATER SAGE-GROUSE NEST PREDATORS, NEST SURVIVAL, AND HABITAT FEATURES AT MULTIPLE SPATIAL SCALES.***

In the Virginia Mountains of northwestern Nevada we monitored Greater Sage-grouse (*Centroccus urophasianus*; hereafter sage-grouse) nest survival relative to multi-scale habitat features and nest predators during the 2009 and 2010 nesting seasons. A portion of the study area is scheduled for wind and solar energy development lending potential for alterations in vegetation and predator communities. These impacts will likely adversely affect sage-grouse nest survival. To address complex interactions influencing sage-grouse nest survival females were captured and radiomarked (n = 56) for analyses of nest site selection and survival. Micro-habitat variables within a 100 m radius of each nest were evaluated in conjunction with larger spatial scale features using Geographical Information Systems. Indices for two common predators, common raven (*Corvus corax*) and American badger (*Taxidea taxus*), were developed at multiple spatial scales. Predator indices and vegetation features were included as explanatory variables in a maximum likelihood modeling approach using Program R and Mark. Furthermore, continuous video recording systems at nest sites (n = 22) were used to unambiguously identify sage-grouse nest predators and monitor grouse behavior whereby an array of predator types were identified engaging in nest predation that have not previously been documented in the literature. An estimated nest survival of 13.5% (CI 8.9–20.2), using a 37-day exposure period, was relatively low compared to other derived likelihood values across their range. We also detected linkages between habitat characteristics, raven abundance, and probability of sage-grouse nest survival at multiple spatial scales. Badger abundance indices were not found to influence the probability of nest survival. Information from this research should emphasize the importance of multi-scale approaches in analyzing nest survival data and also inform management decisions related to human land-use, habitat restoration, and changes in predator communities in the sagebrush steppe.

LUCID, MICHAEL[1], S. Cushman[2], L. Robinson[1], B. Bosworth[3], and S. Cook[4]. [1]Idaho Department of Fish and Game, Coeur d' Alene, Idaho 83815; [2]USFS Rocky Mountain Research Station, Missoula, Montana 59812; [3]Idaho Department of Fish and Game, Boise, Idaho 87102; [4]University of Idaho, Moscow, Idaho 83843.
GASTROPOD INTOXICOLOGY: ONE OUT OF FIVE SNAILS PREFERS BEER-BAITED COVER BOARD TRAPS TO UN-BAITED CONTROL TRAPS.

The Idaho Comprehensive Wildlife Conservation Strategy lists the need for basic inventory as a recommended action for 82% (n = 40) of gastropod Species of Greatest Conservation Need (SGCN). Techniques for sampling terrestrial gastropods are limited, but include the use of cover objects. Cover objects are less effective during the dry summer months when many field crews are active. We sought to add a new twist to an old technique to allow more effective summer surveys of terrestrial gastropods.

We established three cardboard cover board traps at 110 sites in the U.S. Selkirk Mountains. At each site one control trap was left untreated, the second was soaked in water, and the third was soaked in Natural Ice Beer. Traps were left in place for approximately 14 days, revisited and rebaited, and visited again after approximately 14 days. Traps baited with beer captured significantly more species (n = 18) than control traps (n = 12) and those baited with water (n = 10) ($p<0.05\%$). Traps that were baited with beer or water captured significantly more specimens (n = 150 and 101 respectively) than control traps (n = 27) ($p<0.05\%$), although beer and water traps did not capture significantly differing numbers of specimens. Taxonomy work is being finalized, but of the 22 minimum species we captured, at least five are SGCN, with the largest diversity of SGCN found on beer baited traps (n = 5 SGCN) and water and control traps each capturing three different SGCN. This technique was particularly effective for sampling small gastropods (i.e., less than 5 mm) which are usually underrepresented in species inventories. We incorporated this quick, simple, and repeatable trapping technique into wildlife diversity monitoring plots.

MOSER, ANN, B. Lowe, M. Remming, and M. Schwender. Idaho Department of Fish and Game, Boise, Idaho, 83707. ***WILDLIFE RESPONSES TO THE 2007 MURPHY COMPLEX FIRE.***

We studied the population-level responses of greater sage-grouse, other breeding birds and small mammals to the 2007 Murphy Complex Fire and subsequent vegetation rehabilitation. The Murphy Complex Fire burned approximately 504,400 acres of sagebrush and grassland in southwest Idaho. An intense rehabilitation effort resulted in 82,000 acres drill seeded with native and non-native grasses and forbs, and 258,000 acres aerially seeded with big sagebrush. Seventy-one known sage-grouse leks were within the fire boundary. In 2008-2010, we increased monitoring efforts, both by air and on the ground, for sage-grouse leks in and adjacent to the Murphy Complex Fire. In 2008 and 2009, male attendance at leks within the burn did not exhibit a trend different from leks in the surrounding landscape. However, by 2010 leks within the burn continued a downward trend, while those outside demonstrated an increasing trend. The effect of the fire on lek attendance extended out to at least 5 km beyond the burn boundary. In 2009-2010, we surveyed for breeding birds and small mammals, and measured vegetation composition and structure within 45 1-km^2 sampling blocks. Sampling blocks were selected in proportion to the availability of the 2 dominant ecological sites on the landscape, each of which received a specific seed mix in drill-seeded areas. Blocks were stratified by 1) drill-seeded areas, 2) natural recovery areas, and 3) unburned sagebrush. In 2009, the densities of gray flycatcher, horned lark, and western meadowlark were not different among strata. Brewer's sparrow and sage thrasher had significantly higher densities at sagebrush sites, while vesper sparrow had higher densities at natural recovery sites. For small mammals, deer mice were ubiquitous throughout, while more sagebrush voles were captured at natural recovery sites and yellow-pine chipmunks were mostly captured at sagebrush sites. Breeding bird, small mammal, and vegetation results for 2010 are pending.

MULLER, KRISTA. Idaho Department of Fish and Game, Boise River Wildlife Management Area, Boise, Idaho 83716. ***STATE HIGHWAY 21 WILDLIFE UNDERPASS: PROTECTING PEOPLE, PROTECTING WILDLIFE.***

In recent years, widespread concern has arisen over the increase in wildlife-vehicle collisions on State Highway 21 in Ada and Boise counties in southwestern Idaho. Each year, over 7,000 mule deer (*Odocoileus hemionus*) and 500 elk (*Cervus elaphus*) must cross SH-21 as they migrate from their summer ranges to their wintering habitat at the Boise River Wildlife Management Area. While crossing the road, approximately 150 - 210 vehicle collisions with mule deer and 5 – 10 vehicle collisions with elk occur within a 22 mile stretch of the highway. Estimated annual cost of these collisions is $750,000 to $1,000,000. To reduce the risk of wildlife-vehicle collisions and maintain habitat connectivity, state agencies and private organizations began working together in 2007 to develop and construct the first retrofitted wildlife specific crossing structure in Idaho. Previous research has shown that many big game species respond positively to crossing-structures such as underpasses (a bridge-like structure that allows

the animal to safely walk under the road without contact with surrounding traffic). This presentation will focus on the affected area, its wildlife management implications, underpass engineering, the successes and challenges of working collaboratively with other agencies and the outcomes of the project.

