PROGRAM AND BOOK OF ABSTRACTS

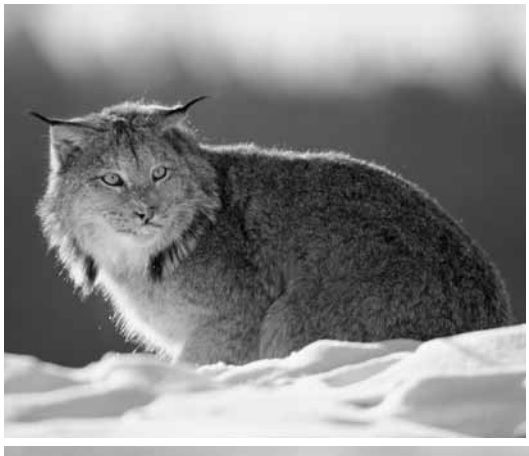
DEFENDERS OF WILDLIFE PRESENTS

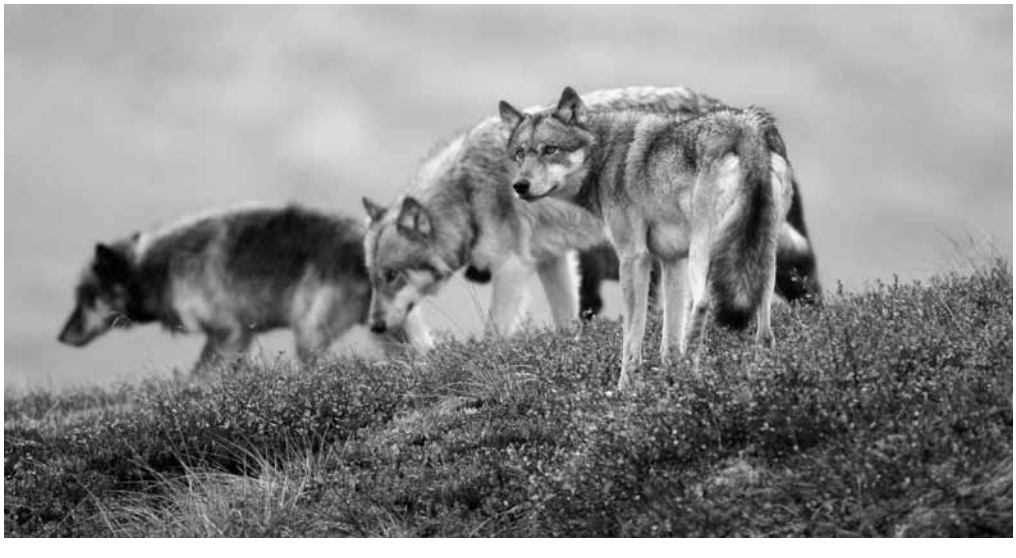
CARNIVORES2009

Carnivore Conservation in a Changing World

NOVEMBER 15-18, 2009

The Grand Hyatt Denver
Denver, Colorado





www.carnivoreconference.org

Preface

Welcome to Defenders of Wildlife's **Carnivores 2009: Carnivore Conservation in a Changing World**. We are pleased to once again bring the conference to Colorado, a state at the forefront of so many carnivore conservation issues.

The theme of this year's conference addresses society's foremost conservation challenge: climate change. According to the U.S. Global Change Research Program's 2009 report *Global Climate Change Impacts in the United States*, temperatures in the American West have already risen by about 1.5°F, and are projected to rise by much more by the end of the century. Carnivore species that depend on snow and ice for habitat, such as lynx and wolverine, are clearly in trouble. And as changes in temperature and precipitation reshape our ecosystems and landscapes, the future of other carnivores is in jeopardy as well. Over the next three days, we'll explore the impacts of climate change, look for ways to adapt our conservation paradigm to a warming climate, and even examine the ways that protecting and restoring top predators can help systems better respond to the changes ahead. We'll also address how shifting our energy supply to renewable resources to respond to climate change may have significant impacts on carnivores and their habitat.

Of course, while climate change will require us to rethink much of what we do to preserve the nation's natural heritage, many of our basic conservation tools will remain the same. Some approaches, like connecting habitats and landscapes, will take on added importance, so an entire track will explore the science of connectivity, how it can be informed by cutting-edge tools like landscape genetics and implemented at a landscape scale. We'll also present a series of sessions exploring how one physical barrier to connectivity—the border wall between the United States and Mexico—is impacting the landscapes and unique biodiversity of the American Southwest and northern Mexico.

In addition to these specialized topics, the conference will once again offer an unparalleled look at the biology, ecology and conservation of the wide array of carnivore species. Several sessions will discuss mesocarnivores, which are on the rebound in much of the eastern United States after a long absence but more threatened than ever in the West. And as always, the ethical and policy questions of living with wolves, coyotes and other carnivores will be fully explored.

Rodger Schlickeisen
Defenders of Wildlife

Conference Agenda

SUNDAY, NOVEMBER 15

10:00 a.m. to 2:30 p.m.

Field Trip. This special tour of the Denver Zoo features the zoo's well-known carnivore exhibits, including Predator Ridge, Bear Mountain, Wolf Pack Woods and Northern Shores. Buses will depart and return from the hotel's Welton Entrance.

3:00 p.m. to 7:00 p.m.

Registration Open. Imperial Ballroom foyer (Hotel, second floor).
Poster setup. Imperial Ballroom foyer.
Exhibit hall setup. Imperial ballroom.

7:00 p.m. to 9:00 p.m.

Welcome reception. Enjoy complimentary refreshments and explore the newest exhibit of the Wildlife Experience (10035 South Peoria, Parker, CO 80134), one of Denver's premiere museums, which focuses on combining wildlife and conservation with interactive learning. Shuttle buses will operate on a loop from 6:30 p.m. to 9:30 p.m. This event is free to conference registrants (please wear your name badge or bring a photo ID for admission). Guests may attend for a fee of $10, payable at the door.

MONDAY, NOVEMBER 16

7:00 a.m. to 7:00 p.m.

Registration open. Imperial Ballroom foyer.

7:00 a.m. to 3:30 p.m. and 5:30 p.m. to 7:00 p.m.

Exhibit hall open. Imperial Ballroom. Light breakfast foods will be available from 7:00 a.m. to 8:00 a.m., and coffee breaks at 9:30 a.m. and 3:00 p.m. will also be held here. See page xii for complete list of exhibitors.

8:00 a.m. to 9:30 a.m.

Plenary session. Imperial Ballroom. A coffee break will follow the plenary.

10:00 a.m. to 5:30 p.m.

Conference breakout sessions (see pages vi-xi for detailed daily schedule). Breakout rooms are located in the Hyatt Conference Center, on the second floor of the Atrium tower, across the breezeway from the hotel.

10:00 a.m. to 11:00 a.m.

Mission:Wolf Session I. Mt. Sopris Room (Hotel, lobby level). Open to ticket holders only.

12:00 p.m. to 12:30 p.m.

Screening of *American Coyote: Still Wild At Heart* (Longs Peak Room). (See page 26 for details.)

1:30 p.m. to 2:30 p.m.

Mission:Wolf Session II. Mt. Sopris Room (Hotel, lobby level). Open to ticket holders only.

3:30 p.m. to 4:30 p.m.

Mission:Wolf Session III. Mt. Sopris (Hotel, lobby level). Open to ticket holders only.

Conference Agenda (cont.)

MONDAY, NOVEMBER 16

7:00 p.m. to 10:00 p.m.
Carnivore Film Festival. Imperial Ballroom. We will show *The Lords of Nature*, a special sneak preview of the upcoming *Nature* release *Clash: Encounters of Bears and Wolves*, and more! (free to conference registrants, $5 for guests). Full details, see page 68.

TUESDAY, NOVEMBER 17

7:00 a.m. to 7:00 p.m.
Registration open. Imperial Ballroom foyer.

7:00 a.m. to 3:30 p.m. and 5:30 p.m. to 7:00 p.m.
Exhibit hall open. Imperial Ballroom. Light breakfast foods will be available from 7:00 a.m. to 8:00 a.m., and coffee breaks at 10:00 a.m. and 3:00 p.m. will also be held here.

8:00 a.m. to 5:30 p.m.
Conference breakout sessions (see pages vi-xi for detailed daily schedule). Breakout rooms are located in the Hyatt Conference Center, on the second floor of the Atrium tower, across the breezeway from the hotel.

10:30 a.m. to 11:30 a.m.
Mission:Wolf Session IV. Mt. Sopris Room (Hotel, lobby level). Open to ticket holders only.

1:30 p.m. to 2:30 p.m.
Mission:Wolf Session V. Mt. Sopris Room (Hotel, lobby level). Open to ticket holders only.

3:30 p.m. to 4:30 p.m.
Mission:Wolf Session VI. Mt. Sopris Room (Hotel, lobby level). Open to ticket holders only.

5:30 p.m. to 7:00 p.m.
Poster reception and booksigning. Imperial Ballroom and Foyer. Peruse the exhibit hall and speak with poster presenters about their work. (Poster abstracts begin on page 233).
Authors of carnivore-related books will also be on hand to sell and sign their work. Light refreshments and a cash bar will be available. See page 150 for additional details.

7:00 p.m. to 10:00 p.m.
Banquet. Capitol Peak Ballroom (Atrium tower, 38th floor). Cost: $75. Tickets must be purchased by 7:00 p.m. Monday. See page 150 for additional details.

WEDNESDAY, NOVEMBER 18

7:00 a.m. to 1:30 p.m.
Registration Open. Imperial Ballroom foyer.
Exhibit hall open. Imperial Ballroom. Light breakfast foods will be available from 7:00 a.m. to 8:00 a.m., and coffee break at 10:00 a.m. will also be held here.

8:00 a.m. to 5:30 p.m.
Conference breakout sessions (see pages vi-xi for detailed daily schedule). Breakout rooms are located in the Hyatt Conference Center, on the second floor of the Atrium tower, across the breezeway from the hotel.

Conference Information

Welcome to the Grand Hyatt Denver
Carnivores 2009 activities are divided between the Hotel and the Atrium tower of the Grand Hyatt Denver. The Imperial Ballroom, Mt. Sopris Room and Maroon Peak Room are in the Hotel, and the Mt. Elbert, Mt. Evans, Grays Peak and Longs Peak rooms are in the Hyatt Conference Center on the second floor of the Atrium tower, which is connected by breezeway to the Hotel. The banquet on Tuesday is on the 38th floor of the Atrium tower. Located in the heart of the Central Business District and steps from the 16th Street Pedestrian Mall, the hotel is convenient to a huge array of dining options to suit any budget.

Ambassador Wolf Workshops
Mission:Wolf will bring ambassador wolves for six small-group programs to allow attendees an up-close look at a live wolf. Mission:Wolf is a peaceful wolf sanctuary located in the remote mountains of Colorado. The refuge supports a primitive visitor center that provides visitors and volunteers with hands-on working experience. Socialized ambassador wolves travel nationally, offering public education about wild wolves while stimulating people to care about and respect nature. The programs will provide information on basic wolf biology and behavior and offer a unique opportunity to interact one-on-one with a wolf. There is no cost for this workshop, but space is limited to the first 200 conference registrants who enroll. Tickets to an assigned session are included in your registration packet and are not transferable to any other session. No food or beverage is permitted in the sessions. For more info visit www.missionwolf.com.

Notice to Speakers and Poster Presenters
To ensure a fair time allotment for all speakers, moderators have been instructed to adhere to the schedule. Please complete your presentation in the designated time allowed so as not to shortchange other speakers or interfere with other conference activities.

Speakers who are using PowerPoint presentations must submit their presentations on a USB device (flash drive), CD or a Zip (100 or 250) disk at the registration desk at least three hours prior to their session. Speakers should report to their assigned rooms 30 minutes before the start of their session for a final check of audiovisual materials.

Posters should be set up in the Imperial Ballroom foyer between 3:00 p.m. and 7:00 p.m. on Sunday and must be removed by 1:30 p.m. on Wednesday. Velcro and thumbtacks will be provided. All poster presenters should plan to be present for the poster session on Tuesday from 5:30 p.m. to 7:00 p.m. to discuss their work with interested attendees.

Carnivores 2009 Science Advisory Committee
Peter Brown, McGill School of the Environment
James Estes, University of California, Santa Cruz
Lloyd Lowry, University of Alaska, Fairbanks
Barry Noon, Colorado State University
Reed Noss, University of Central Florida
Pete Peterson, University of North Carolina
Ron Pulliam, University of Georgia
Rich Reading, Denver Zoo
Bill Ripple, Oregon State University
David Wilcove, Princeton University
Gerald Zuercher, University of Dubuque

Monday, November 16

8:00-9:30	Plenary (Imperial Ballroom): Ecological Consequences Of Large Predator Removal: A Comparison Of Five U.S. National Parks, Robert Beschta and William Ripple (page 1)	
	MT. ELBERT ROOM	**MT. EVANS ROOM**
10:00-NOON	**The U.S.-Mexico Border Wall: Implications for Carnivore Conservation ..... 2** 1. Challenges To Carnivore Conservation In The Mexico- U.S. Border Region, Rurik List 2. Potential Effects of the U.S.-Mexico Border Fence on Ferruginous Pygmy-owl, Matt Clark 3. Border Fence and Fragmentation Effects on Mid-sized Mammals in Arizona's National Parks, Jamie McCallum 4. Using Remote Cameras To Assess Wildlife Species, Habitat Preference, And Potential Impacts In The Mexican Sky Islands, Jennifer Yates 5. Landscape Connectivity For Black Bears In Arizona: Identifying Corridors And Determining The Impacts Of Habitat Fragmentation, Todd Atwood 6. Genetic Structure And Black Bear Habitat Connectivity Across The US-Mexico Border, Cora Varas	**Ecology and Recovery of Mesocarnivores ..... 8** 1. Wolverine Distribution In The East Greater Yellowstone Ecosystem, Jason Wilmot 2. Confirming The Identity Of Suspected Predators Of Fishers Through Molecular Techniques, Greta M. Wengert 3. Restoring Lynx, Wolverines And Fishers In The American West--What's It Gonna Take? David Gaillard 4. State-Space Modeling As A Method For Data Integration In Monitoring Carnivore Populations At Large Scales, John Melko 5. An Alternative Method For Tracking Movement In Elusive Carnivores, Danielle Ethier 6. Reconstructing the Evolution and Geographic Spread of Early Domestic Dogs, Sarah Brown
1:30-3:00	**Conservation Challenges, Priorities & Opportunities in the U.S.-Mexico Border Region ..... 27** 1. Identifying Potential Conservation Areas For Felids In The USA And Mexico: Integrating Reliable Knowledge Across An International Border, Melissa Grigione 2. Genetic Management for Borderlands Carnivores, Melanie Culver 3. A Carnivore Conservation Model In The Rio Aros Basin, Sonora, Mexico, Ron Thompson 4. A Carnivore Conservation Model In The Rio Aros Basin, Sonora, Mexico–A Perspective From Mexico, Martinez Jesus Florencio Moreno	**Climate Change ..... 31** 1. Polar Bears In The Greenhouse: Global Populations Under Stress, Bruce G. Marcot 2. Lynx and Climate Change: Cat (and Managers) on a Hot Tin Roof? Gary Koehler 3. Can Predators Reduce Atmospheric Carbon Dioxode Through Trophic Cascades? Jim Estes 4. Climate Change Adaptation and Carnivore Conservation, Aimee Delach
3:30-5:30	**Jaguars ..... 43** 1. Bio-Politics And The Path To Jaguar Recovery, Tony Povilitis 2. Jaguar Monitoring In Sonora, Mexico (1999-2009): Towards A Recovery For The Northern Populations, Carlos A. López González 3. Jaguar Population Connectivity In Northwest Mexico, Daniela Valera 4. Community Protected Areas and the Conservation of Jaguars and their Prey in the Chinantla Region of Oaxaca, Mexico, Joe Figel 5. What's On The Menu? Food Habits Of Pumas And Jaguars In The Lowland Amazon Forest Of Peru, Samia Carrillo-Percastegui 6. Jaguar Corridors In Brazil, Leandro Silveira	**New Tools for Sea Otter Research ..... 49** 1. Foraging Choices And Density Dependence In The Sea Otter: The Perspective Of Nutritional Ecology, Katherine Ralls 2. Does Variation In Sea Otter Activity-Time Budgets Reflect Population Performance? James Bodkin 3. Stable Isotopes: A Powerful Tool For Exploring Dietary Variation Within And Among Sea Otter Populations, Seth Newsome 4. Archival Time-Depth Data Reveal Seasonal Variation In Sea Otter Foraging Behavior, George Esslinger 5. Using Archival Time-Depth Recorders To Measure Within- And Between-Population Variation In Diet And Foraging Success Of Sea Otters, Martin T. Tinker 6. Diet, Behavior And Disease In Sea Otters: Implications For Conservation In A Resource Limited Coastal System, Martin T. Tinker
EVENING	**7:00 p.m. to 10:00 p.m. Carnivore Film Festival (Imperial Ballroom) 68**	

	GRAYS PEAK ROOM	LONGS PEAK ROOM
10:00-NOON	**Non-Invasive Survey Methods ..... 14** 1. Estimating Animal Density From Photo Rates And Animal Movement Speeds Recorded In Camera Trap Videos, Roland Kays 2. Frontiers in Follicles: Snagging Hair and What You Can Learn from It, Kate Kendall 3. Lynx Habitat Selection And Hunting Behavior From Snow Tracking During Winter In Northern Washington, Benjamin Maletzke 4. Molecular Genetic Contributions To Noninvasive Survey Approaches For Carnivores, Lisette Waits 5. A Comparative Study Of Felid Densities Via Simultaneous Scat Detector Dog And Remote Camera Trap Mark-Recapture Surveys In Belize, Central America, Marcella Kelly 6. The Use Of Noninvasive Survey Methods For Road Ecology Research, Robert Long	**Urban Coyotes: Ecology, Management and Ethics 20** 1. Science, Ethics, And Coexistence: What It Will Take And What It Means To Live With Coyotes, Marc Bekoff 2. Movement Patterns, Toxicant Exposure And Diet Of Coyotes In Urban Southern California, Seth Riley 3. Ecology Of Coyotes In The Chicago Region: Implications For Management, Stanley Gehrt 4. Developing Effective Outreach Material Content To Encourage Human-Coyote Coexistence, Megan Draheim 5. Human-Coyote Relationships In Suburban New York: Exploring People's Attitudes And Experiences, Heather Wieczorek Hudenko 6. Coyotes In Our Midst: Challenges & Opportunities, Camilla Fox
12:00		**Film: *American Coyote: Still Wild at Heart* 26**
1:30-3:00	**Using Diet Studies to Assess Carnivore-Human Interactions ..... 35** 1. Spatiotemporal Pattern And Process In Isotopic Records Collected From Alaskan Grey Wolves Over 50,000 Years, Kena Fox-Dobbs 2. Cooperation And Individuality Among Man-Eating Lions: Dietary Specialization During A Period Of Anthropogenic Environmental Change, Justin Yeakel 3. Use Of Stable Isotopes To Examine The Historical And Contemporary Diet Of Food-Conditioned Black Bears In Yosemite National Park, Jack Hopkins 4. Using Stable Isotopes To Investigate Diet Effects On Body Condition Of Polar Bears, John Whiteman	**Contrasting Views of Coexistence ..... 39** 1. Hunting For Solutions To Carnivore Conservation, Adrian Treves 2. Perspectives On Wisconsin Wolf Policy Among Ojibwe Tribe Members, Victoria Shelley 3. Andean Bear Presence on Private Lands within Sangay National Park, Ecuador, Becky Zug 4. Verification Methods For Certified Wildlife Friendly Properties In And Around Sangay National Park, Ecuador, Taylor Jones
3:30-5:30	**Scat Detection Dog Methods and Applications .. 55** 1. Simultaneous Monitoring of Predators and their Prey in the Tar Sands of Northeast Alberta, Canada, Samuel Wasser 2. Carnivore Connectivity in the Greater Yellowstone Ecosystem: Using Detection Dogs as a Tool to Model Linkage Zone Functionality for a Suite of Species, Jon Beckmann 3. Using Scat Detector Dogs And Molecular Scatology To Monitor Jaguars And Other Elusive Feline Species Co-Occurring In Belize, Central America, Claudia Wultsch 4. Gathering Noninvasive Genetic Samples From Elusive Carnivores: Quantitative Assessment Of Variables Affecting Scat Detector Dog Success And Detector Dog Efficacy Relative To Hair Snares, Jennifer White 5. Roundtable Discussion With Additional Participants Barbara Davenport, Robert Long and Megan Parker	**Human Dimensions of Carnivore Conservation ... 62** 1. A Quantitative Content Analysis Of Expressions Of Attitudes And Values Toward Wolves In The United States And Canadian Print News Media, Melanie Houston 2. Emotions Toward Wolves And Wolf Management: The Importance Of Segmentation, Lori B. Shelby 3. Understanding The Clusters: Characteristics Of Respondents' Behavioural Intention Toward Management Options Regarding Wolves And Brown Bears In Central Italy, Jenny Glickman 4. Enhancing The Understanding Of Human-Mountain Lion Management Strategies Using The Potential For Conflict Index, Jerry J. Vaske 5. What Constitutes "A Significant Portion Of Its Range?" Implications For Large Carnivore Recovery In The United States, Jeremy T. Bruskotter 6. Value Orientations and Emotions: The Case of Wolf Reintroduction in Colorado, Jason Horner
EVENING	**5:30 PackLeader Detector Dog Demo 68**	**6:00 to 9:00 IUCN Otter Specialist Group Meeting**

Tuesday, November 17

	MT. ELBERT ROOM	MT. EVANS ROOM
8:00-10:00	**Wolf Recovery & Management ..... 69** 1. Recovery of the Gray Wolf in the Northern Rocky Mountains of the United States, Edward E. Bangs 2. Developing A Wolf Conservation & Management Plan For Wolves Recolonizing Washington: Challenges And Approach, Harriet Allen 3. The Geography Of Wolf Recovery Under The Endangered Species Act, Carlos Carroll 4. Wolf Litigation: Legal Hurdles to Removing Federal Protection for Gray Wolves in the Great Lakes and Northern Rockies, Jason Rylander 5. The Wolf Helpline: Helping Wolves And Humans Coexist In A Wilderness Town In Northeastern Minnesota, Jess Edberg 6. Dead Wolves In The Northeast, Walter Pepperman	**Corridor Theory ..... 75** 1. An Overview Of Science-Based Approaches To Wildlife Linkage Design, Tabitha Graves 2. Prioritizing Habitats For Carnivore Connectivity Conservation Using Circuit Theory, Brad H. McRae 3. Multi-Species Modeling For Connectivity And Biodiversity Conservation, Brett G. Dickson 4. Mammalian Carnivore Use Of Avocado Orchards: Habitat Selection In A Mixed Urban–Agricultural Landscape, Theresa Nogeire 5. Roundtable Discussion With Participants
10:30-NOON	**Wolf Ecology & Behavior ..... 90** 1. The Wolf Effect: An Ecological Imperative For Wolf Restoration, Nathan Varley 2. Finding a Needle in a Haystack: Developing Less Invasive Wolf Population Monitoring Techniques, David Ausband 3. Interpreting Wolf Expressive Behavior: Assisting Professionals In Recognizing Immediacy Of Danger When Encountering 'Bold' Wolves, Holly Jaycox 4. Early Development Of Wolf Behavior, Kathryn Lord	**Large-Scale Connectivity in Practice ..... 94** 1. Migration, De-Fragmentation And Preservation-Linking Our Nation's Natural Heritage, Elaine Leslie 2. Implementation Of The Montana Crucial Areas Assessment, Will Singleton 3. Protecting The Spine Of The Continent Wildway, Kurt Menke 4. Rewilding North America–Visions for Predator Restoration, Dave Parsons
1:30-3:00	**Red Wolf ..... 107** 1. The Face Of Red Wolf Conservation Today, Kim Wheeler 2. Factors Influencing Red Wolf-Coyote Hybridization In Eastern North Carolina, Justin H. Bohling 3. A Re-Assessment Of Red Wolf Viability Using Stage-Structured, Stochastic Population Models, Peter Mahoney 4. Can Large Carnivores Persist In Human-Dominated Landscapes? The Case Of The Red Wolf, Todd Steury	**Predator Conservation in the Southern Rockies ..... 111** 1. Implementing Landscape-Scale Management Strategies For Wide-Ranging Mammals, Kim Crumbo 2. The Future of Wolf Recovery in the Southern Rockies, Jonathan Proctor 3. Balancing Public Access With Biodiversity Protection: Impacts Of Hiking, Dogs, And Motor Vehicle Noise On Carnivores In Protected Areas, Sarah Reed 4. The Importance Of Critical Habitat In The Southern Rocky Mountains For The Canada Lynx, Paige Bonaker
3:30-5:30	**Alaska Carnivore Management ..... 124** 1. Predator Control By Any Other Name: How The State Of Alaska Is Increasing Wolf And Bear Harvest On Alaska's National Preserves, Jim Stratton 2. Predator Control in Alaska and the Bureau of Land Management: The Impact of ANILCA, Julie Lurman Joly 3. Trends In State Management Of Alaskan Brown Bears: 1975-Present, Sterling D. Miller 4. Temporal Use Of The Nushagak Peninsula By Wolves, Togiak National Wildlife Refuge, Southwest Alaska, Patrick Walsh 5. Roundtable Discussion With Participants	**Delineating Wildlife Corridors Using Landscape Genetics 128** 1. Landscape Genetics For Evaluating Corridors, Critical Populations, And Connectivity Of Carnivores, Michael Schwartz 2. Wolverine Landscape Genetics For Building Corridors And Evaluating Reintroductions, Kevin McKelvey 3. Use Of Empirically Derived Source-Destination Models To Map Regional Conservation Corridors For Black Bears, Sam Cushman 4. Beyond Counting Bears: Using Genetics To Delineate Subpopulation Structure, Kate Kendall 5. Landscape Genetics Meets Phylogeography: Southwestern Red Fox Populations, Benjamin Sacks 6. Landscape Genetic Patterns Of American Marten In Northern Idaho, Tzeidle Wasserman 7. Applications Of Graph Theory To Carnivore Landscape Genetics, Colin J. Garroway
EVENING	**5:30- 7:00 p.m. Booksigning and Poster Session (Imperial Ballroom and Foyer) ..... 150** **7:00-10:00 p.m. Banquet (Capitol Peak Ballroom, Atrium Tower, 38th Floor) 150**	