PEEK, JAMES M. University of Idaho, Moscow, ID 83844-1136. ***MOUNTAIN SHEEP GRAZING OF BLUEBUNCH WHEATGRASS IN CENTRAL IDAHO .***

Mountain sheep (*Ovis canadensis*) grazing on bluebunch wheatgrass (*Pseudoroegneria spicata*), a major forage species, in central Idaho was examined over the 1992-1996 period. Grasses in this habitat were vigorous and showed no evidence of heavy grazing, suggesting that even at higher densities, sheep were not appreciably affecting this habitat. Regressions of height/weight relationships of bluebunch wheatgrass were developed to estimate biomass produced and removed from individual plants. Mean amounts of tissue removed from bluebunch wheatgrass plants ranged from 5.3% to 26.8% over the 5-year period. Nitrogen levels ranged from 0.7-1.4% from 1998-2007 in plants collected in late June after seed-set. Higher levels of N occurred in growth following wildfire burns. The hypothesis that mountain sheep were not grazing this species at levels that were likely to affect plant growth because sheep metabolic requirements required that they graze only the most nutritious plant parts was supported. Implications for regulation of numbers of sheep in this system are discussed.

RACHLOW, JANET L.[1], M. K. Lonneker[1], L. A. Shipley[2], W. R. Bosworth[3]. [1]Department of Fish and Wildlife Resources, University of Idaho, Moscow, ID 83844; [2]Department of Natural Resources, Washington State University, Pullman, Washington 99164-6410; [3]Idaho Department of Fish and Game, Boise, ID 83712. ***MAPPING THE DISTRIBUTION OF PYGMY RABBITS: HOW BIG IS THEIR RANGE ANYWAY?***

Currently, no range-wide map exists that accurately represents the known occurrence of pygmy rabbits. The often cited and reprinted map from Green and Flinders (1980) and the recent map created for the 12-month status review of the petition to list the species both provide only a range perimeter that encompasses the area occupied by the species. However, distribution within that perimeter is highly patchy. To create a range map that reflects current knowledge about distribution of pygmy rabbit populations, we gathered historic and current location data from all states within the range. We screened the data to include only confirmed locations (verified via sighting, capture, photography, or DNA evidence), and we buffered locations by 10 km, which is close to the maximum dispersal for juvenile rabbits. Locations were categorized as either recent (confirmed since 2000) or historical (documented before 2000). Comparisons of these two categories demonstrated that the extent of the species range has not declined markedly. However, rabbits have not been confirmed within several regions where populations were documented historically. These data represent the known distribution of this species, act as a baseline against which future distribution changes can be assessed, and can be used to evaluate range-wide patterns of change over time, including apparent range contractions and expansions.

RICE, KAREN, BLM, Idaho Falls District, Idaho Falls, Idaho 83401. ***THE UPPER SNAKE RIVER LAND CONSERVATION PARTNERSHIP.***

The BLM's east Idaho Snake River and Henrys Lake Areas of Critical Environmental Concern (ACECs) are born of snowmelt and springs among the high ridges of Yellowstone country. These two ACECs support multiple listed species, big game and upland game, the most unique and bio-diverse ecosystem in Idaho, one of the largest cottonwood gallery forests remaining in the lower forty-eight western United States, rare wetlands, produce one-third of the Greater Yellowstone Ecosystem's bald eagles, have world-renowned blue ribbon trout rivers and lake that supports the largest population of native Yellowstone cutthroat trout outside of Yellowstone National Park, and active water-based recreation

programs. The State of Idaho ranked the project area as Idaho's #1 priority wetland based on resource values and threats.

The Upper Snake River Land Conservation Partnership was formed in 1998 in response to the imminent threats of subdivision and resort development in the area, the great potential of many conservation projects across a large geographic scope, and the diversity of landowners along the Snake River corridors and Henry's Lake. The three non-profit conservation organizations (The Conservation Fund, The Nature Conservancy, Teton Regional Land Trust) operate independently to accomplish common conservation goals. They collaborate as a team with the BLM to acquire critical properties from willing land owners to secure crucial habitat within the ACECs.

This partnership has vastly expanded the ability of the BLM to accomplish the intent of the Land and Water Conservation Fund Act and the Federal Land Transaction Facilitation Act. Through the efforts of these organizations, approximately 91 privately owned properties, many working farms and ranches, have been protected through purchase of 25,000 acres -10,300 acres in fee and 14,500 acres of conservation easements along the South Fork, Henrys Fork, Main Snake Rivers and Henrys Lake area in southeastern Idaho's Greater Yellowstone Ecosystem.

SERVHEEN, GREGG and G. Vecellio. Idaho Department of Fish and Game, Boise, Idaho 83707. ***DEVELOPING DECISION SUPPORT SYSTEMS FOR IDAHO AND THE REGION: AN OVERVIEW OF CURRENT EFFORTS AND AN EXAMINATION OF THE IMPLICATIONS ON FUTURE OF WILDLIFE MANAGEMENT DECISION MAKING.***

The Idaho Department of Fish and Game, in collaboration with neighboring states Montana, Washington, and Oregon, is undertaking development of a decision support system using current and available data on fish and wildlife. The components of a decision support system and the steps we are taking to develop them via pilot project efforts of the Western Governor's Association are described. Rectification of fish and wildlife data across state boundaries, crucial habitats, wildlife corridors and connectivity, and climate change are being incorporated into these efforts and are described. How the outcomes will be used as a tool to deliver information on fish and wildlife to appropriate users including project proponents, scientists, managers and the public are described. The role of this approach will be discussed in terms of the evolution of fish and wildlife management and what it will mean in the future to individual scientists, researchers, managers, and organizations concerned with and involved in managing and sustaining fish and wildlife and their habitats.

SHARP, NICHOLAS W.* Yellowstone and Northern Rockies Office of the Wildlife Conservation Society, University of Montana, Missoula, Montana 59812. ***NAVIGATING THE HUMAN LANDSCAPE, A MIGRATORY UNGULATE PERSPECTIVE.***

What do animals perceive as they navigate the human landscape? In a landscape altered by humans, animals must cope with numerous anthropogenic disturbances, such as harvested forests, roads, housing developments, and noise. Migrating moose and elk in the southwestern sector of the Greater Yellowstone Ecosystem must run the gauntlet of human disturbance each spring and fall as they move between winter and summer grounds. One particular disturbance animals must cross is US 20, a heavily traveled highway west of the Yellowstone and Grand Tetons National Parks, where moose and elk regularly die due to vehicle collisions. The Idaho Transportation Department, Wildlife Conservation Society and the Idaho Department of Fish & Game have initiated a 3-year study to understand what determines moose and elk choice of migration route, why they cross US 20 where they do, and how vehicles and noise affect animal behavior. This goal implies an approach from 3 perspectives: 1) landscape, 2) local, and, 3) individual. Methodology reflects these 3 perspectives. We have placed GPS collars on 30 moose and 30 elk to test whether landscape variables (snow depth, topography, forest cover, human infrastructure and development, etc…) influence animal movement between summer and

winter grounds. Track surveys along the highway will reveal which local habitat cues signal a choice crossing point. Observation of moose and elk behavior near and far from roads and in response to various noise stimuli will clarify whether individuals with varying exposure to roads perceive vehicles and noise as a predation risk, disturbance, or nuisance to be tolerated. Our goal is that an improved understanding of how animals perceive and navigate the human landscape will lead to insights to protect the process of migration and mitigate ungulate-vehicle collisions.