	GRAYS PEAK ROOM	LONGS PEAK ROOM
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10:30-NOON	**Black-footed Ferrets ..... 98** 1. Recovery Efforts for the Black-Footed Ferret, Paul Marinari 2. Reintroduction Of The Black-Footed Ferret To A Small Prairie Dog Complex, Daniel Licht 3. From The Underground Up: Habitat And Population Analysis Of Prairie Dogs To Support The Reintroduction Of Black-Footed Ferrets In Canada, Tara Stephens 4. Burrow Distributions and Resource Selection of Black-Footed Ferrets on Black-Tailed and White-Tailed Prairie Dog Colonies, David A. Eads	**Carnivores on the Hill ..... 102** 1. The Global Warming Survival Act, Robert Dewey 2. Sustaining Wildlife on Public Lands: America's Wildlife Heritage Act, Peter Nelson 3. Saving the Sea Otter: Defenders of Wildlife's Legislative Efforts in Paving the Road Back Towards Recovery, Jim Curland 4. The Truth About Cats and Dogs–Supporting International Carnivore Conservation, Nina Fascione 5. The Protect America's Wildlife Act, Robert Dewey
1:30-3:00	**Florida Panther ..... 115** 1. Florida Panther Recovery Plans: Next Steps, Chris Belden 2. Current Research Objectives And Management Of The Florida Panther, Marc Criffield 3. Evaluation Of Wildlife Underpasses Designed For The Florida Panther, Deborah Jansen 4. The Florida Panther Protection Program: A New Model For Collaboration Amongst Nongovernmental Organizations And Private Landowners, Christian Spilker 5. Florida Panther Outreach Programs, Elizabeth Fleming	**Energy Development Effects on Carnivores ..... 120** 1. Renewable Energy in the California Desert–Is it Compatible with Conservation? Jeff Aardahl 2. Assessing Impacts Of Wind Energy Development On Wildlife: Challenges And Solutions, Aimee Delach 3. Renewable Energy and Federal Lands: Structuring Decisions for Wildlife, Peter Nelson 4. The Bush Administration's Energy Legacy Impacts to Wildlife–Oil and Gas Leasing and the West-wide Energy Corridors, Nada Culver
3:30-5:30	**Mountain Lions, People and Policy Roundtable 135** 1. Overview 2. Christopher Papouchis, Wild Felid Research & Management Association 3. Tim Dunbar, Mountain Lion Foundation 4. Rick Hopkins, Live Oak Associates 5. Gary Koehler, Washington Department of Fish and Wildlife 6. Jerry Apker, Colorado Division of Wildlife 7. David Mattson, USGS Southwest Biological Science Center 8. Sharon Negri, WildFutures 9. Ron Thompson, Arizona Game and Fish Department	**Eastern Mesocarnivores ..... 144** 1. Seasonal Variation In Detections Of Forest Carnivores In Western Maryland Using Remote Cameras, Julia Smith 2. Spatial And Temporal Distribution Of Bobcat And Fisher Detections In Western Maryland, Zoe Hanley 3. Genetic Analysis Of Formerly Extirpated Carnivores In Northwestern New Jersey, Charles Kontos 4. Distribution Of Fishers Occupying Small Fragmented Forests In Eastern North Dakota, Maggie Triska 5. Distribution And Habitat Use By A Pioneering Fisher Population In Eastern North Dakota, Steve Loughry 6. A Genetic Approach To Determine River Otter Abundance And Effects On Fish Populations In Missouri, Rebecca Mowry

Wednesday, November 18

	MT. ELBERT ROOM	MT. EVANS ROOM
8:00-10:00	**Mexican Wolf ..... 151** 1. The Value Of Private Partnerships And Private Funding To Make Possible Mexican Wolf Recovery In The Wild, Patrick Valentino 2. Will Politics Or Science Govern The Future Of The Mexican Gray Wolf? Michael Robinson 3. Estimating Population Size Of Reintroduced Mexican Gray Wolves On The Fort Apache Indian Reservation, Arizona, Sarah Rinkevich 4. Mexican Wolf Recovery, Or Lack Thereof: An Assessment Of Problems And Solutions, David R. Parsons 5. Mexican Wolf Reintroduction in Northwestern Mexico, Carlos A. López González 6. The Mexican Wolf Conservation Assessment– Where Do We Go From Here? Buddy Fazio	**Attitudes, Education and Policy ..... 157** 1. From Extirpation To Coexistence: Wolves And U.S. Environmental Policy, Lynne Nemeth 2. "The Language Of Success": What Does It Mean to the Delisted Wolf? Karlyn I. Atkinson Berg 3. The Effect Of Civilization On Wolf Habitat And Wolf Populations, Tamara Gregg 4. Re-Creating Eden: Scientific Information In The Depiction Of North American Predators In Contemporary Informational Books For Young People, Debra Mitts-Smith 5. Facts And Values: The Objectivist Stance In Wildlife Management, Kirk C. Robinson 6. Conserving Urban Carnivores: Modeling Humane Treatment, John Hadidian
10:30-NOON	**Ecological Role of Wolves ..... 175** 1. Socio-Political Ecology Of Wolf-Induced Trophic Cascades, Carlos Carroll 2. Trophic Cascades Involving Humans, Wolves, Elk, And Aspen: Defining An Ecologically Effective Wolf Population, Cristina Eisenberg 3. A Cross-System Comparison Of The Ecosystem Effects Of Wolves In Banff, Isle Royale, And Yellowstone, Mark Hebblewhite 4. Do Wolves Buffer Ecological Communities From Climate Change? Christopher Wilmers	**Mountain Lions: Spatial Ecology ..... 179** 1. Cougar Habitat Use, Social Organization and Human Interactions In Washington, Brian Kertson 2. Cores And Corridors: Mountain Lions At The Edge In Southern California, Winston Vickers 3. Mountain Lion Movements And Mortality Relative To Roads And Development In A Fragmented, Urban Landscape In Southern California, Seth Riley 4. Effects Of Fire On Mountain Lion Movement And Habitat Use In Southern California, Megan Jennings
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Exhibitors

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Wildlife Conservation Network
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Manufacturers of radio telemetry equipment

MONDAY, NOVEMBER 16, 8:00 A.M.
IMPERIAL BALLROOM
MODERATOR: JAMIE RAPPAPORT CLARK

Ecological Consequences Of Large Predator Removal: A Comparison Of Five U.S. National Parks

Robert Beschta[1] and William Ripple[1]

Following the extirpation or displacement of large predators in the American West, increased ungulate herbivory appears to have had a profound effect on both terrestrial and aquatic ecosystems. We summarize the 20th century effects on woody plant communities for five national parks where the role of large predators has been diminished—Olympic, Yellowstone, Yosemite, Zion, and Wind Cave. In a subset of these parks, recent studies suggest the loss of an apex predator allowed large herbivores to heavily impact riparian plant communities, thus leading to increased streambank erosion, wider and shallower channels, and impacts to biodiversity. Only in Yellowstone National Park, where wolves (*Canis lupus*) have been reintroduced, does it appear that impacts to plant communities are being reversed.

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MONDAY, NOVEMBER 16, 10:00 A.M.
MT. ELBERT ROOM
MODERATOR: MATT CLARK

1. Challenges To Carnivore Conservation In The Mexico- U.S. Border Region

Rurik List[1]

In an attempt to stop illegal immigration and drug smuggling from Mexico, the United States Congress approved an exemption to the application of the laws along 1,120 km of the International border, so the construction of border infrastructure could be developed without restrictions. As a consequence of this, an east to west barrier has divided the Mediterranean region of California, a large part of the Gulf Coastal Plain and the Sonoran Desert, and about half of the Chihuahuan Desert. The new barrier varies in configuration, from post and metal cross beams and Normandy style barriers with barbed wire, to 4 m high solid metal wall. Together with the surveillance road that parallels the new fence along its entire length, the border wall is fragmenting native habitat and represents a formidable and impassable barrier to medium and large mammals. Local populations of threatened species such as pronghorn (*Antilocapra americana*) and bighorn sheep (*Ovis canadensis mexicana*) have already been divided, reducing their long-term viability. Surveys along the border show that gaps in the fence, often cut by those trespassing into the U.S., are being used by pumas (*Puma concolor*) and bears (*Ursus americanus*) to cross, as they are unable to do so elsewhere. Human activity is being directed away from the most surveyed areas, and is therefore increasing in the remote areas that are the refuge of large carnivores. Increased human presence is likely reducing their use of and movement in these areas, the only ones still maintaining ecosystem connectivity between countries. The recovery of wolf (*Canis lupus baileyi*) and jaguar (*Panthera onca*) in the region is unlikely to succeed for as long as the wall stands between both countries.

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MONDAY, NOVEMBER 16, 10:00 A.M.
MT. ELBERT ROOM
MODERATOR: MATT CLARK

2. Potential Effects of the U.S.-Mexico Border Fence on Ferruginous Pygmy-Owls: Mitigation Strategies and Implications for Other Species

Aaron Flesch[1] and *Matt Clark[2]

Movement among habitat patches may be essential for conservation and persistence of wildlife populations in heterogeneous landscapes. Along international boundaries, security infrastructure threatens to degrade landscape connectivity for wildlife at large spatial scales. To begin assessing how security fences along the U.S.-Mexico border may affect wildlife, we used radiotelemetry to evaluate the effects of landscape structure on flight and dispersal behaviors of ferruginous pygmy-owls (*Glaucidium brasilianum*). Pygmy-owls have declined to endangered levels in Arizona, thus movement from larger populations in Mexico may be required for persistence and recovery. Flight height by pygmy-owls averaged only 1.4 m above ground and only 23% of flights exceeded the approximate height of transboundary pedestrian fences in the region (4 m). Juveniles dispersed at slower speeds, changed direction more, and had lower colonization success in landscapes with larger vegetation openings or higher levels of disturbance, suggesting vegetation clearings for patrol roads coupled with tall fences could limit transboundary movements. Because vehicle barriers (1 m) are shorter than average flight height, they may be more permeable than pedestrian fences for pygmy-owls and other similar species. We suggest several mitigation strategies to enhance connectivity while simultaneously augmenting security, including coupling vehicle barriers with remote-surveillance technologies in place of pedestrian fences. Additional research is needed to assess the effects of various types of security infrastructure on wildlife. We suggest prioritizing these efforts on terrestrial species large enough to be physically excluded by fences and that have small population sizes, fragmented distributions, and are obligated to dense vegetation.

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*Presenter

MONDAY, NOVEMBER 16, 10:00 A.M.
MT. ELBERT ROOM
MODERATOR: MATT CLARK

3. Border Fence and Fragmentation Effects on Mid-sized Mammals in Arizona's National Parks

Jamie McCallum[1]

This study seeks to improve understanding of the ecological benefits of transboundary conservation. In two National Parks in the Sonoran Desert Biosphere Reserve Network (SDBRN) on the US/Mexico border, I a.m. using camera traps in riparian corridors to study wildlife abundance before and after construction of a border security fence. Measurement of variation should demonstrate whether the pre-fence transboundary state provided a more ecologically advantageous framework than the fragmented post-fence treatment. A test project at Organ Pipe Cactus National Monument showed that feral dogs (*Canis lupus familiaris*) and humans still managed to cross the border into the USA after fence construction, indicating that the habitat was not wholly fragmented. Therefore I a.m. carrying out a more detailed analysis at Coronado National Memorial (CNM), including post-fence data collected during the summer of 2009, which will help to determine the degree of fragmentation and impact of security fencing upon terrestrial wildlife.

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MONDAY, NOVEMBER 16, 10:00 A.M.
MT. ELBERT ROOM
MODERATOR: MATT CLARK

4. Using Remote Cameras To Assess Wildlife Species, Habitat Preference, And Potential Impacts In The Mexican Sky Islands

Jennifer Yates[1]

A wide array of species coexist in the Sky Island region of the southwestern United States and northwest Mexico. Biotic communities are stacked on top of each other, creating many habitat types in a small geographic area, hence the high biodiversity in the region. Among wild mammals, ocelots (*Leopardus pardalis*), bobcats (*Lynx rufus*), and mountain lions (*Puma concolor*) historically ranged throughout parts of the United States and northern Mexico. Habitat destruction, loss of sustainable prey populations, and persecution by humans affects these species in the region. Felids typically are difficult to study because of their elusive nature as well as the region's isolation. Remote camera traps are an ideal way to study the interactions between these species and those of their prey and competition. In collaboration with Sky Island Alliance, we used remote camera information to assess habitat preferences of the region's wildlife, including grey foxes (*Urocyon cinereoargenteus*), coyotes (*Canis latrans*), javelina (*Pecari tajacu*), coati (*Nasua narica*), and Coues white-tailed deer (*Odocoileus virginianus couesi*). Based on our analysis, we predicted which species were likely to interact with each other on a regular basis per habitat type. We also determined that regional changes were critical to wildlife behavior. Without wildlife corridors and different habitat types, competitors like bobcats and coyotes would be unable to utilize common avoidance techniques. Additionally, prey species like Coues white-tailed deer would be unable to avoid predators like mountain lions. Understanding the interspecies interactions of predators and prey found in this region will be critical in preserving the ecosystem as predators find increasing pressure from humans in the near future.

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MONDAY, NOVEMBER 16, 10:00 A.M.
MT. ELBERT ROOM
MODERATOR: MATT CLARK

5. Landscape Connectivity For Black Bears In Arizona: Identifying Corridors And Determining The Impacts Of Habitat Fragmentation

Todd Atwood[1], Julie Young[2], Jon Beckmann[3], Stewart Breck[4] and Kirby Bristow[5]

Habitat loss and fragmentation is considered to be the greatest threat worldwide to the continued existence of large carnivores. For carnivores with large spatial requirements, such as black bears (*Ursus americanus*), habitat loss and fragmentation have the potential to sever movement corridors that link populations. We used patch-occupancy modeling, satellite telemetry and genetic analysis to identify core habitats, movement corridors and population structure for black bears in Arizona's White Mountains and Sonoran Desert Sky Islands. Core habitat for bears in the White Mountains was relatively contiguous, inter-patch movement was frequent, and riparian corridors were routinely used to travel between patches. By contrast, core habitat for Sky Island bears was patchily distributed and inter-patch movement was comparatively rare. Similar to bears in the White Mountains, Sky Island bears used riparian corridors to move between patches, but those corridors were less numerous. Black bears exhibited an overall high level of genetic structuring among White Mountains and Sky Island sampling localities. The genetic partitioning among populations suggests a pattern of gene flow from Mexico into Arizona's Sky Islands that has resulted in the structuring among populations. From a conservation perspective, our analyses indicate the importance of 1) protecting the remaining connective linkages in and between Arizona and Sky Islands in Sonora Mexico and 2) restoring corridors to link populations in the White Mountains to those in the Sky Islands.

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MONDAY, NOVEMBER 16, 10:00 A.M.
MT. ELBERT ROOM
MODERATOR: MATT CLARK

6. Genetic Structure And Black Bear Habitat Connectivity Across The US-Mexico Border

Cora Varas[1], Carlos Gonzalez Lopez[2], Paul Krausman[3] and Melanie Culver[4]

The geography of the sky island region of the Sonoran Desert of North America causes natural isolation of populations. Evidence of this isolation has been revealed as morphological and genetic differentiation of plant, insect, invertebrate and small vertebrate species. To understand how sky islands influence the genetic structure of a large vertebrate such as black bears (*Ursus americanus*), we collected black bear samples from Sierra San Luis and Sierra El Nidito (north of Sierra Madre Occidental in Mexico), the Huachuca, Chiricahua, Piñalenos, Rincon Mountains, and two areas of a continuous black bear habitat in the Matzatzal Mountains and near the Escudillo Mountains in Arizona. We PCR amplified 300 base pairs of the mitochondrial DNA Control Region (CR) and eight nuclear microsatellite DNA markers to detect the genetic structure for black bears in this sky island system. The results include the evolutionary history of bears from the Sonoran Desert sky islands, as revealed by genetic markers. In addition, the possible impact of a large human-imposed barrier, such as a border wall, will be examined. The results of these analyses will be discussed.

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MONDAY, NOVEMBER 16, 10:00 A.M.
MT. EVANS ROOM
MODERATOR: DAVID GAILLARD

1. Wolverine Distribution In The East Greater Yellowstone Ecosystem

Jason Wilmot[1], Kerry Murphy[2] and Jeffrey P. Copeland[3]

Little is known about wolverine (*Gulo gulo*) distribution, breeding and residency status, and habitat affinities in Yellowstone National Park and the Absaroka Range. In 2005, we began a comprehensive 5-year field project to evaluate wolverine status and ecology in this area. We captured and marked wolverines in live traps using standard techniques to obtain location, movement, and habitat use data. To date, our live-trapping data suggest that few wolverines occur in the interior and along the east boundary of Yellowstone National Park. We developed and implemented a helicopter-based aerial wolverine track survey to provide an assessment of the relative numbers and distribution of wolverines independent of our live-trapping effort. We tested our method in areas of known wolverine distribution in Montana. In our study area, we defined an inference area by using a wolverine habitat model, and surveyed every other 10 x 10 km grid cell that overlapped wolverine habitat, flying diagonal, straight-line routes over three consecutive days, per replicate. During the winters of 2008 and 2009, we completed three survey replicates and detected thirteen sets of wolverine tracks, nearly all in areas that supported radio-marked individuals. Consistent with our live-trapping data, results of our survey suggest that few wolverines occur in the Yellowstone Park interior and along the east park boundary. This survey approach has strong potential for application to other areas in the contiguous United States where wolverine status is uncertain.

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MONDAY, NOVEMBER 16, 10:00 A.M.
MT. EVANS ROOM
MODERATOR: DAVID GAILLARD

2. Confirming The Identity Of Suspected Predators Of Fishers Through Molecular Techniques

Greta M. Wengert[1,2] M.W. Gabriel[1,2], J.M. Higley[3], S.M. Matthews[4,5], C.M. Thompson[6], K.L. Purcell[6], R. Green[6], R.A. Sweitzer[7], R.H. Barrett[7], J.C. Lewis[8], P.J. Happe[9], K.J. Jenkins[10], J.E. Foley[11] and B.N. Sacks[1,12]

The fisher (*Martes pennanti*) is a candidate for listing under the Endangered Species Act in the Pacific United States. Recovery of their populations requires an understanding of mortality factors, including predation. In most accounts of predation on fishers, observers have suspected potential predators based on puncture wounds, which can be misleading in determining the predator species. Furthermore, DNA evidence of predation in any wildlife community is scarce in the literature. We generated a field protocol for gathering DNA evidence of predation on fishers for several research projects in California and Washington. We have been able to identify predators of fishers through three types of samples: predator fur left at the carcass, predator saliva from matted fisher fur and predator saliva collected by swabbing the interior of bite wounds. In conjunction with necropsies performed, we were able to confirm in most cases that bite wounds from which we collected DNA were inflicted ante-mortem. To date, we have documented bobcats (*Lynx rufus*) and mountain lions (*Puma concolor*) as frequent predators of fishers, while only one fisher was killed by a coyote (*Canis latrans*). Currently, we are working on identifying the sex of the predator through its DNA, as well as the individual identity of each predator, to search for patterns in predation. This information coupled with knowledge of the trends in fisher predation, such as whether fishers of one sex sustain greater predation rates, will allow for a more thorough assessment of the impact that predation may have on fisher populations.

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MONDAY, NOVEMBER 16, 10:00 A.M.
MT. EVANS ROOM
MODERATOR: DAVID GAILLARD

3. Restoring Lynx, Wolverines And Fishers In The American West–What's It Gonna Take?

David Gaillard[1]

Many of America's wildlife restoration successes have been focused on animals that taste good. What about animals that are fanged, furry and nobody wants to eat? Our (unfinished) success restoring wolves (*Canis lupus*) and grizzly bears (*Ursus arctos horribilis*) provides hope for restoring other "non-consumptive" wildlife, but also illustrates the extensive time and resources required for the research, policies and public outreach needed. In this presentation I provide an update on the conservation status and needs of lynx (*Lynx canadensis*), wolverines (*Gulo gulo*), and fishers (*Martes pennanti*) in the Lower 48, with an emphasis on the U.S. Rocky Mountain region. The imperiled status of these species indicates that edible wildlife, wolves and bears are not the only species that have suffered the unintended consequences of overexploitation and the destruction and fragmentation of our forests. We also cannot assume that our progress restoring game species, wolves and grizzly bears is sufficient to restore the full suite of North American wildlife. These rare carnivores have survived thus far largely through neglect, but we can no longer take that for granted, especially given the dual threats of development and climate change across their last remaining habitat. Instead, we must make a conscious commitment to their recovery. At stake is the survival of the full suite of top-level carnivores in North America, and the forest ecosystems where they live.

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MONDAY, NOVEMBER 16, 10:00 A.M.
MT. EVANS ROOM
MODERATOR: DAVID GAILLARD

4. State-Space Modeling As A Method For Data Integration In Monitoring Carnivore Populations At Large Scales

John Melko[1] and Clayton K. Nielsen[1]

Data available to carnivore biologists for population modeling purposes often comes from varied sources and can be incomplete or insufficient. This is especially true for reclusive carnivore species with relatively low abundances, where it is preferable to have at least two separate data sources for modeling. Furthermore, the logistics and expense of collecting such data at large scales can be challenging. In our presentation, we show how the novel technique of state-space modeling provides a flexible framework for the combination of data from multiple sources, with the ultimate goal of modeling carnivore populations. We describe the state-space modeling process using data obtained from animal necropsies, surveys, harvest reports and radiotelemetry to develop separate population models for river otters (*Lontra canadensis*) and bobcats (*Lynx rufus*), respectively, in Illinois, USA. We show how the state-space model can implement scaling techniques that allow for concentrated local-level population studies to be representative of larger-scale population dynamics. We also depict how state-space models can handle differences in population dynamics both temporally and spatially. Our analysis illustrates that state-space modeling can alleviate some of the shortcomings in using limited data for modeling carnivore populations. State-space models allow for efficient combination and assessment of multiple data sources to monitor carnivore population demography, assess the effectiveness of survey methods and predict the impact of potential harvest management at large scales.

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MONDAY, NOVEMBER 16, 10:00 A.M.
MT. EVANS ROOM
MODERATOR: DAVID GAILLARD

5. An Alternative Method For Tracking Movement In Elusive Carnivores

Danielle Ethier[1], Christopher J. Kyle[1], T. Kurt Kyser[2] and Joseph J. Nocera[1,3]

Movement of animals on a daily, seasonal, or annual basis is a fundamental component of ecology and evolutionary biology. Until recently, methods of studying movement primarily involved trapping and tracking extrinsically-marked individuals (e.g., radio or satellite transmitters). Recent technological advancements and new analytical techniques have allowed researchers to use various intrinsic markers, such as biological (e.g., genetic) and biogeochemical (e.g., stable isotopes and trace elements) signatures, as a means of tracking movement and/or migration. Trace element profiles in animal tissues have only recently been viewed as a potential indicator of an individual's geographic origin. Very little empirical work has been performed to support this assertion, however, and has until now been largely limited to investigations of avian migration. Here we present research findings outlining the value of using mammalian claw keratin to assay trace elements, incorporated into the tissue at different stages of growth, to reveal an unbroken time-series of ecological data. As a case study, we demonstrate how trace element signatures in American badger (*Taxidea taxus jacksoni*) claw keratin can be used to assign an individual to its geographic origin, which can ultimately be used to track fine-scale movement patterns of terrestrial carnivores.

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MONDAY, NOVEMBER 16, 10:00 A.M.
MT. EVANS ROOM
MODERATOR: DAVID GAILLARD

6. Reconstructing The Evolution And Geographic Spread Of Early Domestic Dogs

Sarah Brown[1], Niels C. Pedersen[2] and Ben N. Sacks[1,3]

Although most dogs (*Canis lupus familiaris*), especially in the West, descend from inbred lines (breeds) established in the past several hundred years, dogs in parts of South-East Asia apparently continue to exist as they did thousands of years earlier as semi-wild, naturally interbreeding human commensals. The best known example of such relatively pristine dog populations is the Australian dingo (*C. l. dingo*), which both archaeological and genetic data indicate were brought to Australia 3,000-6,000 BP. It is of significant interest to determine if additional populations of dogs retaining ancient diversity exist elsewhere in the world. Discovering which populations exist today is a priority as those already identified are in danger of being lost to hybridization with Westernized dogs, which would erase signatures of recent evolution in these relict populations. We utilized molecular data (mitochondrial, Y chromosome, and autosomal microsatellite DNA) from village dog populations in Southwest and Southeast Asia. By sampling village dogs (loosely associated with primitive villages/settlements), our aim was to sample potential indigenous genotypes that have persisted in regions over a period of time. Our data reveal distinct ancient Y chromosome clades in Southwest Asia and Southeast Asia, which split up to 3,860 years ago. Additionally, endemic Y chromosome clades were found on Islands of Southeast Asia, dating up to 5,000 years BP. In general, the genetic diversity of village dogs was considerably greater than purebred dogs. Our study presents the first evidence of ancient dog populations outside of Australia and argues for the conservation of these populations.

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MONDAY, NOVEMBER 16, 10:00 A.M.
GRAYS PEAK ROOM
MODERATOR: ROBERT LONG

1. Estimating Animal Density From Photo Rates And Animal Movement Speeds Recorded In Camera Trap Videos

Roland Kays[1], Bart Kranstauber[2], Patrick A. Jansen[3], Zhihai He[4], Zhongna Zhou[4], Chris Carbone[5] and Marcus Rowcliffe[5]

The Gas Model suggests camera trap photo rates will be a function of animal density and movement rate, and would allow density estimation for species without unique pelage patterns. However movement rate data are rarely available to parameterize this model. We show how camera trap videos can be used to estimate movement rates, and thus produce density estimates for a mammal community. These data come from camera traps at 789 sites on Barro Colorado Island, Panama. Cameras were moved to a new location every 8 days over one year and recorded 17,266 animal detections. We quantified the instantaneous speed of 1,388 animals recorded moving in videos by physically measuring their movement paths, using vegetation and rocks as landmarks. We also automated this process with an image analysis that replicates our field measurements with high precision. We fit a circular function to daily activity data to calculate the proportion of the day spent moving. Together, these estimates of speed and proportion of the day active can calculate the daily distance moved, which is then used to calibrate Gas Model estimates of animal density. We will present these estimates for 12 tropical mammal species and compare them with transect survey estimates.

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MONDAY, NOVEMBER 16, 10:00 A.M.
GRAYS PEAK ROOM
MODERATOR: ROBERT LONG

2. Frontiers in Follicles: Snagging Hair and What You Can Learn from It

Kate Kendall[1]

The development of powerful genetic methods that can deliver large amounts of information from small samples of hair has fueled a rapid expansion of hair collection studies. Studies initially targeted high-profile and elusive carnivore species but now include numerous other species. Study objectives include estimating species occurrence, population abundance and genetic structure, and monitoring population trends to determining ecological niche. Hair collection methods use both baited and passive approaches and a wide array of devices and structures optimized for differences in hair length and texture and species-specific behavior. This presentation will provide an overview of research and management questions that have been addressed with hair sampling and the wide variety of approaches and devices used to study a range of carnivore species. A case study using hair collection from natural bear rub sites to monitor trends in grizzly bear (*Ursus arctos horribilis*) population abundance, survival, growth rate and genetic structure will illustrate the evolving potential of noninvasive hair collection.

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MONDAY, NOVEMBER 16, 10:00 A.M.
GRAYS PEAK ROOM
MODERATOR: ROBERT LONG

3. Lynx Habitat Selection And Hunting Behavior From Snow Tracking During Winter In Northern Washington

Benjamin Maletzke[1], Gary Koehler[2], Robert Wielgus[1], Keith Aubry[3], Robert Naney[4], Jeff Von Kienast[5] and Marc Evans[6]

Effectively managing habitat for threatened populations of Canada lynx (*Lynx canadensis*) requires knowledge of habitat conditions that provide for their ecological needs. We snow-tracked and used GPS to digitize lynx trails to identify habitat selection and conditions associated with hunting behavior and predation during winters of 2001-2004 in the northern Cascade Range in Washington State. We developed a model of suitable lynx habitat based on logistic regression analyses. We recorded number and success of predation attempts, prey species killed and trail sinuosity as measures of hunting behavior along 149 km of lynx trails. Lynx killed snowshoe hares (*Lepus americanus*), red squirrels (*Tamiasciurus hudsonicus*) and cricetid rodents more than expected in Englemann spruce (*Picea engelmannii*) and subalpine fir (*Abies lasiocarpa*) forests, where snowshoe hare densities were >0.5 hares/ha. Lynx killed prey less than expected in Douglas-fir (*Pseudotsuga menziesii*) and ponderosa pine (*Pinus ponderosa*) forests and forest openings. Lynx trails that included predation events and attempts were more sinuous than trail segments without predation. Lynx trails had greater sinuosity in forest stands with >0.5 hare/ha that were dominated by Engelmann spruce and subalpine fir. Sinuosity measures show that lynx did not hunt stands with low hare densities dominated by Douglas-fir and ponderosa pine, or in forest openings. These results were published in peer-reviewed journals and used to identify and conserve forest stands important as forage habitats for lynx on state managed lands in Washington.

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MONDAY, NOVEMBER 16, 10:00 A.M.
GRAYS PEAK ROOM
MODERATOR: ROBERT LONG

4. Molecular Genetic Contributions To Noninvasive Survey Approaches For Carnivores

Lisette Waits[1]

Non-invasive genetic sampling is a popular new tool for collecting data from wild carnivores. Different researchers have demonstrated that non-invasive genetic sampling can be used to: 1) document the presence of an endangered or rare species, 2) obtain minimum and mark-recapture population estimates and sex ratio data, 3) collect samples for monitoring genetic diversity and gene flow, 4) obtain pedigree and mating system data and 5) detect and monitor hybridization. This presentation will overview molecular genetic contributions to noninvasive survey approaches for carnivores by highlighting results from some of our recent studies on brown bears (*Ursus arctos*), black bears (*Ursus americanus*), red wolves (*Canis rufus*), gray wolves (*Canis lupus*), and snow leopards (*Panthera uncia*). Due to the wide variety of potential applications, there is tremendous interest in applying non-invasive genetic sampling methods; however, caution is warranted, as non-invasive genetic sampling can be expensive, time consuming, and error prone. Thus, for new projects, there is great need for pilot studies with seasonal comparisons, extensive optimization and cost analyses.

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MONDAY, NOVEMBER 16, 10:00 A.M.
GRAYS PEAK ROOM
MODERATOR: ROBERT LONG

5. A Comparative Study Of Felid Densities Via Simultaneous Scat Detector Dog And Remote Camera Trap Mark-Recapture Surveys In Belize, Central America

Marcella Kelly[1], Claudia Wultsch[2], Lisette Waits[3] and Miranda L. Davis[2]

Information on abundance and density of wild felids in forested habitats is difficult to obtain due to the elusive, wide-ranging nature of such species. Yet, this information is essential to determine population trends and to employ effective conservation strategies. We surveyed three broadleaf and one pine forest habitat in Belize, Central America, via simultaneous remote camera traps, scat detector dogs and mark-recapture surveys. We deployed 30-47 camera stations across sites for ~2.5 months each covering an area of 150-250 km^2 per site. Additionally, we blocked the study sites into 4X4 km grids and used a professionally trained scat detector dog to survey a minimum of 5km of opportunistic transect per grid. We considered a single capture occasion as a completed set of transects in all 4X4 km grids. We repeated scat dog surveys 4-5 times for 4-5 capture occasions per site. We identified individual animals by distinct coat patterns in remote camera surveys and by genetic techniques (molecular scatology) from scat samples. Preliminary results suggest that both survey techniques produced similar density estimates for jaguars (*Panthera onca*) and ocelots (*Leopardus pardalis*). The pine forest habitat contained lower numbers of all three felid species than the broadleaf sites. Ocelots ranged from 2.11-38.8 and jaguars from 2.09-5.63 animals per 100km^2 in the pine versus broadleaf sites. Puma (*Puma concolor*) estimates are pending. Both non-invasive techniques are viable and valuable methods for gaining substantial information on densities of elusive felid species.

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MONDAY, NOVEMBER 16, 10:00 A.M.
GRAYS PEAK ROOM
MODERATOR: ROBERT LONG

6. The Use Of Noninvasive Survey Methods For Road Ecology Research

Robert Long[1] and Paula MacKay[1]

Road ecology is a relatively new discipline that explores how roads and highways affect natural communities. Road ecology research has led to advances in highway engineering and the mitigation of road effects on wildlife, including the development and installation of highway crossing structures, wildlife fencing and animal detection systems. Although remote cameras have been used in road ecology research for years, other methods in the noninvasive toolbox can now be instrumental for assessing the effects of roads on wildlife—particularly carnivores. Indeed, noninvasive wildlife survey methods—methods that collect biological information without requiring the capture or handling of animals—are increasingly being used to study carnivores in the wild. Such methods can provide data pertaining to where animals occur, how they move, their relative abundance and their behavior. By combining non-invasively collected samples (e.g., hair, scat) with modern genetic analysis methods, these techniques can also provide population-level information, such as the extent to which a road serves as a movement barrier between populations, or the source population for re-colonizing animals. We describe a number of noninvasive survey methods and show how they can be used effectively by road ecologists. Specifically, we describe a major road improvement project being undertaken by the Washington Department of Transportation along I-90 at Snoqualmie Pass in Washington. This project employs multiple noninvasive methods, operating at both site- and landscape-scales, to collect baseline data prior to the construction of more than 20 large wildlife crossing structures.

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MONDAY, NOVEMBER 16, 10:00 A.M.
LONGS PEAK ROOM
MODERATOR: CAMILLA FOX

1. Science, Ethics, And Coexistence: What It Will Take And What It Means To Live With Coyotes

Marc Bekoff[1]

Coyotes (*Canis latrans*) are quintessential survivors and are of considerable interest to biologists, wildlife managers, Native Americans, and the lay public. Able to live alone, in pairs, or as part of a coordinated pack, these revered and tormented generalist carnivores—cunning tricksters—are among the most adaptable animals known. Long-term research has shown that speaking about "the coyote" is misleading because of enormous amounts of behavioral and social variability and flexibility shown even among neighboring individuals and packs. Yet general and erroneous assumptions about coyote behavior, the nature of "coyote conflicts," and what constitutes "aggressive behavior" are often used without adequate understanding or consistency in their application to management decisions. When coyotes appear in our communities, non-selective killing is far too often the first and fast approach; however, research has shown that killing coyotes has never worked for controlling their populations or for reducing coyote-dog/cat/human encounters. We also have a strong ethical responsibility to recognize coyotes as highly sentient beings who have a point of view about what happens to them. Thus, we must think deeply about the non-selective invasive methods, many of which cause extreme pain, suffering, and death, that are used to try to control these intelligent carnivores. Even if desired goals were achieved, lethal control is ethically questionable and should be replaced with more humane methods.

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MONDAY, NOVEMBER 16, 10:00 A.M.
LONGS PEAK ROOM
MODERATOR: CAMILLA FOX

2. Movement Patterns, Toxicant Exposure And Diet Of Coyotes In Urban Southern California

Seth Riley[1], Cathy M. Schoonmaker[1], Jeff A. Sikich[1], Joanne G. Moriarty[1], Cassity Bromley[1], Eric C. York[1]† and Raymond M. Sauvajot[1]

Populations of mammalian carnivores face significant challenges in urban areas. From 1996-2004, we captured (n=130) and radio-collard (n=110) coyotes in Santa Monica Mountains National Recreation Area, north of Los Angeles. Coyotes (*Canis latrans*) predominantly used natural habitat: 67% of home ranges and 77% of radio-locations were in natural areas. Some coyotes made use of small habitat fragments, as small as 80 ha, moving between them through development areas. For example, one adult female coyote lived and raised young in the highly developed San Fernando Valley, where although 75% of her home range was developed, only 7.5% of her locations were. Her locations were in vegetated areas on a college campus, in landscaped areas (golf courses, parks), or in remnant riparian areas. Coyotes also utilized predominantly natural food items. Even in the most fragmented parts of the landscape, <30% of food items were human-related, and domestic fruit was always the most common of these items: trash, pet food, and domestic cats all represented <6% of items, and cats were never more than 1%. The second-leading cause of mortality for coyotes was poisoning from anticoagulant rodenticides. Of 45 known mortalities, 23 were from vehicles, and 12 were from anticoagulant poisoning (death from uncontrolled internal bleeding). Overall, 20 of 24 coyotes (83%) tested were positive for anticoagulants, and 9 were exposed to multiple compounds. Although coyote-human conflict in southern California has been widely publicized, of 110 radio-collared coyotes in our study, to our knowledge none ever exhibited aggression towards humans or became nuisance animals.

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MONDAY, NOVEMBER 16, 10:00 A.M.
LONGS PEAK ROOM
MODERATOR: CAMILLA FOX

3. Ecology Of Coyotes In The Chicago Region: Implications For Management

Stanley Gehrt[1]

Coyotes (*Canis latrans*) live in most large metropolitan areas across North America, often resulting in conflicts or raising concerns among the public. Unfortunately, the public's perception of coyotes is often influenced by media accounts or publications that focus exclusively on conflicts, with little information on the ecology of coyotes in urban landscapes. My objective is to describe some aspects of coyote ecology from a major metropolitan area and discuss how these findings have potential management implications, particularly with regard to the causation and frequency of nuisance coyotes. During 2000-2008, over 300 coyotes were live-trapped and a subsample radio-tracked in the Chicago metropolitan area. Multiple lines of evidence including activity and movement patterns, land use, and diet, indicate that most coyotes avoided people and pets when possible. Consequently, frequency of nuisance coyotes in the population was relatively low, although media accounts would suggest otherwise. Our data suggest that modifying human behavior through education programs or enforced regulations may be an important element of management programs, and may increase the success of targeted removal of problem coyotes at the local level.

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MONDAY, NOVEMBER 16, 10:00 A.M.
LONGS PEAK ROOM
MODERATOR: CAMILLA FOX

4. Developing Effective Outreach Material Content To Encourage Human-Coyote Coexistence

Megan Draheim[1,2], Larry L. Rockwood[1], E.C.M. Parsons[1] and Gregory Guagnano[1]

Outreach and education efforts aimed at decreasing human-coyote (*Canis latrans*) conflict are vital, and when attitudes towards a species are positive, members of the public are likely more open to changing their behavior in order to prevent conflicts. In-depth educational programs are the most effective means of changing attitudes and behaviors, but wildlife professionals often have only a few moments to grab the attention of their target audiences through materials such as posters or brochures. Because of this, wildlife professionals should understand how best to make use of limited time and space. A survey was conducted that supplied "sound-bite" length pieces of information about coyotes in various categories (coyote behavior and ecology, human-coyote interactions, and images of coyotes) and looked at the effect this information had on attitudes. Amongst other findings, statements about coyote behavior, especially those that emphasized the social aspects of their lives, proved to be most effective in increasing positive attitudes, causing significant changes in five out of six measurements ($p < 0.01$). On the other hand, statements about attempts to lethally control coyotes were viewed negatively. Some traditional images associated with coyotes were viewed negatively, whereas images of coyote social interactions were viewed positively. Although coyotes are not a species of conservation concern, they can be used as a proxy for other predatory species that are endangered or threatened and are themselves valuable to healthy ecosystems. This information will be useful to wildlife managers, environmental educators and others interested in designing outreach materials.

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MONDAY, NOVEMBER 16, 10:00 A.M.
LONGS PEAK ROOM
MODERATOR: CAMILLA FOX

5. Human-Coyote Relationships In Suburban New York: Exploring People's Attitudes And Experiences

Heather Wieczorek Hudenko[1], Daniel J Decker[1] and William F Siemer[1]

Despite urbanization of natural areas, many carnivore species, such as the coyote (*Canis latrans*), persist in suburban landscapes. The close proximity of humans and coyotes in these areas increases opportunity for interactions. Managing human-coyote interactions to reduce negative impacts is of growing interest among wildlife managers and communities. To improve understanding of human-coyote relationships and inform communication initiatives, we conducted a situation analysis. Our inquiry included semi-structured, in-depth interviews with key informants, a content analysis of newspaper coverage, and telephone surveys of residents in two suburban areas of New York State. Analysis revealed that awareness of coyote presence and sightings of coyotes were relatively high in the study communities, but problematic interactions with coyotes were uncommon. While problem occurrence was low and about half of the residents surveyed reported enjoying coyotes, concern about coyotes in suburban areas was rather high and tolerance for their presence in most suburban spaces was low. We also evaluated the relationship between experience with coyotes and people's attitudes and risk perceptions. Neutral experience (e.g., seeing a coyote) generally was associated with positive attitudes, and negative experience (e.g., having a problem with a coyote) was associated with negative attitudes and elevated risk perceptions. People living in an area with a longer history of coyote presence tended to express more positive attitudes and less concern than those living with coyotes for a shorter period of time. In sum, our results imply that people may adjust to living with coyotes if negative impacts occur at low and tolerable levels, and that managers and organizations wishing to engage in communication efforts about coyotes may want to target the high concern associated with coyote presence. These conditions may lead to increased tolerance for coyotes and help to promote human-coyote coexistence in suburban landscapes.

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MONDAY, NOVEMBER 16, 10:00 A.M.
LONGS PEAK ROOM
MODERATOR: CAMILLA FOX

6. Coyotes In Our Midst: Challenges & Opportunities

Camilla Fox[1,2]

As adaptable, resilient, and intelligent carnivores, coyotes (*Canis latrans*) have colonized the most urbanized cities in the U.S. from Los Angeles to Chicago to New York City. Abundant food, water, and shelter found in humanized landscapes have worked to the coyote's advantage. Intentional and unintentional feeding of coyotes has led to increasing encounters and conflicts. How communities address such interactions lies at the center of public debate with passionate viewpoints on both ends of the political spectrum. However, many state wildlife agencies and local municipalities lack the resources to effectively implement proactive strategies before sightings and encounters escalate to conflicts. The lack of agency coordination combined with a largely uninformed populace hinder effective conflict resolutions. Moreover, municipal Animal Control Officers, often first responders to human-wildlife conflicts, lack formal training in human-wildlife conflict mitigation and wildlife ecology even though these comprise an increasingly greater portion of their work. All of these factors can lead to reactive community responses to coyote human/pet conflicts that ultimately fail to address the root of many conflicts: an uninformed populace and landscapes that provide a constant and readily available food source. The failure to address such issues proactively can lead to a vicious cycle of killing coyotes and increased political strife over how to address such conflicts. This presentation discusses the challenges and opportunities of living with coyotes in urban landscapes, strategies for reducing negative interactions, and suggestions of proactive measures communities can implement to address the root of conflicts and promote educated coexistence.

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Screening of *American Coyote: Still Wild at Heart*

MONDAY, NOVEMBER 16, 12:00 P.M.
LONGS PEAK ROOM
MODERATOR: CAMILLA FOX

Immediately following the Urban Coyotes Session, we will offer a screening of the new documentary film *American Coyote—Still Wild at Heart*. In 2009, Project Coyote partnered with Living World Films to create compelling thirty minute film. Produced by San-Francisco based filmmaker, Melissa Peabody, the film is a virtual case study of the coyote's natural range expansion continent wide. While the film unfolds with the return of coyotes to the San Francisco Bay area, it pursues the coyote's story across the North American landscape—from Northern California to New York City's Central Park to Chicago, and points in between. Through interviews with coyote experts, ecologists, and researchers, we learn about the remarkable adaptability and resiliency of this successful native carnivore and the challenges and opportunities coyotes provide to both urban and rural communities. Entertaining and informative, *American Coyote—Still Wild at Heart* reveals the fascinating and complex world of *Canis latrans*—their keen intelligence, amazing resourcefulness, and importance as keystone carnivores in many ecosystems.

This 30-minute film will begin immediately after the Urban Coyotes session, and will be finished with an hour to spare before the afternoon sessions, in order for participants to get lunch.

MONDAY, NOVEMBER 16, 1:30 P.M.
MT. ELBERT ROOM
MODERATOR: ANTHONY GIORDANO

1. Identifying Potential Conservation Areas For Felids In The USA And Mexico: Integrating Reliable Knowledge Across An International Border

Melissa Grigione[1] and Kurt Menke[2]

There are three species of Neotropical cats whose northernmost distribution reaches the USA-Mexico border region: the jaguar (*Panthera onca*), ocelot (*Leopardus pardalis*) and jaguarundi (*Herpailurus yagouaroundi*). To ensure the long-term viability of Neotropical cat populations in this region it is imperative to identify current distribution and status in the northern limits of their range to conserve important populations effectively. The purpose of this study was to construct a blueprint of priority conservation areas for each species in the border region. This was done by (1) compiling reliable sightings for each species from the early 1900s to 2003, (2) conducting field surveys to ascertain species presence, and (3) conducting a geographic information system-based habitat mapping workshop in which 29 scientists and conservationists provided information on the distribution and status of each species. Participants were asked to delineate and describe specific areas in the border region where historical and recent sightings of Neotropical cats have occurred, resulting in a compilation of 864 felid sightings, of which 283 where reliable and had physical evidence. Twenty-one Cat Conservation Units and seven Cat Conservation Corridors were identified as areas in which to concentrate efforts for protecting felids. Only 8.9% of these Corridors and 1.1% of the Units currently have any protection. An additional 12 Corridors and 12 Units were identified as areas requiring further study.

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MONDAY, NOVEMBER 16, 1:30 P.M.
MT. ELBERT ROOM
MODERATOR: ANTHONY GIORDANO

2. Conservation Genetics for Borderlands Carnivores

Melanie Culver[1]

We are studying several carnivores in the borderland region of Arizona and Mexico, using DNA techniques to examine gene flow among populations. Species studied include black bear (*Ursus americanus*), puma (*Puma concolor*), jaguar (*Panthera onca*), and bobcat (*Lynx rufus*). Environmental changes in the borderlands region are affecting these carnivore populations and impacts include the border fence and associated activities, such as construction of a 60 foot-wide access road and the fence itself of varying degrees of penetrability. Climate impacts are also significant in this arid region, compounding the environmental impact of the area. We currently have extensive genetic data on the black bear and limited data on the three felid species. Results will be presented and conclusions drawn with respect to how the genetic data can aid management decisions and recommendations regarding connectivity of populations in light of the border wall and other environmental impacts of this borderland region.

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MONDAY, NOVEMBER 16, 1:30 P.M.
MT. ELBERT ROOM
MODERATOR: ANTHONY GIORDANO

3. A Carnivore Conservation Model In The Rio Aros Basin, Sonora, Mexico

Clayton K. Nielsen[1] and *Ron Thompson[2]

With the initial discovery of the northernmost breeding population of jaguars (*Panthera onca*) as the result of a Turner Foundation funded project, interest in conserving a core population of jaguars eventually evolved into two conservation efforts: the Northland Jaguar Project and the Jaguar Conservation Program in the High Sierra of Sonora, Mexico. Although both are officially recognized by the federal government of Mexico, and the basis for both projects is jaguar conservation, their approaches are very different. One model is based on land-purchase acquisitions as a core area for a much larger possible future government- supported wildlife reserve. The other concept has been to work with existing landowners, mostly ranchers. This model keeps both people and livestock on the landscape and uses conservation agreements to protect jaguars, even in the event of depredations. In 2003 an UMA (official government recognized wildlife management land unit) was established. With approximately 75,000 hectares under conservation agreement, this collection of 11 ranches agreed to a coordinated wildlife management plan with two broad goals: (1) to manage game wildlife species on its properties on a sustained yield basis for their economic potential, and (2) to cease all activities that were counter to conservation of the Sonoran jaguar. Specifically, management of these ranches for deer hunting, ecotourism, wildlife conservation, and livestock production has benefited carnivores and their domestic and wild prey. We will discuss the similarities of this model to the successful North American Model of Wildlife Management and its benefits to capacity building in local communities in Mexico.

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*Presenter

MONDAY, NOVEMBER 16, 1:30 P.M.
MT. ELBERT ROOM
MODERATOR: ANTHONY GIORDANO

4. A Carnivore Conservation Model In The Rio Aros Basin, Sonora, Mexico–A Perspective From Mexico

Martinez Jesus Florencio Moreno[1] and Ivonne Cassaigne[2]

Jaguars (*Panthera onca*) are classified as endangered and are protected in Mexico (SEMARNAT 2002). In northeastern Sonora, the northernmost known breeding population of jaguars in the Americas inhabits the mountainous ranges of the Sierra Madre Occidental in the municipality of Nácori Chico. Livestock grazing is the main rural land use in northeastern Sonora, and it has been a proud tradition since the 18th century (Martínez-Caraza 1983). Predation by jaguars and pumas (*Puma concolor*) is often a source of conflict with cattle ranching in northeastern Sonora, Mexico. Because jaguars are protected in Mexico, such conflicts have biological, social, and economic consequences. The Asociacion para la Conservacion del Jaguar en la Sierra Alta de Sonora was formed in response to a study that documented that calves constituted 58% of the prey biomass consumed by jaguars compared to 9% by pumas (Rosas et al. 2008). Jaguars were responsible for 14% of all Association calf losses and could be as high as 36% (146/408) if missing calves were included in the totals (Rosas et. Al 2008). Jaguar and puma predation have proportionally a higher impact on small cattle operations within the Association than the larger ranches, especially if an individual jaguar that is killing livestock inhabits a smaller ranch. We will discuss the targeting of problem jaguars and pumas rather than broad-scale predator control as a viable alternative to address chronic predation problems, in conjunction with a program that includes better ranch management and big game hunting as an incentive to sustaining jaguars in Sonora.