STANSBURY, CARISA R.*[1], D. E. Ausband[2], C. M. Mack[3], P. Zager[4], M. Mitchell[5], and L. P. Waits[1]. [1]University of Idaho, Moscow, ID; [2]Montana Cooperative Wildlife Research Unit, University Montana, Missoula, MT; [3]Nez Perce Tribe Wolf Recovery, McCall, ID; [4]Idaho Department of Fish and Game, Lewiston, ID; [5]United States Geological Survey, Missoula, MT. ***A NONINVASIVE GENETIC SAMPLING APPROACH FOR MONITORING GRAY WOLVES IN IDAHO.***

Conventionally, gray wolf (*Canis lupus*) population estimation and monitoring has been conducted using capture-recapture techniques and telemetry which can be expensive, invasive and potentially dangerous for both field personnel and wolves. We have designed an alternative approach that combines predictive habitat modeling of wolf rendezvous sites with population estimates based on genetic analysis of scat and hair samples. In 2007 - 2008, we applied this approach in four study areas (11,335 km^2) in Central Idaho and found agreement between traditional field-based population estimates and mark-recapture population estimates derived from genetic analysis. In the summer of 2009, we continued this research at two of the original study areas (7,249 km^2) in Central Idaho and added a new study area (2,727 km^2) in Idaho's Panhandle Region. During field surveys, we collected 1,155 scat and 62 hair samples. A species identification test using mitochondrial DNA was conducted with an overall PCR amplification success rate of 94% for scat and 84% for hair. 416 pup scats, 536 adult scats and 51 hair samples were positively identified as wolf and analyzed for individual identification using 9 nuclear DNA microsatellite loci. Overall individual identification success rate was 73%, and the study area with the wettest climate exhibited a 30% decrease in success rate. Population estimates were conducted using 2 single-session estimators and compared to estimates from telemetry observations. Average numbers of observations/individual ranged from 1.4 to 1.8. Overall, there was agreement between the telemetry-based population estimates and genetic mark-recapture population estimates, but genetic estimates from areas with lower recapture rates were biased high. This method may be useful to managers that need to implement a high resolution monitoring method to track population trends and/or establish quotas for a sustainable harvest of gray wolves.

STEPHENSON, JOHN, K. Reese, P. Zager, P. Heekin, P. Nelle, and A. Martens. University of Idaho, Moscow, Idaho 83844. ***FACTORS INFLUENCING SURVIVAL OF NATIVE AND TRANSLOCATED MOUNTAIN QUAIL IN WEST-CENTRAL IDAHO AND EASTERN WASHINGTON.***

We estimated survival rates for 181 native mountain quail (*Oreortyx pictus*) in west-central Idaho from 1992-1996 and for 199 translocated mountain quail in western Idaho and eastern Washington in 2005 and 2006. Spring/summer survival of native birds over 4 years ranged from 0.210 (SE = 0.116) to 0.799 (SE = 0.103) and their fall/winter survival in 2 years was 0.523 (SE = 0.089) and 0.244 (SE = 0.084). Annual survival rates were 0.418 (SE = 0.088) and 0.174 (SE = 0.065). The spring/summer survival rate of translocated birds was 0.215 (SE = 0.044) in 2005 and 0.059 (SE = 0.021) in 2006. We modeled biweekly survival as a function of sex, age, movement rate, native vs. translocated status, and linear time trend, and then added year and 3 weather covariates (mean biweekly precipitation and maximum and minimum temperatures). Year and climate variables improved the *a priori* top model which included movement rate and native vs. translocated status. Higher mortality rates due to predation coincided with movements to breeding habitat in late winter, periods of higher temperatures in the spring and summer, and periods of higher precipitation and colder temperatures during the fall/

winter seasons. Relatively high movement rates of native birds in winter to avoid snow and by translocated birds when dispersing may have led to greater exposure to predators and consequently lower survival rates. Mountain quail can experience low and variable survival, stressing the potential need for multiple years of releases in restoration efforts in the eastern portion of their range. More attention is needed to identify optimal habitat (including nest sites) for restoring mountain quail populations to reduce movements, lower mortality risks, and provide conditions for withstanding periods of unfavorable weather.

STEVENS, BRYAN S.*[1,2], K. P. Reese[1], J. W. Connelly[3], and D. Musil[3]. [1]Department of Fish and Wildlife Resources; [2]Department of Statistics, University of Idaho, Moscow, Idaho 83844; [3]Idaho Department of Fish and Game, Jerome, Idaho 83338. ***FENCES AND GREATER SAGE-GROUSE: AN EXPERIMENTAL TEST OF MARKING AS A MITIGATION METHOD TO REDUCE COLLISION RISK IN BREEDING AREAS.***

We conducted a field experiment testing effectiveness of fence marking at reducing greater sage-grouse (*Centrocercus urophasianus*) collision risk on breeding areas in southern Idaho during spring of 2010. Using 8 study sites, we experimentally marked 3, 500-m segments of fence at each site using reflective-vinyl markers, with 3, 500-m unmarked control segments at each site. We surveyed treatment and control segments 5 times each during the 2010 lekking season using a repeated measures design. Logistic regression modeling suggested probability a fence-segment survey contained a sage-grouse collision was influenced by marking treatment, size of the nearest lek, distance of fence segment from the nearest lek, and sampling round. Fence marking reduced probability of collision by an average of 93.7% over 5 sampling rounds at mean values of lek size and distance to lek (lek size = 46.9 birds; distance = 1361.8 m). Increasing lek size and decreasing distance both strongly increased collision probability. Zero-inflated Poisson regression modeling suggested collision count summed over the lekking season was influenced by marking treatment, lek size, and distance to nearest lek. Fence marking reduced expected collision counts for a fence segment by 74.0% at mean values of lek size and distance from lek. Increasing lek size and decreasing distance increased expected collision counts. While fence marking was effective at reducing sage-grouse fence collision risk, expected collision counts in extremely high risk areas (i.e. maximum lek size = 127, minimum distance = 104 m) were still high (unmarked fence = 8.3 birds/season, marked fence = 2.2 birds/season), suggesting these fence segments may require removal. Further, expected collision counts in extremely low risk areas (i.e. minimum lek size = 1, maximum distance = 4650 m) were very low (unmarked fence = 0.08 birds/season, marked fence = 0.02 birds/season), suggesting not all fences require mitigation efforts.