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MONDAY, NOVEMBER 16, 1:30 P.M.
MT. EVANS ROOM
MODERATOR: JAMIE RAPPAPORT CLARK

1. Polar Bears In The Greenhouse: Global Populations Under Stress

Bruce G. Marcot[1] and Steven C. Amstrup[2]

We have modeled global populations of polar bears (*Ursus maritimus*) in four major ecoregions under six time periods (out to a century) and range and mean values of ice habitat amount and distribution projected with 10 global circulation models (GCM) running the A1B "business as usual" greenhouse gas climate change scenario of the Intergovernmental Panel on Climate Change (IPCC). We used a deterministic projection of polar bear carrying capacity based on known crude and ecological densities in each ecoregion and GCM projections of future ice habitat, and a probabilistic Bayesian network model to evaluate the effects of multiple anthropogenic stressors and environmental conditions. Our findings suggested that approximately two-thirds of extant polar bears will most likely trend toward extirpation by mid-century, and the rest will occur in smaller distributions than at present. These findings contributed to U.S. Department of the Interior's 2008 listing of the species as globally threatened.

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MONDAY, NOVEMBER 16, 1:30 P.M.
MT. EVANS ROOM
MODERATOR: JAMIE RAPPAPORT CLARK

2. Lynx and Climate Change: Cat (and Managers) on a Hot Tin Roof?

Gary Koehler[1] and Benjamin Maletzke[2]

Lynx (*Lynx canadensis*) are classified as threatened in the contiguous United States, with populations in Washington, Montana, Minnesota, Maine and Colorado. The Okanogan plateau was once considered the best and most contiguous habitat for lynx in Washington. Since 1985, more than 50% of the high elevation (>1,500 m) Engelmann spruce/subalpine fir forest communities occupied by lynx have burned. Establishment of early succession forests on burned areas may take more than two decades to provide habitat suitable for lynx and snowshoe hares (*Lepus americanus*), their primary prey. Persistence of lynx populations in Washington may be compromised on the remaining ~1,022 km^2 fragmented habitats due to the effects of climate change and its influence on the frequency and severity of wildfires and potential changes in regenerated forest conditions. To ensure their persistence, establishing multiple lynx populations may be required. Historically, lynx were more widespread and abundant in northern Washington, with trapping during the 1960s and 1970s reducing their range and numbers. The Kettle Range of northeastern Washington supports relatively high hare densities (0.6-3.6 hares/ha) within 20 year-old stands, where 400-987 km^2 of habitat may support 10 to 23 lynx. Colonization of the Kettle Range by lynx emmigrating from British Columbia may have been inhibited by barriers to dispersal; including surrounding low-elevation xeric forests communities and a major highway corridor and fence at the northern end to prevent vehicle collisions with ungulates. Lack of colonization since the 1970s, suggests that reintroduction of lynx to the Kettle Range may be required to better ensure persistence of their populations in Washington.

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MONDAY, NOVEMBER 16, 1:30 P.M.
MT. EVANS ROOM
MODERATOR: JAMIE RAPPAPORT CLARK

3. Can Predators Reduce Atmospheric Carbon Dioxide Through Trophic Cascades?

Christopher C. Wilmers[1], *Jim Estes[2], Kristin L. Laidre[3] and Matthew Edwards[4]

Top predators, by suppressing herbivores, often have positive indirect effects on plant biomass. Here, we present information on kelp carbon content, kelp biomass densities between areas with and without sea otters (*Enhydra lutris*), and the carbon content of surface sea water in areas with and without a kelp canopy to demonstrate that the magnitude of this effect on atmospheric CO_2 sequestration is substantial. Sea otters suppress herbivorous sea urchins, thus increasing kelp biomass density by roughly 100-fold compared with comparable habitats in which sea otters are lacking. The resulting kelp forests reduce both CO_2 and total inorganic carbon concentrations in surface waters by 25 to 50%. When considered for the slice of atmosphere defined by the sea otter's range across the North Pacific Ocean, this predator effect results in the sequestration of > 40% of the post industrial revolution increase in atmospheric CO_2. Populations of large predators have been extensively depleted or lost throughout much of the globe. Maintaining predators where they still occur and restoring them where they have been depleted might thus be included as part of the global strategy for atmospheric CO_2 control and reduction.

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*Presenter

MONDAY, NOVEMBER 16, 1:30 P.M.
MT. EVANS ROOM
MODERATOR: JAMIE RAPPAPORT CLARK

4. Climate Change Adaptation and Carnivore Conservation

Jean Brennan[1] and *Aimee Delach[1]

The most current and authoritative assessment of the climate change due to human (anthropogenic) effects recognize that the Earth's atmosphere will continue to warm, even if the world's nations were to dramatically reduce carbon dioxide emissions, the major cause of enhanced global warming (IPCC 2007). The climate system now committed to an annual rise in global temperature of 2°C over pre-industrial levels, due to the amount of greenhouse gases that have already been emitted. This is cause for great concern among wildlife and natural resource managers. With just the 0.7°C increase that has been recorded, we have already seen major disruptions to biotic and natural systems such as species movement and change in community structure, asynchrony in phenological events and migration patterns, decline in reproduction and population recruitment, and changes in disturbance regimes, particularly increases in pest infestation, fire, and flooding. Thus, in addition to taking steps to reduce our emissions and mitigate climate change, wildlife managers must also face the necessity of helping wildlife adapt to inevitable changes. I will review the major approaches for assisting wildlife adaptation to climate change: 1) protecting adequate and appropriate natural spaces; 2) maintaining or restoring ecosystem resilience; 3) maintaining or creating travel or movement corridors; 4) reducing other stressors; and 5) practicing active adaptive management. I will illustrate each approach with examples relevant to the protection of carnivore species.

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*Presenter

MONDAY, NOVEMBER 16, 1:30 P.M.
GRAYS PEAK ROOM
MODERATOR: SETH NEWSOME

1. Spatiotemporal Pattern And Process In Isotopic Records Collected From Alaskan Grey Wolves From 50,000 Years Ago To Present

Kena Fox-Dobbs[1]

Isotopic records collected from bone collagen of fossil, historic and modern gray wolves (*Canis lupus*) from non-coastal Alaska provide insight into the diets and habitat preferences of wolves over the past 50,000 years. For most of the Pleistocene from 50,000 to 10,000 years ago the Alaskan large carnivore guild was diverse and included gray wolf, American lion (*Panthera leo atrox*), scimitar-tooth sabercat (*Homotherium serum*), brown bear (*Ursus arctos*), and short-faced bear (*Arctodus simus*). Of these five, only gray wolves were present continuously through the entire late Pleistocene in Alaska. Morphologic and tooth wear analyses suggest that ancient Alaskan wolves were either generalist large animal predators or scavengers. If ancient Alaskan wolves were scavengers, it might explain why they persisted for thousands of years while populations of other carnivores waxed and waned. Dietary reconstructions from bone collagen $\partial^{13}C$ and $\partial^{15}N$ values are consistent with the interpretation that fossil wolves consumed a range of prey (i.e., they were not specialized predators). The contemporary Alaskan large carnivore guild is less diverse than the Pleistocene guild, and historic and modern non-coastal Alaskan wolves are primarily ungulate predators. Variation in the $\partial^{13}C$ and $\partial^{15}N$ values of historic and modern (1950 to 1990) Alaskan wolves can be related to spatial and temporal differences in habitat and diet. Specifically, location of death and inferred pack membership more strongly influence ungulate prey selection than year of death in wolves from both open and forested habitats. Moose (*Alces alces*) and caribou (*Rangifer tarandus*) are isotopically distinct prey, and each ungulate contributes more (or less) to wolf diet depending upon the wolves' habitat at death.

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MONDAY, NOVEMBER 16, 1:30 P.M.
GRAYS PEAK ROOM
MODERATOR: SETH NEWSOME

2. Cooperation And Individuality Among Man-Eating Lions: Dietary Specialization During A Period Of Anthropogenic Environmental Change

Justin Yeakel[1], Bruce D Patterson[2], Kena Fox-Dobbs[3], Paul L. Koch[1] and Nathaniel J. Dominy[1]

Anthropogenic stressors that result in the depletion of natural prey are often first detected by their impact on local carnivore communities. In the wake of prey shortages, carnivores may incorporate novel prey into their diet. In a notorious case dating to 1898, a coalition of two adult male lions (*Panthera leo*) from Tsavo, southern Kenya, cooperatively killed dozens of railway workers during a period of intense environmental degradation. The 'man-eaters of Tsavo' have since become the subject of numerous popular accounts, including three Hollywood films. Yet the full extent of the lions' man-eating behavior is unknown; estimates range widely from 28 to 135 victims. Here we use stable isotope ratios to quantify increasing dietary specialization on novel prey during a time of food limitation. For one lion, the $\partial^{13}C$ and $\partial^{15}N$ values of bone collagen and hair keratin (which reflect dietary inputs over years and months, respectively) reveal isotopic changes that are consistent with a progressive dietary specialization on humans. These findings not only support the hypothesis that prey scarcity drives individual dietary specialization, but also demonstrate that sustained dietary individuality can exist within a cooperative framework. The intensity of human predation (up to 30% reliance during the final months of 1898) is also associated with severe craniodental infirmities, which may have further promoted the inclusion of unconventional prey under perturbed environmental conditions.

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MONDAY, NOVEMBER 16, 1:30 P.M.
GRAYS PEAK ROOM
MODERATOR: SETH NEWSOME

3. Use Of Stable Isotopes To Examine The Historical And Contemporary Diet Of Food-Conditioned Black Bears In Yosemite National Park

Jack Hopkins[1], Paul L. Koch[2] and Steven Kalinowski[1]

Yosemite National Park has managed conflicts between humans and black bears (*Ursus americanus*) for over 100 years. Although the amount of human food accessible to bears has decreased since the last dump in the park closed in 1971, human-bear incidents continued to increase to intolerable levels. Marauding bears persist in Yosemite, causing human injury and thousands of dollars in property damage each year. In 1975, the park initiated a Human-Bear Management Plan (HBMP) to tackle the issues associated with conflict between humans and a "super-sophisticated population of bears." This plan initiated a preventative management strategy which addressed the following elements: public information and education, removal of unnatural food sources, enforcement of regulations regarding food storage and feeding animals, monitoring and control of human food-conditioned bears, and research. Although managers currently report that bears have less access to anthropogenic food sources compared to bears pre-Plan, the contribution of these unnatural foods to food-conditioned bears' diets over time has not been measured. In this study, tissues from bears and humans as well as bear foods (natural and unnatural) were analyzed for their stable isotope composition. Isotope values for sampled bears and humans, food sources, and fractionation were entered into the program MixSIR to estimate the percent contribution of anthropogenic foods assimilated in bears' diets. This analysis was ultimately used to evaluate the effectiveness of Yosemite's Human-Bear Management Program from the early 1900s to present.

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MONDAY, NOVEMBER 16, 1:30 P.M.
GRAYS PEAK ROOM
MODERATOR: SETH NEWSOME

4. Using Stable Isotopes To Investigate Diet Effects On Body Condition Of Polar Bears

John Whiteman[1]

In fasting animals, a period of feeding and depositing fat and protein is followed by a period of utilizing these endogenous reserves. Changes in resource availability can disrupt the balance between these two periods, leading to reduced fat and protein accumulation (i.e. lower body condition) and reduced survival and reproduction during fasting. We are investigating the dynamics of reserve accumulation (during spring) and reserve utilization (during ice-free summer) in polar bears (*Ursus maritimus*) in the southern Beaufort Sea, where climate change is lengthening the ice-free period. Polar bears accumulate reserves by hunting seals on the sea ice during spring. In summer most bears follow the retreating sea ice north into the polar basin, but some bears remain on shore. We hypothesize that bears encounter few seals in both locations, forcing them to extend their fast and utilize more reserves during summer. To test this hypothesis we are capturing bears on land and on the ice in early and late summer and measuring $\partial^{13}C$ values in exhaled breath and respiratory quotients (RQ). Combined, these methods indicate whether bears are using endogenous fat and protein reserves or exogenous resources. In addition, we are sampling $\partial^{13}C$ and $\partial^{15}N$ values in blood and skeletal muscle. Previous studies reported $\partial^{13}C$ values for fasting and feeding polar bears, and an enrichment of $\partial^{15}N$ during fasting for a variety of animals. We are using other methods such as Bioelectrical Impedance Analysis, fat depth measurements, and protein content of muscle to complement the stable isotope analyses and clarify their inferences.

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MONDAY, NOVEMBER 16, 1:30 P.M.
LONGS PEAK ROOM
MODERATOR: ADRIAN TREVES

1. Hunting For Solutions To Carnivore Conservation

Adrian Treves[1], Victoria S. Shelley[1] and Lisa C. Naughton[2]

Carnivores are difficult to conserve because of their direct and indirect competition with people. Regulated, public hunts of carnivores are often proposed to maintain stable populations, prevent property damage, and build public support for carnivore conservation. Yet public hunting is controversial. Sustainable hunting and maintenance of stable carnivore populations has the best scientific foundation, but the theory and its predictions are susceptible to complex patterns of carnivore behavior, migration, and compensatory mortality. Research on hunting to prevent property damage identifies large gaps in our understanding. The direct effects—numerical reduction in problematic individual carnivores—present numerous obstacles, whereas indirect effects—behavioral avoidance of humans by hunted carnivores—hold more promise of effectiveness. Scientific studies of political support for carnivore conservation are almost completely lacking; in particular, there are few measures of attitudes among hunters before and after a controversial carnivore is designated as game. Moreover, illegal killing of carnivores does not appear to diminish when they are designated as game. Hence, it is unclear whether there is grounding for the assumption that hunters will become a constituency for carnivore conservation as they have done for other game. Formulating politically acceptable and scientifically valid designs for public hunting of large carnivores demands sophisticated, interdisciplinary research. Policy-makers are unlikely to wait for the necessary studies, so policy will likely be strongly influenced by individual and interest group assumptions for the foreseeable future.

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MONDAY, NOVEMBER 16, 1:30 P.M.
LONGS PEAK ROOM
MODERATOR: ADRIAN TREVES

2. Perspectives On Wisconsin Wolf Policy Among Ojibwe Tribe Members

Victoria Shelley[1], Adrian Treves[1] and Lisa Naughton[2]

Despite being considered extinct in Wisconsin by 1960, the gray wolf (*Canis lupus*) has shown distinguished resilience, expanding their population to over five hundred individuals by 2008. As the wolf population has grown, so has their perceived conflict with humans. In Wisconsin, livestock owners, rural residents, hunters, Ojibwe Tribe members (also known as the Chippewa), animal welfare organizations, the Wisconsin Department of Natural Resources (WDNR), state politicians, concerned urban citizens and conservation-oriented researchers have all claimed a stake in the management of wolves. The Ojibwe see the recovery of wolves in Wisconsin as parallel to the Tribe's own cultural, economic, and political recovery. This relationship the Ojibwe have with the wolf can yield unique opinions on wolf policy. By sending a mail-back survey to almost 900 members of the Bad River Band of Lake Superior Tribe of Chippewa Indians, we gained insight into the rarely-heard views of Ojibwe Tribe members. The survey assessed people's a) tolerance of wolves and wolf policy, b) level of support for a public wolf harvest and c) avenues for protecting property from damage caused by wolves. By measuring Bad River Tribal members' attitudes on wolf policy, as well as their specific views on a possible public wolf harvest, we were able to shed light on the opinions held by this important player with regard to the future of Wisconsin wolf policy.

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MONDAY, NOVEMBER 16, 1:30 P.M.
LONGS PEAK ROOM
MODERATOR: ADRIAN TREVES

3. Andean Bear Presence on Private Lands within Sangay National Park, Ecuador

Becky Zug[1] and Adrian Treves[2]

Worldwide, large carnivores are targets of persecution due to real or perceived threats to private landowners. Retaliatory killing due to livestock predation and crop raiding is one of the greatest threats to the survival of Andean bears (*Tremarctos ornatus*), a species listed as vulnerable by the International Union for Conservation of Nature and the only bear in South America. Human tolerance for Andean bear presence on private lands is critical to connect protected areas and ensure the long-term survival of the species. First steps in conserving Andean bears include understanding how they are using private lands and determining if different land management regimes impact bear presence. In 2008, a five-month camera trap study monitored Andean bear presence on two large private properties within Sangay National Park, Ecuador. In 1992, both properties were encompassed within park boundaries, but virtually no assistance has been given to landowners to help them mitigate wildlife conflicts. Preliminary data showed bear presence on both property types, but two-thirds of all visits occurred on the single-owner alpaca ranch. I found the highest density estimate currently available for Andean bears anywhere, but I discuss possible factors that could explain this unusual result. Andean bears are elusive and extremely difficult to study in the wild. Pictures taken during this study confirm that the ornate facial patterns unique to each animal can be used to individually identify wild bears. Such identification supports efforts to estimate abundance and document survival of wildlife. I propose to use my data to help landowners predict conflicts and protect their properties using non-lethal methods.

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MONDAY, NOVEMBER 16, 1:30 P.M.
LONGS PEAK ROOM
MODERATOR: ADRIAN TREVES

4. Verification Methods For Certified Wildlife Friendly Properties In And Around Sangay National Park, Ecuador

Taylor Jones[1]

The Andean bear (*Tremarctos ornatus*) is classified as "Vulnerable" on the 2008 IUCN Red List. Conservation of this species in Ecuador depends on private landowners because protected areas are small and under-staffed. Yet private landowners face serious challenges living alongside bears and other wildlife that damage crops or livestock. To help producers earn rewards for conserving wildlife, I investigated verification methods that could be used to certify producers for the Certified Wildlife Friendly eco-label. Building on a recent camera trap study on private lands within Sangay National Park, Ecuador, I was able to document survival of known individuals over time and evaluate an exceptionally high density estimate for the study site. Such verification and certification will increase consumer confidence in eco-labeled products as well as providing photographs of charismatic animals which can be used as flagship species and give producers a sense of ownership of their wildlife. Additionally, by studying deposition sites, species composition, and germination rates of seeds in bear scat, I was able to evaluate the effectiveness of Andean bears as seed dispersers. This information will aid in illuminating the ways in which Andean bears contribute to the health of forests and watersheds.

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MONDAY, NOVEMBER 16, 3:30 P.M.
MT. ELBERT ROOM
MODERATOR: CRAIG MILLER

1. Bio-Politics And The Path To Jaguar Recovery

Tony Povilitis[1]

The absence of a recovery program for the jaguar (*Panthera onca*) contrasts sharply with other efforts by the U.S. Fish & Wildlife Service on behalf of transnational endangered species, and reflects a reluctance to broadly embrace large carnivore conservation. Information on habitat suitability and past occurrence of jaguars in the U.S. warrant a recovery program, but arguments on these and other matters such as whether a U.S. recovery plan would benefit species conservation range-wide have blocked U.S. recovery efforts over the 12 years since the species was domestically listed as endangered. Jaguar recovery presents fundamental policy issues regarding large carnivores and trans-border wildlife restoration. Endangered species recovery is by its very nature fraught with uncertainties about what will and will not work, especially in a climatically challenged world. Elements of a jaguar recovery program should include priority actions to protect habitat linkages and prevent fragmentation of "open country" in a rapidly developing region, measures to ensure "porosity" of the U.S.-Mexico border for the jaguar, design of an experimental release program for Sky Island and central Arizona-New Mexico recovery areas and strong U.S. support for cooperative measures with northern Mexico, including the creation of a bi-national jaguar conservation area. Necessary steps on the path to jaguar recovery include a timely decision by Interior Secretary Ken Salazar to develop an ESA jaguar recovery plan, a "modest" paradigm shift in favor of jaguar recovery within federal and state wildlife agencies and persistent advocacy by conservationists rooted in Teddy Roosevelt and Aldo Leopold traditions.

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MONDAY, NOVEMBER 16, 3:30 P.M.
MT. ELBERT ROOM
MODERATOR: CRAIG MILLER

2. Jaguar Monitoring In Sonora, Mexico (1999-2009): Towards A Recovery For The Northern Populations

Carlos A. López González[1], Carmina E. Gutierrez González[2], Miguel A. Gomez Ramirez[2], Eric Ramirez Bravo[2], Eduardo de Leon Orozco[2], Samia E. Carrillo Percastegui[3] and Gustavo Lorenzana Piña[4]

Long-term jaguar (*Panthera onca*) monitoring is currently taking place in few localities throughout its historical range. One of these sites is northern Sonora, which is the most likely source of individuals entering the United States. In this study, we present results of a decade of long-term jaguar monitoring. Since 1999, we began a monitoring program using camera traps and recording tracks along fixed transects (roads and wildlife trails). Jaguar numbers seem to remain relatively stable from 2000 to 2002 with a steady but non-significant increase in 2004 to 2007. Nevertheless, an increase in population numbers appears to have taken place in 2008 and 2009. This pattern is consistent in both indices (tracks and photographs). Abundance estimates remain constant ranging from 1.4 to 2.5 indices per 100 km^2. We attribute this raise in numbers to an increased protection in a) terms of private land acquisition for reserves, b) an increase in prey numbers resulting from livestock removal and c) a photograph-money reward system favored by neighboring ranches and developed by non-profit organizations in the area. These efforts can contribute significantly to recovery of the species within the region, and possibly favoring establishment of new jaguars in the United States.

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MONDAY, NOVEMBER 16, 3:30 P.M.
MT. ELBERT ROOM
MODERATOR: CRAIG MILLER

3. Jaguar Population Connectivity In Northwest Mexico

Daniela Valera[1] and Carlos A. López González[1]

Connectivity conservation studies have contributed to the preservation of genetic diversity, population dynamics and ecosystem processes. Landscape connectivity could focus on two different approaches: "structural" (landscape characteristics that allow individual movements) and "functional" (biological responses of individuals to structural landscape). Some models include both structural and functional parameters of one or multiple species at individual or population level. We base our study on Individual-Based Movement Model (IBMM) to simulate jaguar (*Panthera onca*) dispersal movements at their most northern distributional limit. Our aim was to evaluate functional connectivity of jaguar populations and to identify potential linkages that promote jaguar movements between natural reserves established in the study area. A virtual landscape where individuals moved was developed using SAMT software applying fuzzy logical method. A suitable habitat map was developed including environmental (elevation, landcover) and human (cattle, human impact) variables. Population parameters include mortality, displacement ability, and movement direction. Our results suggest that most of the jaguar dispersal events are located through the Sierra Madre Occidental. We found that male jaguars have a 0.001 probability to colonize southeastern Arizona, with only one successful establishment north of the border every three years. Because most of linkages important for jaguar populations are in private lands with livestock management, we propose legal protection of them by state authorities following archipielago reserves approach.

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MONDAY, NOVEMBER 16, 3:30 P.M.
MT. ELBERT ROOM
MODERATOR: CRAIG MILLER

4. Community Protected Areas and the Conservation of Jaguars and their Prey in the Chinantla Region of Oaxaca, Mexico

Joe Figel[1], Elvira Durán-Medina[2], David B. Bray[1] and Jose R. Prisciliano-Vázquez[3]

This study explored the phenomenon of community-owned protected areas and evaluated their contribution to the conservation of jaguar (*Panthera onca*) and their prey. The region studied is known as the Chinantla, an ethnic region populated by Chinantec indigenous peoples in the Sierra Norte of Oaxaca (SNO) of southern Mexico. The SNO has been identified as one of nineteen priority sites for jaguar conservation in Mexico. The four Chinantec communities in the study area have declared 205 km² of their land as community protected areas where hunting has been banned. Since 2003, the National Commission of Natural Protected Areas (CONAP) in Mexico has recognized 34 community protected areas. With an estimated 56-62% of its forests under community ownership, there are almost no significant public lands remaining in Mexico that could be designated as federal protected areas. Thus, Mexico presents a national laboratory for studying jaguar conservation on lands outside public protected areas. Ecological research was done using camera traps, and socioeconomic and cultural data were collected through informal, semi-structured and structured interviews. Data such as jaguar distribution, prey abundance and livestock depredation were collected using standardized interview forms. Camera traps registered two jaguars in a 144 km² study area after 705 trap nights, with a 'photographic-capture' rate of 11.35 jaguar captures/1,000 trap nights. This was apparently the first study on local people's perceptions towards jaguars in Mexico and the first to systematically assess the status of the species in both southern Mexico and in community protected areas.

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MONDAY, NOVEMBER 16, 3:30 P.M.
MT. ELBERT ROOM
MODERATOR: CRAIG MILLER

5. What's On The Menu? Food Habits Of Pumas And Jaguars In The Lowland Amazon Forest Of Peru

Samia Carrillo-Percastegui[1], George VN Powell[1] and Melanie Culver[2]

One of the most important aspects of the ecology of a species is their diet. From 2005-2007 we collected scats opportunistically on beaches along the rivers and on trails during both the rainy and the dry seasons. All scats collected were dried, given an ID and GPS location. A portion of the scat was preserved in ETOH for genetic analysis, and was sent to the Center for Conservation Genetics and Global Felid Genetics Program to identify which felid deposited the scat. To identify prey species, scats were disaggregated and all items were separated for further analysis. We extracted DNA from the bone fragments and identify the hair within the scat through scale patterns. Prey was successfully isolated from 41 jaguar (*Panthera onca*) scats and 20 puma (*Puma concolor*) scats. Jaguars feed mainly on medium to large sized prey species while pumas also included smaller prey species.

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MONDAY, NOVEMBER 16, 3:30 P.M.
MT. ELBERT ROOM
MODERATOR: CRAIG MILLER

6. Jaguar Corridors In Brazil

Leandro Silveira[1], Ana Tereza de Almieda Jácomo[1], Mariana Malzoni Furtado[1], Rahel Sollmann[1], Natália Mundim Tôrres[1], Eliot Cohen[2] and Jose Alexandre Felizola Diniz-Filho[3]

Among the biggest threats to wide-ranging species like the jaguar (*Panthera onca*) are habitat fragmentation and population isolation. Even most large reserves do not hold enough jaguars to guarantee the species' long-term survival. Corridors linking populations have been identified as a potential tool to avoid negative effects from isolation and increase population viability by allowing metapopulation dynamics. We conducted a nationwide evaluation of potential dispersal corridors along river basins, mountain ranges or strings of habitat fragments connecting protected jaguar populations in Brazil. Six variables of human impact (number of dams, roads and railways, dam reservoir size [km²], human population and number of cities) expected to reduce jaguar dispersal success were analyzed together with total length for 180 potential corridors and compared among biomes. Based on these variables, we performed a Principal Component Analysis to establish disturbance scores for the corridors, and defined five disturbance classes to compare the degree of corridor functionality between biomes. Our results show that the Atlantic Forest and the semi-arid Caatinga biomes have the most impacted corridors while the Amazon and Pantanal still have good potential for jaguar dispersal between protected populations. The Cerrado grasslands showed an overall average corridor quality, but recent development trends indicate that they might become highly impacted in the near future. Our conclusions suggest that if we aim to guarantee long-term viable jaguar populations throughout Brazil, we urgently need to plan jaguar conservation on a biome and landscape level and ensure corridor quality while this might still be economically viable.

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MONDAY, NOVEMBER 16, 3:30 P.M.
MT. EVANS ROOM
MODERATOR: TIM TINKER

1. Foraging Choices And Density Dependence In The Sea Otter: The Perspective Of Nutritional Ecology

Katherine Ralls[1], Olav Oftedal[2] and M. Tim Tinker[3]

The sea otter (*Enhydra lutris*) population along the central coast of California occurs at higher densities than elsewhere in the species' range, and recent evidence indicates that it may be limited by food abundance. We investigated possible nutritional constraints on this population by combining data on the nutrient composition of prey species with data on the prey consumed by 63 individually known otters. We collected and analyzed samples of more than 80 species of intertidal and subtidal invertebrates and recorded the prey consumed during 1,620 feeding bouts comprising 58,319 feeding dives. We found that the diet of this population is diverse at the population-level but specialized at the individual-level, such that most otters could be classified into one of 6 distinct diet types. To assess nutritional adequacy, we calculated the mean nutrient composition of each diet type and compared it to published requirements for mammalian carnivores. Otter prey are mostly low in fat but contain highly variable amounts of inorganic material (ash), resulting in low to moderate energy density. Five of six diet types were approximately balanced in nutrient composition, but the snail diet appeared low in energy, thiamin, vitamin A and phosphorus, and excessive in calcium and iron. Regardless of diet type, sea otters in central California showed low rates of energy consumption compared to otters at San Nicolas Island, CA, and Glacier Bay, AK. Reduction in prey densities coupled with gradual population expansion in central California have likely selected for individual dietary specialization, however some diets are apparently nutritionally sub-optimal.

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2. Does Variation In Sea Otter Activity-Time Budgets Reflect Population Performance?

James Bodkin[1], George G. Esslinger[1], Dan Monson[1], Michelle Staedler[2], M. Tim Tinker[3] and Gina Bentall[2]

Time-depth recorders (TDRs) have demonstrated utility in describing activity-time budgets in sea otters (*Enhydra lutris*). We now ask if activity budgets provide a reliable indicator of a) population density (with respect to carrying capacity) and b) current population growth rates. We present TDR derived time budgets for five sea otter populations; three high-density populations established for > 20 years (Prince William Sound (PWS), AK (n=19), Port Althorp, AK (n=11), and Monterey, CA (n=17)) and two low-density, recently established populations (Idaho Inlet in Southeast AK (n=4) and San Nicolas Island, CA (n=6)). Time spent foraging ranged from 6.7-9.7 hr/day (in Idaho Inlet and PWS, respectively) and was significantly greater ($P<0.05$) in long-established populations (mean = 9.7 hr/d or 40%) as compared to colonizing populations (mean = 7.1 hr/d or 29.6%). Time spent resting averaged 12.5 hr/d (range 12.2-13.7, or 50-57%) and did not differ among populations. Time allocated to other activities (e.g., traveling, or other diving behaviors) averaged 2.9 hr/d (range 1.2-4.1 or 5-17%) and also did not differ among populations. Time spent foraging, as calculated from TDR data, appears to be a useful indicator of population abundance and relative food availability. There was also a significant correlation between time spent foraging and current estimates of growth rates for these five populations, although there was considerable variation around this relationship. We propose that discrepancies between expected growth rates (based on time-activity budgets) and measured growth rates (based on independent surveys) can be used to identify instances where factors other than food (e.g. predation, disease, direct human take) are contributing to population performance.

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MT. EVANS ROOM
MODERATOR: TIM TINKER

3. Stable Isotopes: A Powerful Tool For Exploring Dietary Variation Within And Among Sea Otter Populations

Seth Newsome[1], M. Tim Tinker[2], Daniel H. Monson[3], Katherine Ralls[4], Olav T. Oftedal[4], Marilyn L. Fogel[1] and Jim A. Estes[5]

Differences in diet among con-specifics (dietary specialization) have been documented across a range of taxonomic groups and habitats; variation at the individual level is increasingly recognized as an important component of diversity in trophic interactions. Identification of individual dietary specialization, however, requires longitudinal records that are labor- and cost-intensive to obtain for many species. We explore the use of stable isotopes ($\partial^{13}C$ and $\partial^{15}N$) to quantify patterns of individual dietary specialization. Sea otters (*Enhydra lutris*) offer a unique opportunity for testing this approach because: 1) they consume a variety of prey that span multiple habitats and ecologically-defined functional groups; 2) diet specialization can be validated with observational data. We analyzed sea otter vibrissae from 4 populations in California and Alaska to characterize inter- and intra-individual dietary variation. In California, sea otters showed substantial isotopic variation at the population-level, occupying nearly all of the "isotopic prey space" created by the diversity of isotopic signatures of potential prey. In contrast, the two Alaskan populations showed little isotopic variation at both the population and individual level, though the size of the isotopic prey space was similar to that available to the California populations. Our results demonstrate that isotopes provide an efficient tool for measuring individual- and population-level dietary breadth, and are useful for studying populations where longitudinal data on individuals would be impossible to acquire. This is critical for examining the causes and consequences of dietary variation within and among consumers, improving understanding of these ecological and evolutionary processes at the community level.

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MODERATOR: TIM TINKER

4. Archival Time-Depth Data Reveal Seasonal Variation In Sea Otter Foraging Behavior

George Esslinger[1], Jennifer M. Burns[2], Daniel H. Monson[1], James L. Bodkin[1] and André R. Breton[3]

We used time-depth recorders to examine seasonal patterns in the foraging behavior of sea otters (*Enhydra lutris*) in Prince William Sound (PWS), Alaska. Being the most northerly population, PWS sea otters experience a greater degree of seasonal variation in temperature and daylight than otters at lower latitudes. Based on prior studies using radiotelemetry, we expected otters to increase foraging effort during winter. Dive records were recovered from 15 females and four males. Both sexes showed strong preferences for diurnal foraging and adjusted foraging effort according to the amount of available daylight. One important exception to the diurnal foraging mode occurred after females gave birth and switched to nocturnal foraging for approximately three weeks post-partum, possibly in an effort to lower the risk of eagle predation on newborn pups. Males and non-reproductive females foraged about one hour more per day during winter than summer, while reproductive females varied their foraging effort according to reproductive stage. We used multilevel mixed models to assess the contribution of several biological and environmental covariates to variation in daily foraging effort (measured in hours). In the random effects only model, 86% of the total variation in foraging effort was within-otter variation; 14% was among-otter variation. About 16% of the within-otter variation was explained by reproductive stage, day length and wind speed in the top Akaike Information Criterion model. This analysis suggests sea otters in northern climates respond to biological and physical demands by altering foraging effort and identifies periods when otters are potentially more vulnerable to human-induced perturbations.

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MT. EVANS ROOM
MODERATOR: TIM TINKER

5. Using Archival Time-Depth Recorders To Measure Within- And Between-Population Variation In Diet And Foraging Success Of Sea Otters

Martin T. Tinker[1], James Bodkin[2], Michelle Staedler[3], Daniel Monson[2] and Gena Bentall[3]

Bio-logging instruments such as Time Depth Recorders (TDRs) provide a wealth of information on foraging behavior for marine carnivores. We deployed TDRs on radio-tagged sea otters (*Enhydra lutris*) at 6 locations, three in Alaska (Prince William Sound, Idaho Inlet and Port Althorp) and three in California (Monterey, San Simeon and San Nicolas Island). We retrieved and downloaded data from 86 of these instruments, approximately half of which were from animals with matching observations on diet and foraging behavior. We used these data to re-parameterize a previously-published logistic regression model for distinguishing feeding dives from other dive types, and applied this model to the TDR records to identify feeding dives and group these into temporally discreet feeding bouts. We then calculated a suite of parameters for each feeding bout: mean and variance in dive duration, post-dive surface interval (when all captured prey are handled and consumed), dive depth, descent and ascent rates, ratio of time at bottom to total dive duration, and fluctuations in depth while at bottom (corresponding to degree of movement along the bottom). By combining observational data with TDR records for individual animals, we developed and validated multivariate models for estimating dive success rate (i.e. the proportion of dives on which prey were captured) and for classifying feeding bouts into general diet categories by identifying sets of parameters that were predictably associated with certain prey types. We interpret within- and between-population patterns of variation in dive behavior in terms of their significance for foraging success, trophic interactions, and population status.

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MONDAY, NOVEMBER 16, 3:30 P.M.
MT. EVANS ROOM
MODERATOR: TIM TINKER

6. Diet, Behavior And Disease In Sea Otters: Implications For Conservation In A Resource Limited Coastal System

M. Tim Tinker[1], Christine Kreuder Johnson[2], James A. Estes[3], Pat Conrad[2], David Jessup[4], Melissa Miller[4], Michelle Staedler[5] and Jonna A.K. Mazet[2]

Patterns of disease emergence in wild animal populations are likely due to highly complex and interactive processes. We combined field studies with epidemiologic tools to evaluate the relationship between two key factors impeding southern sea otter (*Enhydra lutris nereis*) population growth: disease and resource limitation. We followed radio-tagged sea otters and evaluated infection with two disease-causing protozoal pathogens, *Toxoplasma gondii* and *Sarcocystis neurona*, in order to identify behaviors that increase the likelihood of pathogen exposure. We found that variation in pathogen exposure could be explained by the spatial ecology and prey preference of individual otters. High risk zones of sea otter infection were detected for otters with home ranges in southern Monterey Bay for *S. neurona*, and near San Simeon and Cambria for *T. gondii*. Otters feeding on abalone had very low risk of infection with both pathogens, while otters eating small marine snails were more likely to be infected with *T. gondii*. Abalone has been characterized as preferred prey for sea otters having both high nutritional value and energy content. Individual specialization in sea otters on alternate prey is a facultative behavioral response to food limitation. Patterns of pathogen exposure in sea otters are suggestive of an association between infectious disease and consumption of lower quality prey types. Elevated pathogen exposure may therefore be a negative consequence of dietary diversification at the population level and specialization at the individual level. Under this scenario, disease and increasingly scarce food resources will act synergistically to decrease population-level fitness and limit recovery.

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MONDAY, NOVEMBER 16, 3:30 P.M.
GRAYS PEAK ROOM
MODERATOR: PAULA MACKAY

1. Simultaneous Monitoring of Predators and their Prey in the Tar Sands of Northeast Alberta, Canada

Samuel Wasser[1], Heath Smith[1], Jonah Keim[2] and Mark Taper[3]

As the number and magnitude of anthropogenic disturbances continue to grow, so does the challenge of their measurement and mitigation. Disturbances are having an increasingly large footprint in environments that vary over space and time; where there is one disturbance there are usually many; and their relative impacts are often realized through interactions between multiple species. Reliable, cost-effective tools are needed to determine whether populations of wildlife communities are stable, increasing or decreasing in the face of these disturbances; how and why disturbances impact resource use for each species over the landscape; and the environmental and physiological correlates of such events. Here we rigorously evaluate a comprehensive non-invasive sampling method that meets many of the above criteria. We use detection dogs to simultaneously acquire scat samples from wolves (*Canis lupus*) and their primary prey, caribou (*Rangifer tarandus caribou*) and moose (*Alces alces*), collected over large landscapes with multiple levels of disturbance in the rapid industrial growth area of northeast Alberta. Wolf removal is the most common tool used to maintain threatened caribou herds in Alberta, even though numerous anthropogenic pressures may be contributing to caribou decline. We demonstrate that use of scat detection dogs, coupled with mark-recapture and resource selection analyses of genotyped scat samples, provide ideal tools to guide impact assessment and mitigation of this problem. More generally, we show that sampling with detection dogs can simultaneously provide highly reliable measures of the abundance and resource use of multiple species, across guilds, even with markedly different densities.

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MONDAY, NOVEMBER 16, 3:30 P.M.
GRAYS PEAK ROOM
MODERATOR: PAULA MACKAY

2. Carnivore Connectivity in the Greater Yellowstone Ecosystem: Using Detection Dogs as a Tool to Model Linkage Zone Functionality for a Suite of Species

Jon Beckmann[1]

In the Greater Yellowstone Ecosystem (GYE), isolation is of particular concern for large carnivore species that currently occur inside the Yellowstone and Grand Teton National Park core areas. The Centennial Mountains along the Montana-Idaho border just west of Yellowstone National Park are a high priority concern for connecting the Yellowstone to Yukon (Y2Y). Because the Centennials have been delineated not only as an area of possible linkage within Y2Y, but also identified as a possible peripheral sink area for large carnivores inside the GYE, it is critical to identify those human activities that potentially influence the use of the Centennials as a linkage zone by carnivores. The aim of this project is to utilize a novel, non-invasive Deoxyribonucleic acid (DNA) sampling technique to examine connectivity for carnivores in the Centennials and surrounding valleys. To sample the Centennials, we used detection dogs specifically trained to locate the scat of four species: black bear (*Ursus americanus*), grizzly bear (*Ursus arctos horribilis*), cougar (*Puma concolor*) and wolf (*Canis lupus*). Using DNA extracted from scat samples we identified individuals for all four species. I utilized multiple logistic regression analyses with respect to habitat parameters, changes in land use patterns and measures of human activity in combination with Geographic Information System (GIS) spatial analyses to examine human impacts on each species' distribution and movements. I generated Resource Selection Probability Function (RSPF) models for each species independently and a joint "suite" model. I will discuss the resulting models and merits and limitations of this novel method for carnivore research and conservation at landscape scales.

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GRAYS PEAK ROOM
MODERATOR: PAULA MACKAY

3. Using Scat Detector Dogs And Molecular Scatology To Monitor Jaguars And Other Elusive Feline Species Co-Occurring In Belize, Central America

Claudia Wultsch[1], Lisette P. Waits[2], Marcella J. Kelly[1], Mike R. Vaughan[1] and Eric M. Hallerman[1]

Jaguars (*Panthera onca*) and other elusive carnivore species are extremely difficult to study due to their wide ranging behavior, their occurrence in low population densities often in dense forest habitats, and their nocturnal and crepuscular activity peaks. As a result, little is known about these species, making it difficult to provide for their conservation and management. This project uses a scat detector dog, and molecular scatology to monitor jaguars and co-occurring cat species, puma (*Puma concolor*), ocelot (*Leopardus pardalis*), margay (*Leopardus wiedii*), and jaguarundi (*Puma yagoauaroundi*), across six study sites in Belize, Central America. This study is one of the first projects to use scat detector dogs and molecular scatology to gather valuable population genetics information on felid species in a tropical environment. After 14 months of field work 1,042 scat samples have been collected. Species identification success rates ranged from 51% in the wet forest to 83% in the dry forest. Success rates for individual identification were 40% in the wet forest and 71% in the dry forest. In addition, a standardized protocol for locating, collecting and preserving scat samples was optimized for feline molecular scatology studies in tropical climates. The preliminary results obtained and methodology developed show the high potential for using scat detector dogs and molecular scatology as valuable conservation and management tools for studying carnivore communities in the tropics.

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GRAYS PEAK ROOM
MODERATOR: PAULA MACKAY

4. Gathering Noninvasive Genetic Samples From Elusive Carnivores: Quantitative Assessment Of Variables Affecting Scat Detector Dog Success And Detector Dog Efficacy Relative To Hair Snares In The Northern Lower Peninsula, MI Bobcat Population

Jennifer White[1]

The application of genetic techniques to wildlife population ecology has greatly advanced conservation efforts for carnivore species across the globe. Wildlife detector dogs are a promising method for acquiring genetic samples from elusive carnivore species. This study examines the impact of environmental factors on the detection rate of scat by canines by using captive bobcat (*Lynx rufus*) scat in controlled experimental transects. The effect of vegetation characteristics, level of scat degradation, distance from dog handler, weather, and trial characteristics on scat detection (0,1) were analyzed using generalized linear models. The dog's ability to detect scat was most strongly influenced by the distance of the scat from the handler's path as well as wind speed and level of scat degradation to a lesser extent. Vegetation characteristics had no effect on scat detection, suggesting scat detector dogs work effectively in open areas as well in dense vegetation. We also compared the relative efficacy of wildlife detector dogs and hair snares for collecting noninvasive genetic samples from bobcat in the field. Hair-snares and dogs were employed during the summer and fall of 2006 in the Northern Lower Peninsula, MI. Hair snares yielded two confirmed bobcat genotypes in 75 active sampling days. Scat samples found by detector dogs yielded 9 bobcat genotypes with 35 sampling days. Cost-per-sample comparisons show a much higher cost-efficiency of detector dogs over hair snares. This study demonstrates that wildlife detector dogs offer a versatile and cost-effective method of collecting noninvasive genetic samples from carnivores.

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GRAYS PEAK ROOM
MODERATOR: PAULA MACKAY

5. Biographical Information For Roundtable Participant Barbara Davenport[1]

Barbara has been involved with the development of the methodology for using canines in wildlife conservation research since 1997. She is a principle in PackLeader LLC/PackLeader Detector Dogs.

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GRAYS PEAK ROOM
MODERATOR: PAULA MACKAY

6. Biographical Information For Roundtable Participant Robert Long[1]

Robert Long is a research ecologist with the Western Transportation Institute at Montana State University. His past research used dogs to locate scat from black bears (*Ursus americanus*), fishers (*Martes pennanti*) and bobcats (*Lynx rufus*) in the Northeast. He currently conducts wildlife research, including the use of dogs to study carnivores, in the Cascades of Washington.

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GRAYS PEAK ROOM
MODERATOR: PAULA MACKAY

7. Biographical Information for Roundtable Participant Megan Parker[1]

Megan Parker is the co-founder and Executive Director of Working Dogs for Conservation. This group is developing and furthering the training and use of canine-human teams for non-invasive scientific inquiry, conservation, and management. Dogs are successfully working across more taxa, more geographic regions and more complex problems. Working Dogs for Conservation has also been training dogs on invasive species detection and discrimination between species, thus targeting conservation issues.

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MONDAY, NOVEMBER 16, 3:30 P.M.
LONGS PEAK ROOM
MODERATOR: JEREMY BRUSKOTTER

1. A Quantitative Content Analysis Of Expressions Of Attitudes And Values Toward Wolves In The United States And Canadian Print News Media

Melanie Houston[1], Jeremy T. Bruskotter[1] and David P. Fan[2]

Several trends suggest public attitudes toward wildlife—especially charismatic species such as wolves (*Canis lupus*)—changed during the latter half of the 20th century. Increases in wildlife ballot initiatives, declining participation in hunting, and changes in the how predators are portrayed in the media suggest a fundamental change in the way U.S. residents feel about wildlife. Identifying how attitudes toward wildlife have changed over time is difficult given that attitudinal studies tend to be cross-sectional and focused on relatively small geopolitical units. The current body of literature on attitudes toward wolves is inconclusive; some researchers suggest attitudes towards wolves have become more positive due to increased knowledge of wolves' role in ecosystems, while existing empirical research indicates attitudes toward wolves are generally stable. Quantitative content analyses of news media has emerged as an alternative method for measuring public attitudes and values and assessing attitude change. In this study, expressions of attitudes and values regarding wolves in U.S. and Canadian print news media were analyzed over a 10-year time period. We used the LexisNexis Academic news database to identify stories written about wolves during from 1999-2008. We limited our search to include only publications that were continuously available throughout this time period. We then developed a system of rules for classifying relevant paragraphs into positive-negative attitudinal expressions. Our search identified 7,437 stories about wolves which were analyzed using the InfoTrend®, Inc. content analysis software. Results provide insights as to how attitudes toward wolves change over time.

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MONDAY, NOVEMBER 16, 3:30 P.M.
LONGS PEAK ROOM
MODERATOR: JEREMY BRUSKOTTER

2. Emotions Toward Wolves And Wolf Management: The Importance Of Segmentation

Lori B. Shelby[1], Jerry J. Vaske[2] and Jonathan G. Taylor[3]

Understanding linkages between judgments of responsibility, emotions, and acceptability of wildlife management actions can enhance agency efforts to abate human-wildlife conflict. To help clarify these relationships for wolves (*Canis lupus*), data were obtained from two surveys: (a) Grand Teton National Park (GTNP) visitors (n = 596, response rate 81%), and (b) local residents near GTNP (n = 604, response rate 51%). Confirmatory factor analysis suggested four emotional components: sympathy for rancher, anger about wolf presence, fear of wolves, and sympathy for wolves. For this presentation two research questions are considered: (a) determine if the factorial structures are similar for the two segments (local residents and park visitors) on the four emotion concepts, and (b) determine if a mediation test using structural equation modeling is appropriate for the entire sample or if the local residents and park visitors should be segmented. Criteria for selecting the best model is based on the LaGrange Multiplier test, standardized residuals, goodness of fit statistics, theory, and parsimony. The structure of the four emotion indices differed between local residents and park visitors. The results showed that segmentation is an important consideration in structural equation modeling and should be considered prior to model testing. Indices commonly used by researchers to measure social science concepts such as emotions cannot be assumed to fit all segments (i.e., ranchers and visitors). Implications of these findings for managing human-carnivore conflicts are discussed.

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LONGS PEAK ROOM
MODERATOR: JEREMY BRUSKOTTER

3. Understanding The Clusters: Characteristics Of Respondents' Behavioural Intention Toward Management Options Regarding Wolves And Brown Bears In Central Italy

Jenny Glickman[1] and Alistair J. Bath[1]

Traditionally, managers have focused attention on understanding the differences between hunters and non-hunters, but we found that it is better to segment the public by behavioural intention to support or oppose wolf (*Canis lupus italicus*) and brown bear (*Ursus arctos mariscanus*) management options. We examined the characteristics of the respondents in the various clusters of behavioural intention and compared differences in these characteristics between wolves and brown bears. Data were collected through personal interviews with rural residents (n=1611) in Abruzzo, Lazio and Molise National Park and surrounding area. Separate K-means cluster analysis was performed using items that illustrate support or opposition to management options for wolves and brown bears. Cronbach's alpha reliability estimates were calculated for three affective items (For wolves=0.887, for brown bears=0.839). These items were then compared using analysis of variance across the clusters. Chi-square tests were used to compare the characteristics of the clusters. For wolves, there were four clusters of respondents: those that were extremely positive, extremely negative, slightly positive and slightly negative. For brown bears there were three clusters: extremely positive, extremely negative and neutral. While being a hunter and age were two variables important in characterizing clusters of respondents for wolves, these were not significant for brown bears. Instead, perceived impacts of brown bears on livestock and agricultural crops, and wolves on small game, big game and livestock were important for understanding the characteristics of clusters. Understanding the beliefs on perceived impacts of these large carnivores helps in predicting behavioural intention on management options, more than group membership.

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MONDAY, NOVEMBER 16, 3:30 P.M.
LONGS PEAK ROOM
MODERATOR: JEREMY BRUSKOTTER

4. Enhancing The Understanding Of Human-Mountain Lion Management Strategies Using The Potential For Conflict Index

Jerry J. Vaske[1], Rebecca Howe[1] and Michael J. Manfredo[1]

Information about public attitudes and norms toward mountain lion (*Puma concolor*) management practices is most useful when it accounts for the specific context of human-lion encounter situations. This article integrates attitude and norm theory with the Potential for Conflict Index (PCI) to visually clarify how individuals with different attitudes vary in their support for four management actions. Data were obtained from a survey of residents (n = 1,641, response rate = 59%) living in Denver and the foothills west of Denver. Attitude toward mountain lions were measured with three semantic differential items (i.e., good-bad, positive-negative, beneficial-harmful). The combined index ranged from -3 to +3 with a Cronbach's alpha of .84. Respondents evaluated the acceptability of four management actions (i.e., monitor lion, capture and relocate lion, frighten lion away, destroy lion) in each of four encounter situations (i.e., a mountain lion is: seen, kills a pet, injures a person, or kills a person in a residential area). Acceptability ratings were measured on a 7-point scales ranging from highly acceptable (+3) to highly unacceptable (-3). Results indicated that as severity of human-mountain lion interaction increased, respondents were less accepting of monitoring the lion and more accepting of destroying the lion. Evaluations of relocating the lion were generally favorable, while acceptability ratings for frightening the lion away were negative across all contexts. The pattern of findings, however, varied by respondent attitude toward lions. Displaying the results with the PCI provided a visual indication of level of agreement among people expressing positive, negative or neutral attitudes.