STEVENS, BRYAN S.*[1,2], K. P. Reese[1], and J. W. Connelly[3]. [1]Department of Fish and Wildlife Resources; [2]Department of Statistics, University of Idaho, Moscow, Idaho 83844; [3]Idaho Department of Fish and Game, Jerome, Idaho 83338. ***GREATER SAGE-GROUSE FENCE COLLISION: A MULTI-SCALE ASSESSMENT OF COLLISION RISK AS A FUNCTION OF SITE AND BROAD-SCALE FACTORS.***

We used probability sampling methods to survey fences for fence-collision in greater sage-grouse breeding areas across southern Idaho sites during the springs of 2009 and 2010. We randomly selected 1x1 km sampling units within approximately 2.5 km of active leks monitored by Idaho Department of Fish and Game using stratified cluster sampling to estimate fence collision rates. We sampled 129.5 km of fence from March-May 2009 and 2010, of which approximately 91.2 km was sampled on ≥ 2 occasions. During these surveys we located 87 greater sage-grouse fence collision sites, and an additional 25 collision sites from non-target species. Non-target avian collision species identified included: gray partridge, sharp-tailed grouse, horned lark, western meadowlark, American robin, Brewer's sparrow, rock dove, short-eared owl, long-eared owl, western screech owl, great horned owl, ferruginous hawk, and rough-legged hawk. We measured vegetation, topographic, and fence characteristic attributes at each collision site and a similar number of random fence points. Further, we

quantified lek distribution and count characteristics for each sage-grouse collision site and random point, as well as broad scale vegetation, topographic, and fence characteristics for each 1x1 km sampling unit using ArcGIS software. We developed predictive models of sage-grouse collision risk as a function of site and broad-scale features to aide in management prioritization of areas for future mitigation methods. Results and management implications of this analysis will be discussed.

SVANCARA, LEONA K. Idaho Dept of Fish and Game, Moscow, Idaho, 83844. ***IDAHO COMPREHENSIVE WILDLIFE CONSERVATION STRATEGY VER 2.0 - INCORPORATING CLIMATE CHANGE.***

Since the development and approval of the State Wildlife Action Plans, including Idaho's Comprehensive Wildlife Conservation Strategy (CWCS), in 2005, awareness of the impact of climate change on wildlife has grown substantially. As a result, the Association of Fish and Wildlife Agencies (AFWA) is encouraging and facilitating incorporation of climate change into the revised plans which are due in 2015. Several climate change adaptation strategies and tools for planning are available and the approach taken in Idaho will be discussed. Ongoing regional climate change projects, including the Pacific NW Vulnerability Assessment, the Idaho EPSCoR projects, and the Western Governors Association pilot projects, will play important roles in the revision. Objectives, preliminary results, and application of these projects to CWCS2.0 and other management plans will be summarized.

TAYLOR, MARK S. Idaho Department of Fish and Game, Coeur d'Alene, Idaho 83815. ***FERNAN VILLAGE, IDAHO DEER TRAPPING: A COMMUNITY PILOT PROJECT FOR DEALING WITH URBAN WILDLIFE.***

In early 2007, we met with the city leaders of Coeur d'Alene, Dalton Gardens, Hayden, and Fernan Village to discuss the urban deer dilemma and possible solutions. These included the use of sharp-shooters, trapping and euthanizing, trapping and translocation, sterilization, special hunting seasons within city limits, hazing, exclusion, and repellents. Because of the potential for public outcry, the City decided that initially they should pursue the least controversial option: trapping and relocation. First, the City passed an ordinance outlawing the feeding of deer. Then, for three winters, 2008-2010, the City of Fernan funded then hired a trapper to trap and transplant deer. The Department permitted the process and loaned the trappers four of our clover traps for the operation. Other than a few meetings and some oversight, Department personnel were not involved in the operation. Trapped deer were moved over 4th of July Pass to the CDA WMA near Killarney Lake: about 14 air miles, but across a mountain pass and a large lake. Fifty five deer were trapped and transplanted. Forty eight were ear tagged. None of the ear-tagged deer reappeared in Fernan.

First and foremost, this project is not totally about deer. It is also about people and their perceptions. It is about local residents' perceptions and equally, it is about Department employees' perceptions. Whether we made a long term difference in Fernan's white-tailed deer numbers is still unknown. The citizens of Fernan were entrusted with and engaged in a solution to a local problem. They were partners with state government and private enterprise. The Department was not an obstacle to their solution, rather we were a partner.

ULAPPA, AMY C.*[1], J. S. Forbey[1], L. A. Shipley[2], R. Kelsey[3], J. L. Rachlow[4], and A. L. Price[4]. [1]Boise State University, Boise, Idaho 83725-1515; [2]Washington State University, Washington 99164-6410; [3]USDA Forest Service PNW Research Station, Corvallis, Oregon 97331; [4]University of Idaho, Moscow, Idaho 83844-1136.
NUTRITIONAL AND CHEMICAL FACTORS SHAPING THE "FOODSCAPE" OF A DIETARY SPECIALIST HERBIVORE, THE PYGMY RABBIT.

Herbivory is a foraging strategy that poses special challenges, which can be partially addressed by selecting high quality forage among plants that vary nutritionally or chemically. Although several studies

have demonstrated that herbivores prefer diets with the highest nutrient and lowest chemical constituents, these studies are primarily confined to laboratory feeding trials because observing diet selection in free ranging herbivores is difficult. Our field observations demonstrated that pygmy rabbits (*Brachylagus idahoensis*), facultative specialists on sagebrush (*Artemisia tridentata*), forage on specific sagebrush plants more than others within a foraging patch. We used this system to test the hypothesis that sagebrush plants heavily browsed by pygmy rabbits are a higher quality food and preferred to rarely browsed plants. We collected samples from pairs of sagebrush with high and low levels of browsing at active pygmy rabbit burrows. First, we used a choice feeding trial to validate preference for heavily browsed plants. Captive pygmy rabbits voluntarily consumed 2.4 times more leaves collected from sagebrush with high levels of browsing. Second, we compared total and digestible crude protein and monoterpene concentrations between sagebrush plants exhibiting high and low levels of browsing using a paired design. Amounts of total and digestible crude protein were both significantly higher and several monoterpenes were lower in highly browsed sagebrush relative to the rarely browsed plants. Predictive foraging models generated with this study can be used to map areas of palatable sagebrush across the landscape, termed "foodscapes". Understanding dietary preferences of the pygmy rabbit will be another tool for conserving habitat for an obligate of the sagebrush steppe ecosystem.

Vierling, K. T[1]., L. A. Vierling[1], B. D. Linkhart [2], P. Adam[1], JOCELYN L. AYCRIGG[1], J. Pollock [3], G. Sadoti[4], and J. Vogeler[1]. [1]University of Idaho, Moscow, Idaho 83844; [2]The Colorado College, Colorado Spring, Colorado 80903; [3]Boise State University, Boise, Idaho 83725; [4]University of New Mexico, Albuquerque, New Mexico 87131. ***PLACING THE KEYSTONES: ELUCIDATING INTERACTIONS AMONG WOODPECKERS AND CAVITY-DEPENDENT SPECIES FOR IMPROVED VERTEBRATE CONSERVATION AND MANAGEMENT.***

Cavity excavators (e.g. woodpeckers) are considered a keystone guild because their excavations provide critical habitat for a variety of vertebrate species. Secondary cavity users rely on cavities for either nesting or roosting but cannot create these cavities. Understanding cavity user dependencies on specific excavators is important because the absence of cavity excavators in an ecosystem may have far-reaching effects on multiple species that rely on cavities. We conducted a literature review of 23 avian species known to be secondary cavity users, and found the excavator responsible for cavity creation was not known or reported in 72% of the reviewed studies. Studies were unequally distributed across North America, and only 2% of studies included a non-breeding season assessment of cavity use. We therefore developed CavityNet (cavitynet.gapanalysisprogram.com), a web-based reporting network that will provide opportunities for researchers and citizen-scientists to contribute information about cavity excavator-user relationships necessary for effective conservation and management of cavity-using communities.

YENSEN, ERIC[1], T. Tarifa[2], L. Borrelli[3], and L. Sepulveda[3]. [1]Department of Biology, College of Idaho, Caldwell, ID 83605; [2]Museum of Natural History, College of Idaho, Caldwell, ID 83605; [3]INTA Bariloche, Casilla de Correo 277, San Carlos de Bariloche, Rio Negro, Argentina. ***IMPACT OF INVASIVE ANNUAL PLANTS ON SOUTHERN IDAHO GROUND SQUIRREL DIETS.***

The southern Idaho ground squirrel (*Urocitellus brunneus endemicus*) is a Candidate for Federal Listing. Inadequate diet due to range degradation and invasion by exotic annual plant species is considered the principle threat. Southern Idaho ground squirrel diets were previously unknown. To determine ground squirrel diets, we used a microhistological technique. We studied 5 sites for 3 years in 3 seasons. In early season, squirrels ate mostly leaves, in mid-season seeds were 1/3 of the diet, and in late season were over half of the diet. In the early season, diet was >50% exotic grasses at all sites, but by mid-season invasive forbs increased, and then dominated late season diets (up to 67%) and were more important than native forbs in the diet. There was no relation between the abundance of a plant species in the diet and in the vegetation analyses. Ground squirrels depended on only a few species (1-6) per site per season. All invasive species were annuals so the amount of forage available in a given year is highly

dependent on precipitation, and thus highly variable, so invasive species constitute unreliable food sources. Restoration efforts should emphasize native forbs and grasses.

YONK, ALAN and the Idaho Falls Chapter of The Idaho Master Naturalists, Idaho Falls, ID, 83404.
MARKET LAKE IDAHO WILDLIFE MANAGEMENT AREA (WMA) LEAD SHOT STUDY.

The Idaho Falls Regional Office of Idaho Department of Fish & Game is concerned about the amount of lead shot that has been deposited on WMA lands from the Department's put-and-take pheasant release and hunting program and the potential effects of this shot on the health of waterfowl and other birds. The Idaho Falls Chapter of the Idaho Master Naturalist group was asked to undertake a lead shot study of the north agricultural fields (N. Ag fields) area of Market Lake WMA, located north of Roberts, Idaho. The N. Ag fields area is one of the primary release areas for the IDF&G's pheasant release program. In a paper on lead poisoning of trumpeter swans, it was indicated that ingestion of only two to three lead pellets could cause swan mortality in approximately three weeks. The study was initiated to examine the area for the presence of lead shot to answer several questions, two of the most important are: What is the current level of lead shot in top two inches of soil in the N. Ag fields, particularly the southern region that experiences flooding? Does the level of lead shot in the N. Ag fields approach the suggested pellet density threshold for lead poisoning problems of 20,000 pellets per acre? Samples were collected in the upland area of the WMA and initially analyzed for the presence of shot by technical staff from the Idaho National Laboratory (INL) using the INL's X-ray analysis equipment. Shot was recovered from the samples where shot was indicated to be present from the X-ray analysis. A simple random sampling strategy was used to identify the mean and standard deviation of the shots per square foot in the study area. Using this sampling methodology and analysis it was shown that lead shot is present in the upper two inches of the study area and in amounts approaching 20,000 shot pellets per acre.

Abstracts of To The Point Papers

Presented at the 2011 Annual Meeting of Idaho Chapter of The Wildlife Society. Presenter names are capitalized.

BOUDREAU, TOBY. Idaho Department of Fish and Game. ***OCTOBER VELVET – NEW FASHION TRENDS IN MULE DEER.***

Over the past 2 years in the southeast region of Idaho, hunters have been reporting observing and harvesting mule deer bucks that still have velvet on their antlers in October. We have collected specimens from several of these animals after they were either harvested or hit by vehicles. Samples have so far yielded inconclusive results as to the cause of this interesting antler anomaly.

COPELAND, SYLVIA. Power Engineers, Inc., 2041 South Cobalt Way, Meridian, ID 83642. ***A REVIEW OF STUDIES TO ASSESS WIND ENERGY IMPACTS ON BIRDS AND RECOMMENDATIONS FOR INFORMATION EXCHANGE.***

Objectives for assessing potential impacts from wind energy development are clear, i.e. which species use the area, how many, when, for how long, and what is the risk of being struck by a turbine or being displaced by the development. However, there are differences in how these questions are being answered and sometimes the information is considered proprietary. With an increase of wind energy development in Idaho and the limited knowledge on avian use and migration, particularly on the Snake River Plain, there appears to be a need for standardizing protocols and exchanging information to benefit conservation of Idaho's wildlife.

DEAN, DAVE. Power Engineers, Inc., 2041 South Cobalt Way, Meridian, ID 83642. ***WIND DEVELOPMENT IN IDAHO AND IMPACTS TO WILDLIFE.***

Provide a brief overview of wind development in Idaho and outline impacts to wildlife.

DIXON, RITA[1] and B. DOERING[2]. [1]Idaho Department of Fish and Game; [2]Power Engineers. **WHITE-NOSE SYNDROME DISEASE SURVEILLANCE IN IDAHO.**

White-nose syndrome (WNS) is an emerging fungal pathogen causing unprecedented declines in North American bats. Potential implications to Idaho bat populations are as yet unknown but require our best efforts toward statewide coordination on WNS disease surveillance and monitoring.

DOERING, BILL[1] and B. Bosworth[2]. [1]Power Engineers; [2]Idaho Department of Fish and Game. ***ASSESSING THE APPROPRIATE QUESTIONS: A COLLABORATIVE APPROACH TO EVALUATING SEASONAL MOVEMENTS AND TRANSIENT HABITAT (STOPOVER HABITAT) USED BY MIGRATING TREE-ROOSTING BAT SPECIES.***

Currently information is lacking on bat migration location and timing on the Snake River Plain. This data would seem critical for assessing impacts from wind farms on bats and for developing site-specific solutions. We propose a methodology based on interagency collaboration, identification of natural stopover habitats and long term passive acoustical monitoring to help inform wind farm siting decisions and impact assessment.

Bouffard, S. H.[1], MICHAEL FISHER[2], K. Fothergill[3], and J. Krueger[4]. [1]Orma J. Smith Museum of Natural History, The College of Idaho, Caldwell, ID 83605; [2]Southeast Idaho National Wildlife Refuge, US Fish and Wildlife Service, 4425 Burley Drive, Suite A, Chubbuck. ID 83202; [3]Conservation Seeding and Restoration, Inc., 503 Center Street West, Kimberly, ID 83341; [4]Minidoka National Wildlife Refuge, US Fish and Wildlife Service, 961 East Minidoka Dam Road Rupert, ID, 83350. ***LONGEVITY OF TIGER BEETLE HABITAT RESTORATION IN IDAHO: A PRELIMINARY ASSESSMENT.***

This is a brief summary of Imazapic herbicide cheatgrass control on Minidoka NWR sand dunes to

benefit the Idaho, or St. Anthony Dune Tiger Beetle (*Cicindela arenicola* Rumpp), a rare species with restricted range and narrow habitat requirements. These insects require sparsely vegetated dunes. Invasive plants are colonizing the dunes throughout its range rendering the habitat unsuitable.