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MONDAY, NOVEMBER 16, 3:30 P.M.
LONGS PEAK ROOM
MODERATOR: JEREMY BRUSKOTTER

5. What Constitutes "A Significant Portion Of Its Range?" Implications For Large Carnivore Recovery In The United States

Jeremy T. Bruskotter[1], Sherry A. Enzler[2], Courtney Quirin[1] and Kristina Slagle[1]

The credibility of fish and wildlife agencies depends in large part upon their ability to implement policy in a fair and consistent manner. This principle is especially critical with regard to endangered species management, where agency actions face scrutiny from a diverse group of well-funded interest groups that critically examine and often legally challenge these actions. In 2007 the Solicitor for the Department of Interior introduced a new interpretation of the phrase, "a significant portion of its range," a key component of the definition of endangered species, that narrows the definition of endangered species. This phrase has been a recent source of debate, both in the courts, as well as among conservation scientists, as its interpretation could determine not only which species qualify for listing but where they will be listed. We review the ongoing controversy regarding the interpretation of the "significant portion of its range" phrase, focusing on how the various interpretations offered by the courts, the Solicitor, and conservation scientists could affect large carnivore recovery and management in the United States. Our review reveals an agency under intense political pressure to curtail species listings; further, we find that implementation of the Solicitor's interpretation could greatly reduce the number of species that qualify for protections, and specifically, reduce the area in which large carnivores can be protected and recovered in the United States.

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MONDAY, NOVEMBER 16, 3:30 P.M.
LONGS PEAK ROOM
MODERATOR: JEREMY BRUSKOTTER

6. Value Orientations and Emotions: The Case of Wolf Reintroduction in Colorado

Jason Horner[1], Jerry J. Vaske[1], Katie M. Lyon[1] and Alan D. Bright[1]

The cognitive hierarchy predicts that value orientations (e.g., symbolic beliefs) influence higher order constructs (e.g., attitudes, emotions), which in turn, influence behavior. However, emotions are seldom included in the models. This article examines the relationships between general symbolic beliefs regarding wolves (*Canis lupus*), specific positive and negative emotions about wolf reintroduction in Colorado, and voting intentions regarding wolf reintroduction. Data were obtained from a mail survey (n = 1,452, response rate = 58%) of Colorado residents. Five survey items measured symbolic beliefs about wolves. Each item was coded on a 7-point scale (i.e. -3 = strongly disagree to +3 strongly agree). Respondents evaluated 3 positive (e.g., happy) and 4 negative (e.g., fearful) emotions regarding the prospect of wolf reintroduction in Colorado. Each emotional response ranged from 1 = "not at all" to 7 = "extremely." To measure intention to support or oppose reintroducing wolves respondents indicated: (a) whether they would vote "for" (+1) or "against" (-1), and (b) how certain they were of that choice (i.e., 0 = "not at all" to 3 "extremely" certain). The product of the two scores resulted in a 7-point measure of voting intention. As predicted by theory, a structural equation analysis indicated that general symbolic beliefs toward wolves influenced the specific positive (R2 = .71) and negative (R2 = .46) emotions about wolf reintroduction. In the model predicting behavioral intentions, all three concepts were significant, in the hypothesized direction (i.e., positive emotions, β = .39; negative emotions, β = -.24; symbolic beliefs, β = .42), and accounted for 89% of the variance. Overall, these findings reinforce the importance of emotional constructs in explaining public reactions to the management of endangered species.

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Monday Evening Events

5:00 P.M. TO 5:30 P.M. • PACKLEADER DOG DEMO • GRAYS PEAK ROOM

Immediately following the Scat Detection Dog Methods and Applications session, PackLeader Detection Dogs will put on a demonstration of their detector dogs at work. Dogs' sense of smell is more than 1,000 times as keen as a human's. Unlike humans, dogs are not affected by the visual appearance of samples, therefore they are not influenced by the similarities in the appearance of scat samples between targeted and non-targeted species. When properly trained, dogs can locate multiple target species within a search area, while ignoring non-targeted species. More information is available at the PackLeader booth in the exhibit hall.

7:00 P.M. TO 10:00 P.M. • CARNIVORE FILM FESTIVAL • IMPERIAL BALLROOM

Join us Monday evening for screenings of several films showcasing the conservation of wolves, bears and other predators. Grab some popcorn and enjoy this rare opportunity to chat with the filmmakers! (free to conference registrants, $5 for guests)

BEARTREK

A conservation story wrapped in an adventure, *BEARTREK* is a feature length documentary that follows renowned bear biologist and naturalist Chris Morgan on a global crusade to understand and conserve the rarest bears on Earth. Join Chris on an epic motorcycle adventure across four continents to the wildest places on Earth -uncover the secretive nature of the world's most endangered bears, discover the threats facing them in the wild, and meet dedicated individuals racing to saving them from extinction. We will be showing a 20-minute demo reel from the 2010 theatrical release.

The Lords of Nature: Life in a Land of Great Predators

Big predators are back on the prowl in the wildlands of America. Wolves and cougars, once driven to the edge of existence, are finding their way back—from the Yellowstone plateau to the canyons of Zion, from the farm country of northern Minnesota to the rugged open range of central Idaho. It is the historic return that ecologists have been eagerly awaiting, and certain rural cultures equally dreading. And vividly capturing it all, are the acclaimed filmmakers Karen and Ralf Meyer, in their new production, *Lords of Nature: Life in a Land of Great Predators*. *Lords of Nature* presents the engaging story of a science now discovering the great carnivores as revitalizing forces of nature, and a society now learning tolerance for the beasts they had once banished. Bill Ripple and Bob Beschta, whose work is profiled in the film, will be on hand to answer questions following the film.

Clash: Encounters of Bears and Wolves

This special sneak preview of an upcoming episode of *Nature* asks: What happens when two great predators come face to face in Yellowstone? The grizzly and the wolf. They couldn't be more different. The bear is a loner, ranging far and wide in search of resources. The wolf hunts to survive and finds its strength in speed and teamwork. When they meet, it's all in knowing your own strengths and limitations in the heat of the moment in Yellowstone. Filmmaker Bob Landis will be on hand to answer questions following the film.

TUESDAY, NOVEMBER 17, 8:00 A.M.
MT. ELBERT ROOM
MODERATOR: JASON RYLANDER

1. Recovery of the Gray Wolf in the Northern Rocky Mountains of the United States

Edward E. Bangs[1]

Gray wolf (*Canis lupus*) populations were deliberately eliminated from the northern Rocky Mountains (NRM) of the northwestern United States by 1930. Naturally dispersing wolves from Canada first denned in Montana in 1986. In 1995 and 1996 wolves from western Canada were reintroduced to central Idaho and Yellowstone National Park, Wyoming to accelerate recovery under the federal Endangered Species Act (ESA). By December 2008, over 1,645 wolves in over 215 packs occupied 110,000 square miles in the NRM. Wolf restoration proceeded quickly, with more benefits (public viewing and restoration of ecological processes), and fewer problems (livestock and pet depredation and impacts to wild ungulates) than initially predicted. However, from 1987-2008, a minimum of 1,109 cattle, 2,133 sheep, 115 dogs, 28 goats, 21 llamas and 10 horses were confirmed killed by wolves and about $1,400,000 was paid from private and state wolf damage compensation funds. In addition to using a wide variety of non-lethal tools to reduce damage, 117 wolves were relocated and 988 were killed. Livestock damage, compensation and wolf control were all at record levels in 2008, suggesting the wolf population has saturated suitable habitat in the NRM. On May 2, 2009, the Obama administration removed NRM wolves from ESA protection, except in Wyoming where wolves will continue to be managed under the ESA until Wyoming can also develop an adequate wolf management plan. Montana and Idaho will manage wolves in suitable habitat just as they do other resident wildlife like black bears (*Ursus americanus*), mountain lions (*Puma concolor*), elk (*Cervus elaphus*) and deer (*Odocoileus* spp.). That management will include regulated hunting by the public. Montana will manage for over 400 wolves, Idaho for over 500, and continued Service management in Wyoming will maintain about 300 wolves. The controversy, emotion and litigation typically associated with wolves and wolf management will continue as the American public debates its relationship with wolves and wildness. Science alone will not be able to solve the complex legal, policy and human values that are being debated symbolically through wolves and how they should be managed.

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TUESDAY, NOVEMBER 17, 8:00 A.M.
MT. ELBERT ROOM
MODERATOR: JASON RYLANDER

2. Developing A Wolf Conservation And Management Plan For Wolves Recolonizing Washington: Challenges And Approach

Harriet Allen[1]

The gray wolf (*Canis lupus*) is listed as an endangered species under state law in Washington. Under federal law, it is listed as endangered in two thirds of the state, while federal protection was removed from the remaining third. Historically, wolves were found throughout most of Washington. By the 1930s, they were extirpated due to human persecution with the exception of a few individuals that dispersed periodically into the state. Now, wolves are dispersing into Washington from Idaho, Montana, Oregon and British Columbia, and the first fully confirmed breeding pack in recent years was discovered in Okanogan County in July 2008. In response to the return of wolves and state management responsibility following federal de-listing, the Washington Department of Fish and Wildlife (WDFW) began developing a wolf conservation and management plan in 2006. The Washington Wolf Conservation and Management Plan is being developed to ensure a self-sustaining population of gray wolves in the state and to address potential conflicts. A citizen group representing a broad spectrum of values regarding wolves was appointed to advise WDFW in developing the plan. The group was asked to reach consensus on a draft plan. A draft plan was completed and peer-reviewed in late 2008. Public review will occur in late summer 2009, and the plan will be completed in late 2009 or early 2010. Management, monitoring, surveying and protecting wolves reoccupying the state are occurring concurrent with the development of the plan.

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TUESDAY, NOVEMBER 17, 8:00 A.M.
MT. ELBERT ROOM
MODERATOR: JASON RYLANDER

3. The Geography Of Wolf Recovery Under The Endangered Species Act

Carlos Carroll[1]

The Endangered Species Act (ESA) defines an endangered species as one "at risk of extinction throughout all or a significant portion of its range." The prevailing interpretation of this clause, which focuses exclusively on the overall viability of listed species without regard to their geographic distribution, leads to development of recovery criteria with fundamental conceptual, legal, and practical shortcomings. The ESA declares that species "are of aesthetic, ecological, educational, historical, recreational, and scientific value to the Nation and its people," and mandates protection of both "species and ecosystems upon which they depend." These values are not necessarily furthered by a species' mere existence, but rather by a species' presence across much of its former range. The concept of "significant portion of range" thus implies an additional geographic component to recovery that may enhance viability, but also offers independent benefits that fulfill humanistic, policy, and ecosystem protection goals that Congress intended the Act to achieve. Recovery standards should consider not only what proportion of its former range a species inhabits, but the types of habitats which a species occupies. We discuss how the ESA's geographic recovery mandate may be implemented to achieve recovery of the gray wolf (*Canis lupus*) by linking recovery standards to niche and ecosystem concepts, in order to develop a scientific framework that can promote more coherent dialogue concerning the societal decisions surrounding recovery of endangered species.

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TUESDAY, NOVEMBER 17, 8:00 A.M.
MT. ELBERT ROOM
MODERATOR: JASON RYLANDER

4. Wolf Litigation: Legal Hurdles to Removing Federal Protection for Gray Wolves in the Great Lakes and Northern Rockies

Jason Rylander[1]

The restoration of the wolf in the Great Lakes and northern Rockies is a tremendous conservation achievement, but removal of federal endangered species protection for these populations remains an elusive goal. The Bush administration's efforts to simulatenously designate distinct population segments of gray wolves in the northern Rockies and Great Lakes and remove them from the federal endangered species list were rebuffed by two federal courts. In April 2009, the Obama administration proceeded with new delisting rules for both populations, and the decisions were again challenged in court. On July 1, 2009, the U.S. District Court for the District of Columbia approved a stipulated settlement agreement and order (Humane Society of the United States v. Salazar, 1:09-CV-1092-PLF (D.D.C.)). In the settlement, the Service agreed to withdraw the 2009 final rule and, if it republishes another rule, to open a minimum 60-day public comment period. On September 16, the Service formally withdrew the delisting rule for the Great Lakes population; gray wolves are now threatened in Minnesota and endangered elsewhere in the western Great Lakes region. Litigation remains ongoing over the April 2009 delisting of the northern Rockies. On September 9, a federal judge for the District of Montana denied plaintiffs' request for preliminary injunction but indicated that plaintiffs had shown a likelihood of success on the merits. (Defenders of Wildlife v. Salazar, 09-77-M-DWM & 09-82-M-DWM (D. Mont.)). The split decision means that state-authorized wolf hunts in Idaho and Montana may continue this fall, but that the U.S. Fish and Wildlife Service likely violated the Endangered Species Act in delisting the population while retaining endangered status in Wyoming. A final ruling to that effect could return the northern Rockies population to the endangered species list in 2010. Both cases raise significant legal and policy questions that will need to be resolved before removal of Endangered Species Act protections and long-term state management of these populations can be assured.

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TUESDAY, NOVEMBER 17, 8:00 A.M.
MT. ELBERT ROOM
MODERATOR: JASON RYLANDER

5. The Wolf Helpline: Helping Wolves And Humans Coexist In A Wilderness Town In Northeastern Minnesota

Jess Edberg[1]

In the small town of Ely, Minnesota, wolves (*Canis lupus*) have always been a part of the landscape. However, as more humans move into the region, many from non-wolf-inhabited areas, education on preventing conflict is a focus of the International Wolf Center. The Wolf Helpline is a grassroots effort to involve the local communities in dealing with potential triggers to wolf food-conditioning and habituation before conflict may arise. The Wolf Helpline is run in cooperation with Minnesota Department of Natural Resources wildlife biologists and law enforcement, U.S. Department of Agriculture Animal and Plant Health Inspection Service (APHIS) Wildlife Services and Vermilion Community College as well as the Ely Police Department.

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TUESDAY, NOVEMBER 17, 8:00 A.M.
MT. ELBERT ROOM
MODERATOR: JASON RYLANDER

6. Dead Wolves In The Northeast

Walter Pepperman[1] and John Glowa, Sr.[1]

The state and federal governments continue to refuse to acknowledge the presence of gray wolves (*Canis lupus*) in the Northeast. However, after having been allegedly extirpated some one hundred years ago, it is now evident that the wolves have returned. The proof of this continues to accumulate over time. Between 1968 and 2007, eight gray wolves are known to have been killed in the Northeast. Six were males, one was female and the sex of one is unknown. Three were killed in New York, two each in Maine and Vermont, and one in Massachusetts. Six were shot, one trapped and one hit by a car. Their weights ranged from 67 to 91 pounds, with the average weight being 82 pounds. DNA testing was performed on all but one. Five were conclusively determined to be wolves. The test results on two were deemed inconclusive, one because of some coyote genes, and one because of questionable reference standards. Nevertheless, when all physical characteristics are considered, there is little doubt that these were wolves as well. The U.S. Fish and Wildlife Service files on several of these animals seem to indicate that a lack of reference DNA samples is hindering proper identification of so-called "eastern gray wolves." In addition, there has only been a single federal prosecution under the Endangered Species Act, because of the "McKittrick instruction," whereby no prosecutions will be brought unless the killer knew the biological identity of the animal before killing it.

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TUESDAY, NOVEMBER 17, 8:00 A.M.
MT. EVANS ROOM
MODERATOR: RON PULLIAM

1. An Overview Of Science-Based Approaches To Wildlife Linkage Design

Paul Beier[1] and *Tabitha Graves[1]

Wildlife linkages may not be the best or only way to conserve connectivity, but are appropriate where we cannot conserve an intact landscape or manage the entire matrix for permeability. At the regional scale, linkage design includes 5 sequential tasks: (1) defining natural landscape blocks to be connected, (2) developing a regional map of 'fuzzy' linkages between neighboring blocks, (3) prioritizing linkages, (4) developing optimum linkage designs for priority linkages, and (5) evaluating practical alternatives to the optimum linkage design. For each of these 5 tasks, planners can use 1 or more of 8 science-based approaches, namely expert workshops, least-cost modeling, individual-based movement models, graph theory, spatially-explicit population modeling, circuit theory, simulated annealing, and network flow. No single approach can do all 5 tasks. Least cost corridor (not path) modeling has been the best workhorse for creating regional maps and producing optimum linkage designs. Circuit theory and individual-based movement models are emerging tools for these 2 tasks. One weakness of least-cost modeling, circuit theory, and individual-based movement models is that they depend on a resistance map that is usually based on expert opinion. Graph theory has been the best tool for prioritizing; circuit theory is an emerging competitor for this task. Despite limitations, each science-based approach has the following virtues: it makes assumptions explicit, it can be improved as underlying data (especially the resistance map) are improved, and it helps implementers focus on desired ecological flows rather than other constraints.

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*Presenter

TUESDAY, NOVEMBER 17, 8:00 A.M.
MT. EVANS ROOM
MODERATOR: RON PULLIAM

2. Prioritizing Habitats For Carnivore Connectivity Conservation Using Circuit Theory

Brad H. McRae[1], Brett G. Dickson[2] and Viral B. Shah[3]

Circuit theory is an emerging tool for modeling connectivity in the fields of conservation planning, landscape genetics, and movement ecology, and is being applied to prioritize habitats for conservation using carnivores. Circuit models represent raster landscapes as conductive surfaces, with resistance levels corresponding to movement probabilities or costs in different habitat types. Resistance and current calculated across the grids can then be related to ecological processes, like individual movement and gene flow, across landscapes. For conservation planning, circuit theory is particularly useful in quantifying the conservation value of multiple movement pathways, and identifying "pinch points," or areas that are critical for connectivity conservation because of a lack of redundant pathways. We'll review basic circuit theory, discuss relationships between circuit and random walk theories, and describe software (circuitscape.org) that implements circuit theory for conservation planning, landscape genetics, and movement modeling. We'll describe how circuit models are being applied for carnivores in the western USA, and discuss their use to identify barrier effects, parameterize movement models using genetic data, and to prioritize important connective habitats for conservation.

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TUESDAY, NOVEMBER 17, 8:00 A.M.
MT. EVANS ROOM
MODERATOR: RON PULLIAM

3. Multi-Species Modeling For Connectivity And Biodiversity Conservation

Brett G. Dickson[1], Ronald H. Pulliam[2], Nick Haddad[3] and B. H. McRae[4]

Animal movement is motivated by a complex suite of environmental cues and ecological processes, including the location of prey, conspecifics, and competitors in time and space. However, the movement patterns of species cannot be separated from the habitat and landscape features that connect individuals or populations. For multiple species on a heterogeneous landscape, connectedness depends on the organisms under investigation and how relevant habitat attributes are distributed. Due to differences in life and ecological histories (e.g., body size, mobility, migration rates), co-occurring species can simultaneously perceive a landscape as both connected and disconnected. Thus, the methods used to quantify connectivity require careful consideration of how organisms differentially interact with the landscape during movement events and how these events are influenced by management or land-use activities. We discuss experimental and quantitative methods to estimate multi-species connectivity, and consider both individually- and population-based approaches. To model multi-species connectivity across large landscapes, we present a Bayesian framework that integrates empirical information and expert opinion, and draws on concepts from electronic circuit theory. With increasing levels of habitat loss and fragmentation, species are forced to navigate novel environments with features that may impede their distribution or persistence. In this context, novel tools are required to measure and conserve connectivity processes for multiple species, and maintain or enhance biodiversity in threatened environments.

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TUESDAY, NOVEMBER 17, 8:00 A.M.
MT. EVANS ROOM
MODERATOR: RON PULLIAM

4. Mammalian Carnivore Use Of Avocado Orchards: Habitat Selection In A Mixed Urban–Agricultural Landscape

Theresa Nogeire[1], Erin E. Boydston[2], Lisa M. Lyren[2], Kevin R. Crooks[3] and Frank W. Davis[1]

Avocado orchards in southern California create surprisingly high quality habitat for carnivores. Avocados thrive on steep slopes, so orchards are frequently situated in hills adjacent to wild lands. Avocados orchards are structurally similar to the oak woodlands they frequently replace, and they are not as intensively managed as many row crops. These characteristics, along with the exceptional nutritional value of avocados, lead to diverse wildlife assemblages in orchards. Our pilot study used remote-triggered camera traps to document mammalian carnivore use of avocado orchards as a function of landscape context. Results suggest that carnivores are attracted to avocado orchards: coyotes (*Canis latrans*), bobcats (*Lynx rufus*) and gray fox (*Urocyon cinereoargenteus*) were detected in avocado orchards with higher frequency then in natural areas, and were detected with highest frequency in natural vegetation adjacent to orchards. Other species including cougar (*Puma concolor*) and black bear (*Ursus americanus*) were also detected in avocado orchards. Using data from GPS-collared bobcats, we examined habitat selection and use of orchards over other land use types; three of four bobcats positively selected for avocado orchard in their core home range. Our study area is potentially an important conduit for wildlife movement between two natural areas. When the resistance value of avocado orchards in our study area is decreased to reflect our findings, this alters the most important lands for connectivity in a circuit-theory based connectivity model. In addition, the overall resistance of the landscape between the two natural areas decreases, potentially changing the relative importance of this connectivity zone compared to alternatives.

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TUESDAY, NOVEMBER 17, 8:00 A.M.
GRAYS PEAK ROOM
MODERATOR: CHERYL ASA

1. Population Size Of The San Clemente Island Fox

William F. Andelt[1], Kenneth P. Burnham[1] and Kyran E. Kunkel[2]

Because the island fox (*Urocyon littoralis*) has been listed as threatened on the Channel Islands by the state of California and listed as endangered by the U.S. Fish and Wildlife Service on 4 of 6 Channel Islands, we conducted a modified mark-resight survey to estimate population size of the island fox on the northwestern 2/3 of San Clemente Island (SCLI), California. Previously, population sizes of island foxes have been estimated primarily with capture-recapture trapping grids. However, accurate estimates of population size and density are difficult to obtain with capture-recapture trapping grids because sizes of sampling areas of grids are unknown. Thus, we used a marked population of 59 radio-collared foxes that were captured at random locations across the northern 2/3 of SCLI and "resighted" the foxes via capture of 163 foxes 404 times on 10 trap grids during late June-July 2007. Using program NOREMARK and a closed population estimator, we estimated that 386 (95% CI = 320–480) island foxes occurred on the northern 2/3 of SCLI.

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TUESDAY, NOVEMBER 17, 8:00 A.M.
GRAYS PEAK ROOM
MODERATOR: CHERYL ASA

2. Reproduction And Denning Ecology Of The San Clemente Island Fox

Nicholas P. Gould[1] and William F. Andelt[1]

Island foxes (*Urocyon littoralis*) have experienced severe reductions in populations on 4 of 6 California Channel Islands. While numbers of foxes on San Clemente Island (SCLI) have remained relatively stable, we need data on reproductive success in urban and non-urban areas so that we can better manage them if they also sustain declines in their population. We also need to know location and characteristics of den sites in order to minimize possible impacts of military training activities on foxes. We found that 5 of 6 urban females and 5 of 11 rural females produced at least 19 kits on the northern 2/3 of SCLI during 2008. Although foxes in urban areas may be reproducing more successfully than foxes in rural areas, urban foxes often selected den sites near roads which may expose them to increased mortalities. We located 23 den sites, most of which were on 17° slopes with south/southwest-facing aspects. Avoiding these areas during February through June may minimize impacts of training activities on foxes.

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TUESDAY, NOVEMBER 17, 8:00 A.M.
GRAYS PEAK ROOM
MODERATOR: CHERYL ASA

3. Analyses Of Factors Affecting Reproductive Success In Island Foxes

Cheryl Asa[1], Karen Bauman[1] and Elizabeth Calkins[2]

As with red and Mexican gray wolves, captive breeding has been central to recovery of the endangered island fox (*Urocyon littoralis*). When fox populations declined precipitously on several of the Channel Islands, foxes were brought into captivity for safe-keeping and to augment their numbers for later release. Initial reproductive success was high, but subsequent breeding failure of some genetically important pairs prompted intensive monitoring of potential causes. Monitoring efforts included video for behavioral analysis, fecal hormone assays, and blood samples and ultrasound exams for pregnancy detection. Multi-factorial analyses of other factors that might affect reproduction also were conducted. Results revealed that almost all pairs mated and females ovulated and conceived, but most failures occurred during gestation or around the time of parturition. Losses did not appear related to stress, as judged by fecal cortisol levels, but intra-pair aggression was unexpectedly high. Despite all pairs spending considerable time in close proximity and in contact, measures typically indicative of pair-bonding, all pairs also engaged regularly in aggressive interactions, even during pregnancy. These results are particularly surprising in light of information for other canid species. The high levels of aggression in general and the greater probability of reproductive failure in many captive-born foxes call into question whether aspects of the mating system of island foxes might differ in important ways from that reported for other canids. Now that the captive foxes all have been returned to the wild, studies of their behavioral ecology may begin to answer some of these questions.