HAAG, BECKY. Idaho Department of Fish and Game. ***WILDLIFE MANAGEMENT ISSUES IN THE WILD LAND URBAN INTERFACE.***

The west is one of the fastest growing regions of the country, with Idaho's population expected to double in the next forty years. Working with residents in the wild land urban interface to reduce wildlife conflicts and breaking the "need to feed" mentality poses a challenging endeavor for IDFG.

LONG, RYAN A., R. T. Bowyer, and J. G. Kie. Department of Biological Sciences, Idaho State University, 921 S. 8th Ave. Stop 8007, Pocatello, ID 83209. ***MONITORING ELK IN THE DESERT: PRELIMINARY RESULTS.***

In 2010 we initiated a 3-year study of movement, behavior, and condition of elk (*Cervus elaphus*) on the Idaho National Laboratory Site. We captured 20 adult females by net gun from a helicopter in March, obtained a variety of morphological data, measured depth of rump fat using a portable ultrasound, and fit each individual with a GPS collar programmed to record hourly locations. We report preliminary results from the first year of study, and compare those results with those obtained from elk occupying montane forest habitat.

LUCIA, MATTHEW. Teton Regional Land Trust, P.O. Box 247, Driggs, ID 83422. ***DATA SHARING: THE KEY TO LAND CONSERVATION IN THE FUTURE.***

Collaborative efforts between federal, state, and NGO partnerships in Southeastern Idaho have yielded significant private land conservation through fee title and conservation easement acquisitions. Delivering conservation projects in the future will depend largely on federal and state grant sources that increasingly require more detailed information on how species, populations, and habitats benefit from proposed conservation measures. Thus, monitoring data and resource knowledge shared among agencies and NGO partnerships are essential components for identifying and protecting important resources and securing grant funds that provide lasting protection of key fish and wildlife habitats.

MILNER, GREG and G. Hompland. Idaho Department of Fish and Game. ***VALUE OF DEER***.

Deer hunting as a wildlife management tool has evolved into a highly competitive sport generating dollars based on antler size. There are still some limited "traditional" values based on food and clothing, but the antler business has created a black market for large antlers. Escalating values have created an economic incentive for poaching that can effect deer populations that have a reputation for producing large antlers. This presentation will touch on social/hunt value, meat value, antler value, and judicial value of deer.

MUSIL, DAVID. Idaho Dept. Fish & Game, Jerome, ID 83338. ***USING VIE TO MARK DAY-OLD PHEASANT CHICKS.***

We used Visible Implant Elastomer (VIE) to mark 2,400 day old game farm pheasant chicks (*Phasianus colchicus*) which were eventually released at 4-weeks of age after being reared in portable brooding units in 3 IDFG Regions during 2010. VIE has previously only been used for marking aquatic species (fish, crustaceans, amphibians). The VIE method was initially successful but problems with tag retention and consistent location under the skin have been observed.

PHILLIPS, BLAKE. Idaho Department of Fish and Game. ***THRILL KILLERS.***

Across the nation Conservation Officers are seeing a disturbing trend among youthful game violators called "Thrill Killing". Thrill killing is defined as the killing of large numbers of animals with little or no

attempt to retrieve them. Idaho is no exception to this new "extreme sport" which seems to be a symptom of societies decaying values and family life.

ROZZELL, LARA. Idaho Conservation League, PO Box 844, Boise, ID 83701. ***SAGE GROUSE MITIGATION FRAMEWORK.***

SVANCARA, LEONA. Idaho Dept of Fish and Game, Moscow, Idaho, 83844. ***GETTING THE MOST OUT OF NAIP USING JPEG2000.***

A quick example of how you can use the 2009 NAIP data with the infrared band in ArcGIS, we used it to calculate a quick NDVI of the Owyhee ecoregion and map wetlands for the Columbia spotted frog recovery plan

SVANCARA, LEONA. Idaho Dept of Fish and Game, Moscow, Idaho, 83844. ***PIVOT TABLES AND SLICERS - SAVE YOURSELF SOME TIME.***

Using Excel pivot tables and slicers to quickly organize & summarize large datasets, will use a couple of examples including the species of greatest conservation need list.

WAKKINEN, WAYNE and JIM HAYDEN. Idaho Dept. of Fish and Game, Coeur d'Alene, Idaho 83815. ***CARIBOU CONUNDRUMS.***

During winter, 2 to 3 woodland caribou reside in Idaho, usually within a mile of the Canadian border. A few likely summer here as well. Across their range, caribou are limited by predation, often in a moose/wolf/caribou complex. In Idaho, caribou appear to also be limited by predation, but associated with a white-tailed deer/cougar complex. Moose have become common in this area, and recently wolves have colonized the area extensively. Given this...and habitat changes predicted from climate change...is it prudent to continue trying to recover caribou, or is it more wise to abandon caribou recovery efforts and refocus that effort on another species with better potential for recovery?

WAKKINEN, WAYNE. Idaho Dept. of Fish and Game, Coeur d'Alene, Idaho 83815. ***HOW TO USE DRUGS: A SPREADSHEET APPROACH.***

Wayne Wakkinen has developed a quick and easy reference sheet that provides non-narcotic drug doses for common animals in Idaho. It's designed to minimize drug dose calculations so you don't screw up in stressful situations, like when the cameras are rolling and the public is watching that poor bear stuck up the tree.

CAMP, MEGHAN J. *, B. A. Woods, J. L. Rachlow, and L.A. Shipley. University of Idaho, Moscow, ID 83843, Washington State University, Pullman, WA 99164. ***EXAMINING THE FUNCTIONAL COMPONENTS OF COVER: THE RELATIONSHIP BETWEEN CONCEALMENT AND VISIBILITY IN SHRUB-STEPPE HABITAT.***

Cover is a primary habitat requirement for most wildlife, especially for prey species. Cover provides concealment from predators, but it can simultaneously decrease visibility of the surrounding area. Previous studies have demonstrated that visibility, or the tradeoff between concealment and visibility, can influence patterns of habitat selection. The relationship between concealment and visibility has rarely been quantified, although there is often the implicit assumption that two are inversely related. We measured both functional components of cover (i.e., concealment and visibility) in shrub-steppe vegetation at 3 horizontal distances as related to terrestrial predators, and also vertically as related to avian predators. We collected measurements at 3 sagebrush-dominated sites used by pygmy rabbits (*Brachylagus idahoensis*) in Idaho and Montana and within nearby grassland vegetation. Concealment and visibility differed among sites and across distances. Overall, concealment and visibility were inversely and linearly related, but the relationship between these two variables differed among sites. We investigated habitat selection by pygmy rabbits by comparing concealment and visibility at locations used by rabbits with measurements collected at paired, random locations. Our research demonstrates how two functional components of habitat cover are related, and because individuals cannot maximize both, suggests that prey animals might trade off one component for another.