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TUESDAY, NOVEMBER 17, 8:00 A.M.
GRAYS PEAK ROOM
MODERATOR: CHERYL ASA

4. Identifying Suitable Habitat For Endangered San Joaquin Kit Foxes: Conservation Implications

Brian Cypher[1], Scott E. Phillips[1] and Patrick A. Kelly[1]

The San Joaquin kit fox (*Vulpes macrotis mutica*) is listed as federally endangered and California threatened, primarily due to profound habitat loss and degradation. Long-term conservation and recovery of the kit fox is dependent upon protection of sufficient quantities of suitable habitat. In general, kit foxes prefer arid scrub or grassland habitats in gentle terrain with relatively sparse vegetative cover. We developed a GIS-based additive weighting model to identify and rank remaining suitable habitat for San Joaquin kit foxes. Data layers incorporated into the model included land use and land cover, terrain ruggedness, and vegetation density. Based on previous studies, land use and land cover types were weighted according to likelihood of occupation by foxes. Measures of topographic ruggedness were incorporated into the model using elevation values derived from a digital elevation model. Vegetation density was estimated using Moderate Resolution Imaging Spectroradiometer imagery for a six-year period. Based on model results, 3,624 km^2 were classified as high suitability for San Joaquin kit foxes and 10,326 km^2 were classified as medium suitability. Much of the highly suitable habitat is highly fragmented with many patches that are either isolated or too small to support a viable kit fox population. Also, although considerable habitat of medium suitability is present, this habitat primarily supports intermittent populations of kit foxes. Persistent kit fox populations primarily occur in highly suitable habitat. Therefore, to maintain viable kit fox populations and connectivity between these populations, conservation efforts should target high suitability habitat and the interconnecting medium suitability habitat.

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TUESDAY, NOVEMBER 17, 8:00 A.M.
GRAYS PEAK ROOM
MODERATOR: CHERYL ASA

5. Phylogeography Of The North American Red Fox: Vicariance In Pleistocene Forest Refugia

Keith Aubry[1], Mark J. Statham[2], Benjamin J. Sacks[2,3], John D. Perrine[4] and Samantha M. Wisely[5]

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

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TUESDAY, NOVEMBER 17, 8:00 A.M.
GRAYS PEAK ROOM
MODERATOR: CHERYL ASA

6. The Origin Of Putative Nonnative Red Foxes In The Contiguous United States: Translocations Or Natural Range Expansions?

Mark Statham[1], Benjamin N. Sacks[1,2], Keith B. Aubry[3], John D. Perrine[4] and Samantha M. Wisely[5]

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

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TUESDAY, NOVEMBER 17, 8:00 A.M.
LONGS PEAK ROOM
MODERATOR: TIMM KROEGER

1. Ecosystem Services, Markets, And Red Wolf Habitat: Results From A Farm Operator Survey

Randall Kramer[1] and *Aaron Jenkins[1]

Humans derive many benefits from healthy ecosystems, including water purification, flood control, wildlife habitat and climate regulation. Much of the production of ecosystem services in the U.S. occurs on privately held farm and forest land. This study investigates how land conservation programs can increase the supply of ecosystem services, including red wolf (*Canis rufus*) habitat. We conducted a survey of farm operators residing in six counties in northeastern North Carolina. Using a focus group, expert consultations and pretesting methods, a mail survey was developed and implemented August-October 2008, and responses from 298 farm operators were returned. Approximately one-half of farm operators in the study area had participated in conservation payment programs in the past and generally were satisfied with their participation experience. Despite a lack of familiarity with ecosystem services terminology, many are interested in participating in future payment-for-ecosystem-services (PES) programs, particularly if the programs emphasize wildlife conservation or water quality. Econometric results indicate that payment levels are the most important factor in decisions to enroll in PES programs, with contract length and program administration type also playing significant roles. Respondents were more likely to select program options over the status quo if they were younger, more educated, or currently participating in a conservation program. We found that a PES specific to red wolf conservation is not widely supported, with concerns about government restrictions on private property and not wanting to sustain the red wolf population being the main reasons cited by respondents for declining to participate in future red wolf PES.

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*Presenter

TUESDAY, NOVEMBER 17, 8:00 A.M.
LONGS PEAK ROOM
MODERATOR: TIMM KROEGER

2. Using The Wildlife Habitat Benefits Estimation Toolkit To Value Wildlife Habitat*

John Loomis[1], Timm Kroeger[2] and Leslie Richardson[1]

The Wildlife Habitat Benefits Estimation Toolkit is an easy-to-use set of spreadsheet-based valuation models, tables and databases that allow users to estimate the economic value of a range of benefits associated with natural lands. The toolkit comprises individual estimation models for 1) residential property value premiums associated with open space, 2) net economic benefits of wildlife-associated recreation activities (fishing, hunting, wildlife-viewing), 3) the number of wildlife-associated recreation visits supported by a conservation area, and 4) the value of selected ecosystem services provided by terrestrial and aquatic habitat or wetlands. The estimation models were derived through original and updated meta-analyses of the valuation literature, and include indicator variables that allow users to "fit" them to a particular site of interest. Thus, the toolkit enables users to draw on the wealth of economic valuation studies in generating site-specific value estimates for a particular area. The toolkit also includes a set of tables that provide average values per activity day for a variety of wildlife-associated recreation activities, by game or fish type and geographic region, as well as comprehensive databases (together comprising several hundred studies) that provide information on individual studies in the literature and allow users to search for a study similar to their local context. Thus, users can choose between estimation models, tabular values or individual study findings when quantifying the conservation values generated by a particular site. The toolkit also directs users to information on trip and equipment expenditures and economic impact modeling for wildlife-associated recreation activities.

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*Note: This is a 30 minute talk, occupying two time slots

TUESDAY, NOVEMBER 17, 8:00 A.M.
LONGS PEAK ROOM
MODERATOR: TIMM KROEGER

3. Economic Benefits Provided By Red Wolf Habitat In North Carolina

Timm Kroeger[1]

Conservation of red wolf (*Canis rufus*) habitat on private lands in North Carolina generates a range of ecosystem services and associated economic (market and non-market) benefits, both on- and offsite. Compensating landowners for the provision of these benefits is expected to benefit red wolf conservation, both by discouraging conversion of red wolf habitat to conflicting land uses and by encouraging improvements in the quality of existing habitat. In this study, we estimate the value of several of the services provided by red wolf habitat. We estimate net carbon uptake and associated potential market value generated by undeveloped, non-agricultural lands in the red wolf reintroduction area. We develop estimates of the annual number of wildlife-associated recreation days supported by the area and quantify the associated economic value, reflected both in participants' expenditures and consumer surplus, using the recently developed Wildlife Habitat Benefits Estimation Toolkit and the U.S. Fish and Wildlife Service's 2006 National Survey of Fishing, Hunting and Wildlife-Associated Recreation. Red wolf habitat also generates open space-related price premiums for many of the residential properties located in the vicinity of natural lands. These premiums, captured in the market prices of the respective properties, are due to the amenity value of open space, which reflects part of the value local residents place on the scenic attractiveness of open space compared to alternative, developed or agricultural land uses. We estimate the aggregate value of these premiums using the Wildlife Habitat Benefits Estimation Toolkit. Finally, we use previous research to quantify the existence value of red wolves.

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TUESDAY, NOVEMBER 17, 8:00 A.M.
LONGS PEAK ROOM
MODERATOR: TIMM KROEGER

4. Otters And Wildlife Tourism: A Recipe For Conservation Success?

Sadie Stevens[1], John F. Organ[2] and Thomas L. Serfass[3]

The spotted-necked otter (*Lutra maculicollis*) occurs in appropriate habitat in all African countries south of the Sahara, from Senegal to Ethiopia and south to the Cape provinces. The species' status on the IUCN Red List has moved from Vulnerable to Species of Least Concern; however, spotted-necked otters face threats from habitat destruction, pollution, persecution, and to some extent, hunting. Trade of the species is regulated through its listing in Appendix II of CITES. Otters as a group are widely popular in many developed countries. Surveys in both England and the United States determined that citizens were willing to pay large sums for the conservation of their indigenous otter species. Residents of many countries also pay to enter zoos and aquaria to see exhibits on otter species from all over the world, and purchase books and movies about otters or with otter characters. In South America, giant otters (*Pteroneura brasiliensis*) have become a popular tourist attraction. On Rubondo Island National Park, Tanzania, spotted-necked otters receive full protection and are easily visible during daylight hours from both shore and boat. The species' activity patterns and high visibility may provide a unique viewing opportunity for tourists. Our integrated approach to assessing the otter's potential as a flagship and wildlife tourism icon includes: surveying and interviewing people living near the Park; surveying tourists; interviewing tour operators; and assessing the "viewability" of otters in various habitats, and during different times of day and seasons. We will discuss this work and its implications for ecotourism and the conservation of the spotted-necked otter.

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TUESDAY, NOVEMBER 17, 8:00 A.M.
LONGS PEAK ROOM
MODERATOR: TIMM KROEGER

5. Launching the Wolf Capital of Canada: How A Small City is Building A Wolf Industry

Volker Beckmann[1]

Manitoba has always had an abundance of wolves (*Canis lupus*), and Thompson, a modern city surrounded by boreal forest, has never had an issue with human/wolf conflicts. Wolves were not on the radar screen five years ago when a volunteer community group in Thompson, Manitoba decided to raise funds to develop a tourist attraction called Spirit Way—a walkway with 16 Points of Interest that highlight unique aspects of this small city in the northern Canadian wilderness. However, wolves became a dominant theme following the completion in 2006 of the first point of interest, an 86-ft high mural of a Robert Bateman painting of a wolf peering at the viewer. After some research and discussion with wolf parks, wolf biologists, and Defenders of Wildlife, it became apparent that Thompson had all the raw resources to build a sustainable wolf industry that would encompass research, education, tourism, Aboriginal cultural aspects, and wolf events. This presentation will discuss Spirit Way Inc.'s work with the Thompson Zoo, University College of the North, conservation organizations, and provincial authorities, geared at making Thompson the Wolf Capital of Canada. We are also working with the nearby town of Churchill, the Polar Bear and Beluga Whale Capital of the World, to promote From Wolves to Whales, an ecotourism initiative highlighting the wildlife features of both locales.

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TUESDAY, NOVEMBER 17, 10:30 A.M.
MT. ELBERT ROOM
MODERATOR: MIKE LEAHY

1. The Wolf Effect: An Ecological Imperative For Wolf Restoration

Nathan Varley[1] and Linda Thurston[1]

Wolves (*Canis lupus*) may have keystone effects that are only beginning to be understood. Thus, continuing studies on the community effects of wolf restoration is critical. The magnitude of ecological effects will vary within and among systems based on the set of current conditions to which wolves are restored. Because wolf interactions vary in strength, consistency, and duration, both within and among systems, an understanding of system dynamics will be necessary for understanding and predicting the ecological outcome after restoration. Wolf predation effects may cascade to lower trophic levels, so regardless of the magnitude of these effects, the influence is important and must be understood in the context of interactive processes that structure food webs and maintain dynamic patterns in ecological communities. This presentation will review wolves' effects on overabundant herbivores, temporal prey population fluctuation, proportional effects on prey population growth, and the resulting effects on vegetation and community dynamics.

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TUESDAY, NOVEMBER 17, 10:30 A.M.
MT. ELBERT ROOM
MODERATOR: MIKE LEAHY

2. Finding a Needle in a Haystack: Developing Less Invasive Wolf Population Monitoring Techniques

David Ausband[1] and Mike Mitchell[1]

The gray wolf (*Canis lupus*) population in the northern Rocky Mountains (NRM) of the U.S. has been monitored intensively with radiotelemetry. However, federal funding for monitoring will be eliminated following delisting, and state agencies will have to rely on scarce resources for population monitoring. We envision a population monitoring program based on patch occupancy modeling to create a more cost-effective monitoring approach. To populate a patch occupancy model we are evaluating a variety of survey methods. We surveyed 2,000 hunters annually and found a strong correlation between the number of wolves detected by hunters and wolf density, suggesting hunters' observations are accurate. We also developed a habitat model for locating wolf pack rendezvous sites where genetic samples can be found in abundance. We surveyed 475 predicted rendezvous sites annually resulting in the detection of 12 of 17 accessible litters of pups and all 25 study packs. DNA analyses of genetic samples provided accurate abundance estimates. To survey remote areas, we developed an automated device that can detect wolves and obtain minimum pack size counts using spectrograms. We have also developed a method for collecting hair samples using rub pads and scents that elicit roll responses from wolves. Our goal at the end of 2011 is to provide managers with a cost-effective population monitoring tool that will provide reliable estimates, with associated measures of precision.

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TUESDAY, NOVEMBER 17, 10:30 A.M.
MT. ELBERT ROOM
MODERATOR: MIKE LEAHY

3. Interpreting Wolf Expressive Behavior: Assisting Professionals In Recognizing Immediacy Of Danger When Encountering 'Bold' Wolves

Holly Jaycox[1], Patricia Goodmann[1] and Monty Sloan[1]

Wild wolves (*Canis lupus*) rarely approach humans. Exceptions typically involve habituation, usually related to food, although it can involve the presence of dogs (*C. l. familiaris*). Bold behavior is sometimes interpreted as aggression based on the wolf's physical proximity, more than on its expressive behavior. Wolves are intelligent and curious, and may approach for reasons other than predation or territoriality. Knowing which animals pose an immediate threat, and which do not, could help aid in managing some problem wolves. Regardless of the reason for a wolf's approach, it can ultimately be a dangerous situation. However, understanding the behavior of the wolf can allow for more options in choosing how best to manage the animal. A wolf that is exhibiting predatory or aggressive behavior towards a human might need to be removed. But wolves that are not exhibiting predatory or aggressive behavior, but are curious or have been conditioned to approach people for food, can potentially be induced to avoid contact with humans through mild aversive conditioning, avoiding the need for removal. In this presentation we will offer visual examples of wolf expressive behavior which is intended to assist professionals in the interpretation of wolf body language. This could be a tool for wildlife professionals who need to make management decisions regarding bold wolves. While any wolf that approaches must be considered a possible danger, with wolves still existing in such low numbers in most places, removing the fewest number of wolves possible is still in the species' best interest.

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TUESDAY, NOVEMBER 17, 10:30 A.M.
MT. ELBERT ROOM
MODERATOR: MIKE LEAHY

4. Early Development Of Wolf Behavior

Kathryn Lord[1] and Raymond P. Coppinger[2]

Little is known about the early development of wolves (*Canis lupus*), except that changing its timing produced the domestic dog. While dogs can form social bonds with humans in ninety minutes, wolves must be exposed to extended, constant human contact, beginning before they are three weeks old. The interaction of the development of sensory, motor, and fear systems between four and eight weeks renders dog pups highly sensitive to their environment. While we know wolves begin to walk at two weeks, there is conflicting evidence suggesting they become too fearful to explore at either three or six weeks, and nothing is known about their sensory development. In this study we determine the timing of this period of sensitivity in wolves by investigating the timing of their sensory development. Eleven wolf pups' and forty-three dog pups' responses to familiar and novel olfactory, auditory, and visual stimuli were tested at ages 2, 3, 4, 5, 6, and 7 weeks. Wolf pups were also observed with conspecifics in the absence of their caretakers for orientation towards olfactory, auditory and visual stimuli during two-hour sessions, five days a week, from two to eight weeks old. The results suggest that wolves, like dogs, have a four-week critical period. However, wolves' senses are developing during the critical period, unlike dogs, which have adult-like sensory capacities before the beginning of the critical period. These findings have implications for wolves' perception of the world around them, captive rearing protocols, the process of domestication, and behavioral development in altricial mammals.

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TUESDAY, NOVEMBER 17, 10:30 A.M.
MT. EVANS ROOM
MODERATOR: BARRY NOON

1. Migration, De-Fragmentation And Preservation-Linking Our Nation's Natural Heritage

Elaine Leslie[1]

This talk describes National Park Service (NPS) development of a long-term strategy to address many of the issues facing migratory species today: alternative energy development, fragmentation, and climate change. NPS needs a strategic approach to assessing the number of species and critical habitat and linkages for species that spend a short and long periods of time within the boundaries of our parks. In addition, the NPS mission requires the stewarding, preservation and protection of the resources of the parks. While NPS is not entirely responsible for those resources outside our boundaries, NPS is dependent upon the management skills of others, partnerships, and the good fortunes of the traveling species being able to return to the parks. It is critical that NPS work closely with our neighbors who host these species, whether the migratory species move a short distance or thousands of miles, as some of these shared species are known to move.

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TUESDAY, NOVEMBER 17, 10:30 A.M.
MT. EVANS ROOM
MODERATOR: BARRY NOON

2. Implementation Of The Montana Crucial Areas Assessment

Gary Tabor[1], Janet Hess-Herbert[2], T.O. Smith[2],
Brent Brock[3] and *Will Singleton[4]

The State of Montana is implementing the Western Governors Association Wildlife Corridor Initiative. As part of this process, the State has engaged in a stakeholder participatory process to upgrade its Comprehensive Fish and Wildlife Conservation Strategy (State Wildlife Action Plan—SWAP). This includes identifying crucial habitat for wildlife, developing a connectivity conservation layer and assessing impacts of climate change in developing a prototypic adaptation plan. The challenges and opportunities associated with the conservation of focal and iconic aquatic and terrestrial carnivorous species based on the experiences within this process are explored.

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*Presenter

TUESDAY, NOVEMBER 17, 10:30 A.M.
MT. EVANS ROOM
MODERATOR: BARRY NOON

3. Protecting The Spine Of The Continent Wildway

Kurt Menke[1], Kim Vacariu[2] and Kenyon Fields[2]

An international network of conservation organizations is collaborating to connect a 5000-mile "wildway" stretching from Alaska's Brooks Range south through the Canadian and U.S. Rockies to the Sierra Madre Occidental in northern Mexico. Led by Wildlands Network and a committed steering team, including nine of the West's most respected wildlands protection organizations, the Spine of the Continent Initiative is the largest conservation effort ever undertaken in North America, with a goal of linking existing regional wildlife corridor connection projects into a continuous chain of wildlife-friendly pathways. Together, these "wildlands networks" will provide room to roam for the continent's wide-ranging native species, allowing them to respond to climate change and to maintain genetic diversity. The Spine of the Continent Initiative is, in essence, "Networks of people protecting networks of land."

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TUESDAY, NOVEMBER 17, 10:30 A.M.
MT. EVANS ROOM
MODERATOR: BARRY NOON

4. Rewilding North America–Visions For Predator Restoration

Dave Foreman[1] and *Dave Parsons[1]

"Rewilding" is a large-scale ecological restoration and conservation approach based on the vital role of large carnivores. These top predators are classic examples of keystone or highly interactive species. When they are removed, ecosystems start to unravel. Contemporary research shows that when enough top predators are restored to terrestrial regions, damaged ecosystems begin to heal. In order to play their stabilizing ecological role, populations of top predators must be above a certain threshold of abundance, thus reaching "effective densities." Rewilding requires active protection and management in order to ensure that effective densities of top predators occur in broad geographic ranges wherever it is politically feasible. Because humans are often intolerant of large carnivores and because many carnivore species are sensitive to human disturbance, large core roadless areas (wildernesses) are typically necessary for their recovery and persistence. And because there are few adequately large wildernesses left in most of the world, core areas must be linked by protected habitats that provide safe passage of large carnivores among core areas to ensure their persistence and evolutionary and ecological effectiveness. Although rewilding was controversial when first proposed in the 1990s, it is now widely embraced as the model for large-scale conservation throughout the world and should be the foundation of landscape- and regional-scale ecological restoration. A rewilding vision for restoring gray wolves (*Canis lupus*) in North America will be presented.

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*Presenter

TUESDAY, NOVEMBER 17, 10:30 A.M.
GRAYS PEAK ROOM
MODERATOR: JONATHAN PROCTOR

1. Recovery Efforts for the Black-Footed Ferret

Pete Gober[1], Scott Larson[1], *Paul E. Marinari[2],
Sarah M. Bexell[2], Julie Kreeger[2] and Heather Branvold[2]

One of the world's most endangered mammals, the black-footed ferret (*Mustela nigripes*), once occurred widely in the mid-North American continent wherever its prairie dog prey existed. Prairie dogs, and ferrets by extension, have declined due to the conversion of prairie to cropland, by poisoning of prairie dogs and the introduction of non-native sylvatic plague. Ferrets were first listed as endangered in 1967. The U.S. Fish and Wildlife Service supports the recovery of the black-footed ferret throughout its range. Since the 1980s, aggressive captive breeding and reintroduction programs have helped to recover ferret populations in the wild. Six facilities intensively manage captive ferret populations totaling approximately 280 individuals for the survival of the species, and to provide animals for reintroduction. Since 1991, over 2,300 ferrets have been reintroduced at 17 sites in the U.S. and one in Mexico. The first reintroduction in Canada is planned for fall 2009. At present, ferret numbers in the wild total over 1,000 individuals each fall, with approximately half of them surviving to breed each spring. Another key aspect of wildlife conservation is public awareness and participation in conservation efforts, which can be supported by successful education and outreach programming. Full recovery will not be achieved until more ferrets exist in the wild and routine reintroductions are no longer necessary. However, recovery is within reach because the most challenging obstacles, including the development of captive breeding and reintroduction techniques, are being successfully addressed.

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*Presenter

TUESDAY, NOVEMBER 17, 10:30 A.M.
GRAYS PEAK ROOM
MODERATOR: JONATHAN PROCTOR

2. Reintroduction Of The Black-Footed Ferret To A Small Prairie Dog Complex

Daniel Licht[1], Daniel Roddy[2] and Barbara Muenchau[2]

The recovery of the endangered black-footed ferret (*Mustela nigripes*) is hindered by a lack of reintroduction sites supporting large prairie dog (*Cynomys* spp.) complexes. Therefore, the recovery program has turned to sites with comparatively smaller prairie dog complexes. However, there are unknowns and concerns about the ability of these small sites to sustain ferret populations and their role in ferret recovery. Wind Cave National Park in South Dakota supports 2,800 acres of black-tailed prairie dogs (*C. ludovicianus*), although many of the colonies are separated from other colonies by habitat unsuitable for ferrets. Yet, the park is plague free and in protected status, so a ferret reintroduction program was initiated. In the summer and fall of 2007, 49 black-footed ferrets were reintroduced to the park, 33 of which were wild-born animals from the Conata Basin reintroduction site and the remaining 16 from the black-footed ferret captive propagation program (25 males: 24 females). At the end of 2008 the park supported a minimum estimate of 26 ferrets based on spotlighting surveys and mark-recapture analysis. At least six litters were produced in 2008. Although the results have somewhat exceeded expectations, it is too early to draw conclusions about the viability of the ferret population. In addition to providing another ferret reintroduction site, Wind Cave National Park is well suited for education and outreach programs to the public. In 2008, the park conducted ranger-led spotlighting tours for the public. Although only one ferret was observed, the nighttime walks were a unique experience for visitors and were well-received.

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TUESDAY, NOVEMBER 17, 10:30 A.M.
GRAYS PEAK ROOM
MODERATOR: JONATHAN PROCTOR

3. From The Underground Up: Habitat And Population Analysis Of Prairie Dogs To Support The Reintroduction Of Black-Footed Ferrets In Canada

Tara Stephens[1], Darren Bender[2] and David Gummer[3]

The black-footed ferret (*Mustela nigripes*), a specialist predator of prairie dogs, was extirpated from Canada prior to 1974. A national recovery strategy has been developed to reintroduce captive-reared ferrets in black-tailed prairie dog (*Cynomys ludovicianus*) colonies in Grasslands National Park of Canada and surrounding lands. The size and distribution of prairie dog colonies are key factors affecting the suitability of reintroduction sites for ferrets. The purpose of our research is to improve understanding of the habitat requirements of prairie dogs in Canada and estimate the relative viability of the prairie dog metapopulation and its capacity to support ferrets. We used a resource selection function (RSF) to investigate prairie dog habitat associations and generated an inventory of potential prairie dog habitat. Our preliminary model found that prairie dog occurrence is predictable from surficial geology, soil texture, elevation, and slope. We identified approximately 3000ha of currently unoccupied habitat with high probability ($P > 0.85$) of predicted use by prairie dogs, 3 times more than believed necessary to establish new prairie dog colonies to support ferrets. The predictive surface generated from the RSF is being used to estimate the spatial structure of a viability analysis to assess the sensitivity of the prairie dog metapopulation to various climate, disease, ferret reintroduction and prairie dog management scenarios. Our results will provide preliminary estimates of theoretical carrying capacity for ferrets in Canada and direction for habitat and population management for both species.

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TUESDAY, NOVEMBER 17, 10:30 A.M.
GRAYS PEAK ROOM
MODERATOR: JONATHAN PROCTOR

4. Burrow Distributions and Resource Selection of Black-Footed Ferrets on Black-Tailed and White-Tailed Prairie Dog Colonies

David A. Eads[1], Brian E. Holmes[2], Dean E. Biggs[3], David S. Jachowski[1], Joshua J. Millspaugh[1], Travis M. Livieri[4] and Randy M. Matchett[5]

Black-footed ferrets (*Mustela nigripes*) evolved to become specialized, semifossorial predators of prairie dogs (*Cynomys* spp.), colonial sciurids of North American grasslands. Historical specimens and studies of extant and reintroduced ferrets suggest black-footed ferret habitat is equated, on a coarse scale, with the collective ranges of three species of prairie dogs. At fine scales, however, burrow opening (i.e., burrow) and prairie dog distributions vary within and among prairie dog colonies, suggesting ferrets historically had access to environments of variable quality regarding refuge and prairie dog density. A comparison of burrow/prairie dog distributions and resource selection by ferrets on differing prairie dog colonies should provide insight into the spatial and behavioral ecology of black-footed ferrets. We hypothesize that high quality ferret habitat is positively correlated with high density patches of prairie dog burrows. We 1) quantitatively investigate variation of burrow arrangements for black-tailed prairie dogs (*C. ludovicianus*) and white-tailed prairie dogs (*C. leucurus*); 2) investigate selection of patches of varying burrow and prairie dog density by ferrets inhabiting differing prairie dog colonies; and 3) compare resource selection of ferrets inhabiting black-tailed and white-tailed prairie dog colonies. Insight into resource selection by ferrets has important ramifications for conservation, because choices of ferret reintroduction sites are based, in part on habitat evaluations, and available habitat is likely to be a factor that presently limits ferret recovery.