FRYE, GRAHAM*, Boise State University, Boise, ID 83703. ***LANDSCAPE-LEVEL NEST SITE CHARACTERISTICS AND MORTALITY OF GREAT GRAY OWLS (STRIX NEBULOSA) IN SOUTH-CENTRAL MONTANA.***

I conducted a pilot study on Great Gray Owl breeding ecology in the Bridger and Bangtail Mountains of southern Montana, from 2002-2005. In addition to collecting preliminary data on nesting habitat, reproductive success, site fidelity, population density, and anthropogenic impacts on survival and reproduction, my goal was to assess the feasibility of initiating long-term research on the study area. The study area is a mosaic of private and public lands, with significant acreage currently devoted to timber harvest. Landscape-level habitat characteristics were measured within a radius of 1 km of Great Gray Owl nests (N=9), using orthorectified aerial photographs imported into ArcGIS 9.1.
Great Gray Owl core areas contained more forested habitat and less logged area than expected based on habitat availability. Mean road length within core areas was 3,470 m (SD=1244 m). Mean distance from nests to natural forest openings (>1 ha) was 182 m (SD=97 m). Mean distance from nests to logged openings (>1 ha) was 575 m (SD=335 m). Although known to selectively utilize forest openings for foraging, these preliminary data support the hypothesis that Great Gray Owl nesting is discouraged when forest cover is removed beyond some minimum threshold.

Of 17 Great Gray Owls banded on the study area, a relatively large proportion (18%) were recovered as mortalities in motor vehicle collisions. One of these mortalities was a breeding male, whose nest (containing three 2-3 week old young) subsequently failed. This small sample of marked individuals and the abundance of roads found in core areas suggest that motor-vehicle collisions may be an important factor in the persistence of Great Gray Owls in some areas.

HAAK, BRUCE A., K. Oelrich, and C. Rudeen. Idaho Department of Fish and Game, Nampa, ID 83686. ***AUTUMN MOVEMENTS OF RADIO-MARKED RAPTORS IN SOUTHWEST IDAHO.***

Real-time data on the southerly migration of raptors through southwest Idaho is needed by land management agencies and flight safety officials. During September and October, up to 8000 raptors pass the mountains east of Boise, ID. Raptors use thermals and uplifting wind currents on ridgelines and mountain ranges to migrate. However, specific information is lacking on the movements, behavior, and flight corridors used by raptors crossing Idaho. Between 2004 and 2008, 28 raptors, mostly Cooper's hawks (*Accipiter cooperii*) and Sharp-shinned Hawks (*Accipiter striatus*), were marked with VHF radio-transmitters. In both 2009 and 2010, two Cooper's hawks and one Red-tailed hawk (*Buteo jamaicensis*) respectively were marked with satellite transmitters (PTT units) to facilitate remote monitoring. Marked near Cascade, most radio-tagged raptors crossed the Snake River between Grandview and Glens Ferry. When confronted by the Snake River Plain they might: 1) cross the 90+ miles distance quickly, typically about 3.5 hours; 2) short-stop their movements to rest and feed in nearby canyons for several days; 3) or cross southern Idaho going east and southeast toward the borders with Nevada and Utah. Monitoring of VHF-tagged raptors ended near the Nevada border, while four PTT-tagged raptors continued on to wintering grounds in southwest Mexico, a distance of 1,880 miles (2,900 km). Migration routes were identified through Military Operations Areas and general aviation airspace, which has the potential for avian collisions with aircraft.

HAAK, BRUCE A. Idaho Department of Fish and Game, Nampa, ID 83686. ***WINTER OCCURRENCE OF THREE MERLIN SUBSPECIES IN SOUTHWESTERN IDAHO.***

The Merlin (*Falco columbarius*) is a Species of Greatest Conservation Need in Idaho due to a lack of population estimate and trend data, and uncertainties about the effects of environmental pollutants on their population. A rare breeder but regular migrant, little is known about their habitat preferences or the distribution of subspecies in winter. Between 27 December 2006 and 7 March 2010, 140 Merlins were encountered during road surveys throughout the Boise River Valley in southwest Idaho: 80 individuals were observed only, while 60 were captured. Based on plumage characteristics of the 135 merlins that could be assigned to subspecies, 69% (N=93) were identified as Taiga Merlins (*F. c. columbarius*), 24% (N=32) were Black Merlins (*F . c. suckleyi*) and 7% (N=10) were Richardson's Merlins (*F. c. richardsonii*). Of this sample, nearly equal numbers were first observed in rural and urban areas. Of the 130 individuals for which sex was identified, females outnumbered males in a 3:1 ratio. Sixty Merlins were trapped and photographed to confirm subspecies identification, age and sex. Of the 45 females captured, about half were in juvenile plumage (N=23). In contrast, 60% (N=9) of the 15 males captured were adults. While a relatively large proportion of Taiga Merlins and small proportion of Richardson's Merlins would be expected on wintering grounds in southwest Idaho, the percentage of Black Merlins noted in this study is unexpectedly high. The skewing of age and sex data may be the result of low sample size. This information adds to the overall knowledge of Merlins in Idaho and suggests that urbanization has created core wintering habitat for Merlins in the high desert. Based on the number of Black Merlins noted in this study, the wintering range of this subspecies is dissimilar to breeding habitat and should be reevaluated.

KNETTER, JEFFREY M. Idaho Department of Fish and Game, Boise, ID 83707. ***SPRING MIGRATION OF LESSER SNOW GEESE THROUGH IDAHO.***

There are two populations of lesser snow geese (*Chen caerulescens caerulescens*) in the Pacific Flyway. The Western Arctic Population (WAP) breeds primarily on Banks Island, Northwest Territories, Canada, with smaller breeding colonies on the mainland of the Northwest Territories and Alaska. The Wrangel Island Population breeds on Wrangel Island, Russia. Both populations pass through southern Idaho during spring migration. I have used observations of neck-collared snow geese and leg band recoveries to describe the winter and spring distribution of snow geese as they pass through Idaho during spring migration.

Pierce, J. E.[1], R. T. Larsen[1], J. T. Flinders[1], and JERICHO C. WHITING[2]. [1]Department of Plant and Wildlife Sciences, Brigham Young University, Provo, Utah 84602 USA; [2]S.M. Stoller Corporation, 120 Technology Drive, Idaho Falls, Idaho 83401 USA. ***FRAGMENTATION OF SAGEBRUSH COMMUNITIES: DOES AN INCREASE IN HABITAT EDGE IMPACT PYGMY RABBITS?***

Sagebrush (*Artemisia* spp.) communities are ecologically critical; however, these areas currently face severe threats from alteration and reduction. Pygmy rabbits (*Brachylagus idahoensis*) are sagebrush specialists that occupy the intermountain region of the United States. Little is known concerning how fragmentation of sagebrush and an increase in habitat edge may impact pygmy rabbits. From 2004 to 2009 in Utah, USA, we tested hypotheses relating to the effects of habitat edge on pygmy rabbits. We quantified the number of active pygmy rabbit burrows in relation to distance from habitat edge. At differing distances from habitat edge, we also deployed remote cameras at burrows and counted fecal pellets to document potential increases in the number of terrestrial predators and competitors. We classified activity of 528 burrows (284 active and 244 inactive). The proportion of active burrows was lower within 100 m of habitat edge ($r^2 = 0.502$, $P = 0.02$) compared with burrows located in control areas (> 100 m from habitat edge). Photographs of pygmy rabbits decreased at burrows closer to habitat edge ($P < 0.01$). Photographs of predators increased near habitat edge, but was marginally insignificant ($P = 0.07$), and photographs of potential competitors (cottontail (*Sylvilagus* spp.), $P < 0.01$; jackrabbits (*Lepus californicus*), $P < 0.01$) increased near habitat edge. Our results indicated that the proportion of active burrows and the relative abundance of pygmy rabbits were reduced near habitat edge. This reduction was likely associated with an increase in terrestrial predators and competitors near habitat edge. Consideration should be given to the influence of habitat edge on pygmy rabbits in order to conserve and manage this unique species.

SURONEN, ELISE F.* and B. A. Newingham. University of Idaho, Moscow, Idaho 83844.
IDENTIFYING HABITAT ATTRIBUTES OF THE THREATENED NORTHERN IDAHO GROUND SQUIRREL.

The northern Idaho ground squirrel (*Urocitellus brunneus brunneus)* is a threatened species that is endemic to west-central Idaho. Habitat loss is presumably due to fire suppression and subsequent increases in ponderosa pine forest density, in particular tree encroachment into historically open meadows and scablands. Management practices include thinning and burning to open up encroached habitat. We measured attributes of areas designated as 'used' or 'available' at four sites: Cap Gun, Summit, Price Valley and OX Ranch. Used areas were determined via monitoring surveys, visual and audio counts of individuals; available areas were selected 100-300m away from used areas, lacked the presence of squirrels, and could be burned the following fall. Measured attributes were limited to parameters that can be altered by thinning and burning: canopy cover, ground cover, organic layer depth and soil chemistry. We analyzed variables with 'used' nested within site in a nested ANOVA. Canopy cover was significantly lower ($P = 0.01$) in used areas regardless of site. There was a significant difference between used and available areas within site for litter, soil, rock, moss/lichen, and understory cover (for all variables $P < 0.0001$). Soil nitrogen levels did not vary between used and available areas *($P = 0.66$);* phosphorus and calcium levels varied between used and available within site ($P = 0.02$, $P < 0.0001$). Soil pH was significantly different ($P = 0.001$) between used and available areas. The organic horizon was not significantly different between used and available areas ($P = 0.17$), but within sites used and available organic material was statistically different ($P = 0.03$). Our results suggest used areas have less acidic soils, overstory and understory coverage, while having higher levels of bare ground and rocks. Further analysis will be conducted post-fire to determine the effects of prescribed fire on habitat characteristics.

UTZ, JAMIE*, J. Forbey, J. Rachlow and L. Shipley. Boise State University, Boise, Idaho 83705. ***UNDERSTANDING THE TRADE-OFF BETWEEN SAFETY AND FOOD QUALITY IN PYGMY RABBITS (BRACHYLAGUS IDAHOENSIS).***

To best conserve sensitive animal species, managers must understand the simultaneous trade-offs between food and shelter that a particular landscape provides. Current conservation approaches typically only consider aspects such as percent cover at large spatial scales. However, food quality and cover at a scale relevant to a foraging animal may influence the functional use of habitats and ultimately the fitness of individual animals. To better understand these hidden yet crucial relationships between food, cover and habitat use, we studied trade-offs between perceived predation risk and diet quality in the imperiled pygmy rabbit (*Brachylagus idahoensis*). We hypothesized that pygmy rabbits would forage more intensely in areas with the lowest predation risk and highest quality food, but would trade-off lower predation risk for higher quality food. To test this hypothesis, we compared intake by captive pygmy rabbits under varying levels of cover and food quality. We compared intake between two simultaneously offered treatments in three separate studies: 1) dark (low predation risk) versus clear (high predation risk) cover; 2) non-toxic food (high quality) versus food with 5% toxin (low quality); and 3) toxic food under dark cover versus non-toxic food without cover. Rabbits preferred to eat under dark cover and eat non-toxic food during the single choice experiments. However, rabbits ate significantly less under dark cover with toxic food compared to dark cover with non-toxic food and did not compensate for lower intake by eating more non-toxic food without cover. Results suggest that the value of cover can decrease if food quality is low and that the value of quality food can be reduced if cover is not optimal. These results may allow managers to better tailor habitat conservation efforts from a species perspective by considering how factors such as diet quality and predation risk affect habitat use by pygmy rabbits.

WATERBURY, BETH. Idaho Department of Fish and Game, Salmon, Idaho, 83467. ***THE IDAHO POINT-HEADED GRASSHOPPER: THE SEARCH FOR A RARE, CRYPTIC INSECT IN A SAGEBRUSH SEA.***

The Idaho point-headed grasshopper (*Acrolophitus pulchellus*) is a rare Idaho endemic found in xeric shrublands of eastern Idaho's sink drainages. Fewer than 20 source records exist in the Idaho Natural Heritage Program database (dated from 1883 to 1993). The grasshopper is identified as an Idaho Species of Greatest Conservation Need and Type 2 Sensitive Species by the Idaho State Office of Bureau of Land Management (BLM) due to poor understanding of its distribution and population status. During July and August 2010, we conducted surveys at 7 historical collection sites and 22 additional sites on public lands managed by the Upper Snake, Challis, and Salmon BLM Field Offices and Dubois Ranger District of the Caribou-Targhee National Forest. We detected 55 Idaho point-headed grasshoppers in 11 of 29 survey sites. Occupied sites were located in well-drained, gravelly soils on outwash fans, stream terraces, and foothills (elevation range 1,572-2,082 m). We observed previously unreported sexual dimorphism in size and color, reproductive behaviors, and host plant associations. We identified several environmental characteristics that appeared to influence detectability of this rare, cryptic grasshopper in an expansive landscape. These factors highlight the importance of developing study designs that account for imperfect detection of rare populations.

WOODS, BONNIE*[1], M. J. Camp[1], J. L. Rachlow[1], L. S. Shipley[2], and J. Forbey[3]. [1]Department of Fish and Wildlife Resources, University of Idaho, Moscow ID 83843-1136; [2]Department of Natural Resource Sciences, Washington State University Pullman WA 99164-5910; [3]Department of Biological Sciences, Boise State University 83725-1110. ***GIVING-UP DENSITIES AS A METRIC OF RISK FOR INVESTIGATING HABITAT TRADEOFFS BY PYGMY RABBITS.***

Predation is a major source of mortality for pygmy rabbits (*Brachylagus idahoensis*), and predation risk likely exerts a strong influence on their patterns of habitat selection. We are adapting measures of perceived predation risk, including giving-up densities (GUDs), as a means of investigating resource

selection and tradeoffs between vegetative concealment and visibility of potential predators. GUDs measure an individual's perception of risk by assessing willingness to continue to forage in one area relative to another. GUDs are food resources, placed under a variety of habitat characteristics and weighed after a specific timeframe, the lower the weight of the food that remains unexploited, the lower the perceived risk of that location. One challenge in using this technique in the field is the potential for interference by other, non-target species. We evaluated use of commercial rabbit chow as a food source for GUDs for free-ranging pygmy rabbits at 3 study sites in Idaho and Montana. We used infra-red trail cameras to quantify frequency and timing of visitation to feeding stations by rabbits and other species to identify time periods when rabbits were foraging. We found strong peaks in nocturnal activity for deer mice and voles, and diurnal peaks in foraging behavior by ground squirrels. Pygmy rabbits exhibited a marked crepuscular pattern, which facilitated identification of a time-period when rabbits were more likely to be active at GUD trays. This information is valuable for validating the data provided by GUDs trays for quantifying foraging risk and habitat choice.