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Carnivores on the Hill*

TUESDAY, NOVEMBER 17, 10:30 A.M.
LONGS PEAK ROOM
MODERATOR: ROBERT DEWEY

1. The Global Warming Survival Act

Robert Dewey[1]

Climate change poses an immediate and profound threat to our natural world, our economy and our health. Scientists have confirmed that our climate is changing rapidly and the resulting impacts will be sustained by all systems including water resources, forests, coastal areas, fish and wildlife. Because the impacts of climate change are already being felt by ecosystems and communities, we must begin to address those impacts now, even while we are seeking solutions to reduce our greenhouse gas emissions to prevent further damage. On June 26, 2009, the House took that first step and passed the American Clean Energy & Security Act 2009 (H.R. 2454), a comprehensive energy and climate act. This bill, introduced by Representatives Henry Waxman (D-CA) and Edward Markey (D-MA), moves America closer to increasing our energy security and tackling global warming and also works to address the impacts of global climate change on wildlife and natural resources. Given the magnitude of expected and unavoidable impacts, and based on recent scientific studies, we are convinced that while this bill is an excellent first step, we will need to move even farther to achieve our goals of protecting the resiliency of ecosystems in a warming world. The Senate is now working on legislation that we hope will build on the House's efforts and secure a strategy for curbing our greenhouse gas emission, in addition to providing the necessary planning and dedicated funding required to safeguard our natural resources from the impacts of climate change.

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*Note: In order to accommodate five topics, talks in this session will be slightly shorter than usual

TUESDAY, NOVEMBER 17, 10:30 A.M.
LONGS PEAK ROOM
MODERATOR: ROBERT DEWEY

2. Sustaining Wildlife on Public Lands: America's Wildlife Heritage Act

Peter Nelson[1]

The United States Forest Service and Bureau of Land Management (BLM) administer 449 million acres of land—almost 20% of the land area of the U.S.—and play an essential role in conserving the nation's fish, wildlife and plant species. With the threat of global warming, increased use of public lands for energy development and increasing demands for other uses on these "multiple use" lands, there is an urgent need to provide the Forest Service and BLM with a 21st century fish, wildlife and plant conservation policy. America's Wildlife Heritage Act provides the BLM and Forest Service with the tools they need to respond to these challenges. The Heritage Act establishes fish and wildlife habitat and population objectives to guide land management planning and decision-making, and outlines a tiered monitoring strategy that relies on ecosystem and species-level diversity metrics. The Heritage Act also enables Forest Service and BLM land managers to coordinate in the management of cross-jurisdictional wildlife populations, as well as enhancing cooperation with state fish and wildlife agencies. By eliminating the uncertainty created by changing regulatory approaches to federal land management planning under different administrations, the Heritage Act provides the agencies with much needed clarity and direction, while affirming the multiple use missions and stewardship duties of the Forest Service and the BLM.

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TUESDAY, NOVEMBER 17, 10:30 A.M.
LONGS PEAK ROOM
MODERATOR: ROBERT DEWEY

3. Saving the Sea Otter: Defenders of Wildlife's Legislative Efforts in Paving the Road Back Towards Recovery

Jim Curland[1]

Sea otters (*Enhydra lutris*) are one of the most imperiled marine mammals and a classic keystone species. Unfortunately, the sea otter faces a number of threats, including disease, food resource limitations, potential for entanglement in fishing gear, and habitat degradation, including the ever-looming threat of oil spills and impacts from environmental contaminants. Collaborating with sea otter researchers, Defenders of Wildlife utilizes important studies on sea otter health, foraging, diet, demographics, population trends, and other analyses to effect policy changes, mitigate threats to this species, and educate the public. In the last several years, Defenders has led the effort on California state legislation, A.B. 2485, and federal legislation, the Southern Sea Otter Recovery & Research Act, H.R. 556, which combined would fund many critically needed research activities and guide recovery of this magnificent animal. The Southern Sea Otter Recovery & Research Act would further recovery efforts by establishing an assessment on sea otter health to determine why the population is declining and providing funding that would include "1) monitoring, analysis, and assessment of southern sea otter population demographics, health, causes of mortality, and life history parameters, including range-wide population surveys; and 2) development and implementation of measures to reduce or eliminate potential factors limiting southern sea otter populations that are related to marine ecosystem health or human activities."

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TUESDAY, NOVEMBER 17, 10:30 A.M.
LONGS PEAK ROOM
MODERATOR: ROBERT DEWEY

4. The Truth About Cats and Dogs– Supporting International Carnivore Conservation

Nilanga Jayasinghe[1] and *Nina Fascione[1]

Many of the world's felids and canids face an uncertain future due to various threats ranging from habitat loss to poaching to disease. The Great Cats and Rare Canids Act (GCRC) of 2009, H.R. 411/S. 529, would provide resources, through the Multinational Species Conservation Funds (MSCF), to conserve 15 species of rare felines and canines that exist outside the U.S and are recognized as endangered or threatened by the U.S. Endangered Species Act (ESA), the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and/or the World Conservation Union (IUCN) Red List of Endangered Species. Thus far, the only carnivore that receives support through the MSCF is the tiger (*Panthera tigris*). Through the GCRC Act, cheetahs (*Acinonyx jubatus*), African wild dogs (*Lycaon pictus*), lions (*Panthera leo*), dholes (*Cuon alpinus*), jaguars (*Panthera onca*), Ethiopian wolves (*Canis simensis*), snow leopards (*Uncia uncia*), Iberian lynxes (*Lynx pardina*), European wolves (*Canis lupus*), clouded leopards (*Neofelis nebulosa*), maned wolves (*Chrysocyon brachyurus*), bush dogs (*Speothos venaticus*), leopards (*Panthera pardus*), Darwin's foxes (*Pseudalopex fulvipes*) and Borneo bay cats (*Catopuma Badia*) would receive funding for conservation efforts within the species' range. The Act would also leverage private conservation dollars and foster international cooperation for conservation initiatives. Protecting "keystone" or "umbrella" species such as large carnivores can provide ancillary benefits for the many other species that share their ecosystems.

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*Presenter

TUESDAY, NOVEMBER 17, 10:30 A.M.
LONGS PEAK ROOM
MODERATOR: ROBERT DEWEY

5. The Protect America's Wildlife Act

Robert Dewey[1] and Caroline Kennedy[1]

In 1971, after an NBC documentary depicting an aerial wolf hunt (*Canis lupus*) in Alaska caused a national outcry, Congress banned the use of airplanes to hunt or harass wolves and other wildlife by passing the federal Airborne Hunting Act (AHA). Although the AHA includes an exception for wildlife management, it was not Congress' intent for this provision to be used for the purpose of suppressing predator populations to artificially increase game for hunters. Alaska politicians and the state's Board of Game have ignored the intent of Congress and are abusing this exception by decimating wolf and bear populations in more than 60,000 square miles, including on federally owned land, despite the fact the state lacks basic scientific data on prey and predator populations. More than 1,000 wolves have been killed since 2003. With the delisting of wolves in the lower 48, there is concern that other states may try and exploit the wildlife management loophole. In July 2009, the Protect America's Wildlife Act (PAW) was introduced in both the U.S. House of Representatives and the U.S. Senate. The PAW act would clarify the conditions in which states can use airplanes and helicopters to kill wolves and other predators; bar states from using aerial gunning to artificially boost game species populations; and require states to provide a scientific foundation for their use of the wildlife management exception.

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TUESDAY, NOVEMBER 17, 1:30 P.M.
MT. ELBERT ROOM
MODERATOR: NINA FASCIONE

1. The Face Of Red Wolf Conservation Today

Kim Wheeler[1]

The last red wolf (*Canis rufus*) was removed from the wild and declared extinct in 1980. Through a successful captive breeding program and the development of a recovery plan, captive-born red wolves were reintroduced onto Alligator River National Wildlife Refuge (ARNWR) in 1987 by the U.S Fish & Wildlife Service (FWS). Even before the first red wolf was restored to a part of its historic range, a conservation plan for red wolf recovery was being introduced to the communities within the restoration area. The early conservation efforts involved land owners, farmers, local governments and other stakeholders. Also facing red wolf conservation efforts were the many myths and negative perceptions that have existed for years regarding wolves. The challenge was to find a way to present the facts and dispel the myths. The face of red wolf conservation today has seen the acceptance of the only wild population into northeastern North Carolina by local communities. However, 30 years later, the restoration program still faces many of the early conservation challenges. My presentation will show red wolf conservation issues that exist today and explain how the FWS and the only citizens group, Red Wolf Coalition (RWC), continue to work toward finding ways to answer the conservation questions and to solve the problems that still exist regarding red wolf restoration.

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TUESDAY, NOVEMBER 17, 1:30 P.M.
MT. ELBERT ROOM
MODERATOR: NINA FASCIONE

2. Factors Influencing Red Wolf-Coyote Hybridization In Eastern North Carolina

Justin H. Bohling[1], Arthur Beyer[2] and Lisette P. Waits[1]

Hybridization is increasingly recognized as a conservation concern for many endangered carnivores, yet the conditions that facilitate interspecific hybridization are poorly understood. The frequency of hybridization between two species may be encouraged by behavioral and ecological disturbances. Here we document the proximate factors that have facilitated hybridization between red wolves (*Canis rufus*) and coyotes (*C. latrans*) in eastern North Carolina, USA. There are approximately 120 red wolves in the wild and the species is listed as critically endangered, mainly due to the threat of hybridization with non-native coyotes. Red wolf biologists have hypothesized that hybridization events occur when stable red wolf breeding pairs are unnaturally disrupted. We reviewed over 20 years of field and genetic data to elucidate the factors that may have influenced hybridization events between the two species. Hybridization events were bidirectional, with both male and female wolves breeding with coyotes. Of the 17 documented hybridization events, six occurred after a breeding red wolf pair was disrupted by gunshot mortality. When one member of a pair was shot, the remaining breeder was more likely to pair-bond with a non-wolf than a wolf (10 vs. 7). Most of the gunshot mortality occurred during the general hunting season, in the months preceding the red wolf breeding season. These results suggest that hybridization between red wolves and coyotes is encouraged by the disruption of stable breeding pairs prior to the breeding season. Behavioral and social interactions may be a major factor driving hybridization between these two species.

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TUESDAY, NOVEMBER 17, 1:30 P.M.
MT. ELBERT ROOM
MODERATOR: NINA FASCIONE

3. A Re-Assessment Of Red Wolf Viability Using Stage-Structured, Stochastic Population Models

Peter Mahoney[1], Todd D. Steury[1] and Dennis L. Murray[2]

Red wolf (*Canis rufus*) reintroduction in eastern North Carolina represents one of the U.S. Fish and Wildlife Service's success stories. However, the potential for continued success of red wolf recovery efforts needs to be evaluated using population viability analysis (PVA). Previous viability analyses for the red wolf population relied on rough demographic parameter estimates, leading to potentially inaccurate predictions of viability. Building on these previous models, we generated a stage-structured model parameterized with statistical models of survival and reproduction fit to data from the reintroduced red wolf population collected during 1992 to 2007. Demographic and environmental stochasticity were incorporated into simulations using appropriate random distributions with data-driven parameters and estimates of variation. Viability (i.e. stochastic population growth rate, probability of extinction, etc.) was assessed with 25-year projections repeated 1000 times. Our model demonstrates that the wild population of red wolves is at or near carrying capacity within the recovery area, and that without habitat degradation or continued population management, it is likely that red wolves will continue to persist within the recovery area over the next 25 years (Extinction Prob. < 5%). Future model iterations will include a spatial component, as well as genetic consequences of small populations and coyote introgression.

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TUESDAY, NOVEMBER 17, 1:30 P.M.
MT. ELBERT ROOM
MODERATOR: NINA FASCIONE

4. Can Large Carnivores Persist In Human-Dominated Landscapes? The Case Of The Red Wolf

Todd Steury[1], Karen Beck[2], Arthur B. Beyer[3] and Dennis L. Murray[4]

Large carnivores are mostly extinct from the eastern U.S. where landscapes are dominated by humans, but relatively plentiful in the western U.S. where expansive areas of public land are essentially uninhabited. This relationship between carnivore and human presence leads to the overly-simplistic prediction that large carnivores cannot coexist with humans. Here we report on an analysis of habitat use, survival, and reproduction in the reintroduced red wolf (*Canis rufus*) population in coastal North Carolina. We found that red wolves avoided areas with high road or human densities. However, red wolves preferred human-associated agriculture over wetlands or forests. Furthermore, the avoidance of areas with high road or human densities decreased and selection for human-dominated landscapes increased as the wolf population increased. Analysis of wolf reproduction found that human and road density had no effect of probability of having a litter or litter size, but that litters were larger and more likely among packs occupying agricultural lands. Analysis of red wolf survival indicated that mortality risk increased only minimally for packs occupying areas with high road or human densities. Conversely, mortality risk decreased more substantially for packs occupying areas with large amounts of agriculture. Combined these results suggest that wolves may use the entire North Carolina recovery area if the population were sufficiently large, and that such use of human-dominated landscapes may have only a minimal negative effect on wolf fitness.

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TUESDAY, NOVEMBER 17, 1:30 P.M.
MT. EVANS ROOM
MODERATOR: MIKE LEAHY

1. Implementing Landscape-Scale Management Strategies For Wide-Ranging Mammals

Kim Crumbo[1]

At least five major western National Parks are experiencing impairment of natural resources due to factors including the extirpation of large carnivores. Recent studies have increasingly linked declining habitat quality to large predator removals. These outcomes are consistent with trophic cascades theory, whereby loss of large carnivore predation initiates changes that "cascade" to lower trophic levels. While the National Park Service (NPS) is allowed discretion regarding impacts within parks, statutory requirements limit agency discretion regarding resource unimpairment. As an initial step addressing ecological impacts within Grand Canyon and adjacent lands, Grand Canyon Wildlands Council (GCWC) and the NPS conducted a two-day "Landscape-scale Management Strategies for Wide-ranging Mammal" workshop involving 30 participants from the scientific community and federal and state agency staff to address management options meeting NPS non-impairment requirements. The participants identified over 38 separate impacts to native biodiversity and experiential quality due to herbivory in the absence of ecologically effective carnivore populations. They also identified over 250 management actions resolving or mitigating the impacts. These actions included strategies to improve interagency cooperation, recovery and/or reintroduction of native large carnivores, as well as other management suggestions. As a result, conservationists in partnership with state and federal land and wildlife management agencies are actively engaged in planning efforts to identify and implement landscape-scale management strategies for wide-ranging mammals within the Grand Canyon ecoregion. These efforts include active cooperation in development and implementation of conservation goals. Another critical element is development of an ecosystem-based working group that entails collaborative landscape-scale planning and effective implementation.

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TUESDAY, NOVEMBER 17, 1:30 P.M.
MT. EVANS ROOM
MODERATOR: MIKE LEAHY

2. The Future of Wolf Recovery in The Southern Rockies

Jonathan Proctor[1]

Colorado's last native-born wolf (*Canis lupus*) was killed in 1945. In recent years, a few wolves have roamed into the state from the U.S. Northern Rockies, but have not survived and reproduced. Yet the Southern Rockies remain ripe for wolves; studies indicate the region could support more than 1,000 wolves. With roughly 300,000 elk and 700,000 deer roaming Colorado, the region desperately needs wolves to restore the important predator-prey balance that is so important to everything from vegetation to water quality to songbirds. Although Congress directed the U.S. Fish & Wildlife Service in 1994 to study the potential for wolf recovery in the Southern Rocky Mountains of Colorado and northern New Mexico, a restoration plan remains elusive 15 years later. The Colorado public supports wolf recovery; the Colorado Division of Wildlife supports wolves if they make it here on their own; and Defenders of Wildlife has committed to compensating livestock owners for losses to wolves, regardless of how they get here. This talk discusses the different strategies conservationists may take in our quest to see wolf recovery achieved in the Southern Rockies.

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TUESDAY, NOVEMBER 17, 1:30 P.M.
MT. EVANS ROOM
MODERATOR: MIKE LEAHY

3. Balancing Public Access With Biodiversity Protection: Impacts Of Hiking, Dogs, And Motor Vehicle Noise On Carnivores In Protected Areas

Sarah E. Reed[1], Adina M. Merenlender[2] and David M. Theobald[1]

Protected areas around the world were created with the goals of preserving biodiversity and providing outdoor recreation opportunities for millions of people. This dual mandate guides the management of the majority of the world's important reserves, and more research is needed to assess the compatibility of recreational land uses and biodiversity protection. First, we combined non-invasive survey techniques and DNA verification of species identifications to survey 28 parks and preserves in northern California, and we used the distributions and densities of seven mammalian carnivores as indicators of the influences of recreation on protected area effectiveness. Carefully-selected paired comparisons revealed that the presence of quiet, non-consumptive recreation correlated with fivefold declines in the densities of native carnivores and a substantial shift in community composition from native to non-native species. Second, we examined the mechanisms of recreational disturbance to wildlife communities in a recent study of the relationships among motorized recreational activity, associated noise disturbances, and bird and carnivore distributions in Sierra National Forest. Third, we explored the implications of these studies for the Southern Rockies by quantifying the extent of recreational access in Colorado. Using a statewide database of protected areas, we identified areas where key carnivore habitats may be affected by public access for motorized and non-motorized recreation.

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TUESDAY, NOVEMBER 17, 1:30 P.M.
MT. EVANS ROOM
MODERATOR: MIKE LEAHY

4. The Importance Of Critical Habitat In The Southern Rocky Mountains For The Canada Lynx

Paige Bonaker[1]

In an effort to restore the federally threatened Canada lynx (*Lynx canadensis*) to the Southern Rockies, the Colorado Division of Wildlife (CDOW) began reintroducing the cats to the region in 1999. Since then, the program has met most of the criteria needed to attain the ultimate goal of a sustainable population. Despite this encouraging news, the cats still face an uphill road to recovery, one that is hindered by the U.S. Fish and Wildlife Service's failure to designate critical habitat in the Southern Rocky Mountains of Colorado, southern Wyoming and northern New Mexico. The habitat in the Southern Rocky Mountains contains the characteristics required for designation, is in need of special management, and is necessary for the conservation of the species. Further, climate change may make the Southern Rockies even more important to the lynx in the future, as the Southern Rockies contain some of the best high elevation habitat in the lower 48 states. For several years, Center for Native Ecosystems (CNE) has been working to protect Canada lynx and their habitat throughout the region. Currently, CNE is part of a legal challenge aimed at revising the critical habitat designation for the species to include the Southern Rockies. This presentation will discuss why the lynx population in the Southern Rocky Mountains is essential to the entire lynx population and, thus, why it is crucial for the Service to designate critical habitat in the region.

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TUESDAY, NOVEMBER 17, 1:30 P.M.
GRAYS PEAK ROOM
MODERATOR: ELIZABETH FLEMING

1. Florida Panther Recovery Plans: Next Steps

Chris Belden[1]

Florida panthers (*Puma concolor coryi*) once roamed over all of the southeastern United States. However, early settlers to this country attempted to eradicate panthers by every means possible. By 1899, it was reported that panthers were already restricted to peninsular Florida. By the late 1920s to mid 1930s, it was thought by many that panthers had been completely eliminated. However, every survey conducted since then has confirmed that a panther population occurs in southern Florida south of the Caloosahatchee River. A Florida Panther Recovery Team was appointed by the U.S. Fish and Wildlife Service in 1976 for the purpose of preparing a recovery plan for the Florida panther. A revision of this plan was undertaken in 1987 by the Technical Subcommittee of the Florida Panther Interagency Committee by providing new data that had become available and by delineating new tasks needed in panther recovery efforts. An abbreviated revision of the Florida Panther Recovery Plan was undertaken in 1995 specifically to incorporate a management strategy designed to restore and maintain the historic genetic character of the Florida panther. A comprehensive third revision of the Recovery Plan was approved in December 2008. The recovery strategy for the Florida panther as outlined in this plan is to maintain, restore, and expand the panther population and its habitat in south Florida, expand this population into south-central Florida if sufficient habitat exists, reintroduce at least two additional viable populations within the historic range outside of south and south-central Florida, and facilitate panther recovery through public awareness and education.

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TUESDAY, NOVEMBER 17, 1:30 P.M.
GRAYS PEAK ROOM
MODERATOR: ELIZABETH FLEMING

2. Current Research Objectives And Management Of The Florida Panther

Marc Criffield[1] and Mark Lotz[1]

Little was known about Florida panthers (*Puma concolor coryi*) when the Florida Fish and Wildlife Conservation Commission (FWC) began studying this endangered subspecies in 1981. Over the following decades, knowledge of demographics, range, population status, habitat use, prey preferences, and other life history information was expanded primarily through the use of radio-tagged panthers. The Florida panther remains on the endangered species list but its numbers have increased from a low of around 30 in the 1980s to approximately 100 currently. Habitat preservation, genetic introgression, and game hunting regulations have all played a role in increasing the population size. However, habitat fragmentation, the continued loss of quality habitat for population expansion, and the isolated nature of this single population remain the greatest threats to full recovery. Currently, research on the panther by FWC focuses on: 1) monitoring genetic restoration; 2) monitoring and managing biomedical conditions (i.e. disease threats); 3) assessing innovations in GPS technology; 4) describing habitat use across the diel period; and 5) completing a population viability analysis using robust estimates of demographic parameters. A pressing issue for managers has been the recent increase in human-panther interactions. Three agencies (FWC, U.S. Fish and Wildlife Service, and National Park Service) collaborated to create the Florida Panther Response Plan that provides guidelines for dealing with human-panther interactions to promote public safety while assuring the conservation of the Florida panther.

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TUESDAY, NOVEMBER 17, 1:30 P.M.
GRAYS PEAK ROOM
MODERATOR: ELIZABETH FLEMING

3. Evaluation Of Wildlife Underpasses Designed For The Florida Panther

Deborah Jansen[1], Krista L. Sherwood[2] and Elizabeth H. Fleming[3]

Between 1981 and 2008, 111 Florida panthers (*Puma concolor coryi*) have been killed on roads, accounting for 47% of all known mortality. Efforts to alleviate panther deaths on roads have included the construction of wildlife underpasses on several south Florida roads, most notably Interstate 75 (I-75) and State Road 29 (SR 29). Completed in 1993, the 64-km project area on I-75 encompasses 35 wildlife underpasses connected by continuous fencing. Only 1 panther has been killed within the project area since completion. We assessed the underpasses for potential visual and physical impediments to wildlife use, such as standing water, manmade openings in the fencing, and vegetation density. We also examined the movements of 91 radio-collared adult panthers, 61 males and 30 females, whose home ranges fell within 1.6 km of I-75. We found that 17% of the females and 52% of the males used the underpasses. Part of the I-75 project included building an interchange at SR 29, although doing so was controversial since more traffic would increase the likelihood of panther mortality on that road. The 6 underpasses and fencing sections on SR 29 completed in 2007 have likely lessened but not remedied panther deaths there. We make recommendations for improving wildlife use of the underpasses on I-75 and strongly suggest post-construction evaluation and routine monitoring of all wildlife crossing projects. We also encourage that more closely-spaced underpasses coupled with continuous fencing be built on SR 29 to remedy the chronic wildlife mortality that occurs there.

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TUESDAY, NOVEMBER 17, 1:30 P.M.
GRAYS PEAK ROOM
MODERATOR: ELIZABETH FLEMING

4. The Florida Panther Protection Program: A New Model For Collaboration Amongst Nongovernmental Organizations And Private Landowners

Christian Spilker[1] and Tom Jones[2]

The Florida Panther Protection Program been proposed by a broad coalition of leading conservation organizations, small and large farmers, and ranchers in Southwest Florida who are committed to setting the endangered Florida panther (*Puma concolor coryi*) on a path to recovery. This environmentally and economically balanced approach, if successful, will result in the protection of a significant, contiguous range of panther habitat, and the creation of a private fund (up to $150,000,000) to assist restoration efforts that have historically been stymied due to a lack of funding. The program is composed of a combination of preservation incentives, perpetual funding, and enhanced mitigation requirements that will greatly supplement efforts to protect and preserve the Florida Panther.

[1]Collier Enterprises, 3003 Tamiami Trail N. #400, Naples, FL 34103; CSpilker@collierenterprises.com

[2]Barron Collier Companies, 2600 Golden Gate Parkway, Naples, FL 34105

TUESDAY, NOVEMBER 17, 1:30 P.M.
GRAYS PEAK ROOM
MODERATOR: ELIZABETH FLEMING

5. Florida Panther Outreach Programs

Elizabeth Fleming[1]

While habitat loss, degradation and fragmentation constitute the greatest threat to panther survival, the Florida Panther Recovery Plan identifies lack of human tolerance as a major impediment to panther recovery. To address intolerance as a limiting factor, one of the three recovery objectives outlined in the plan is "to facilitate panther recovery through public awareness and education." Even before the plan was finalized, the U.S. Fish and Wildlife Service convened a Florida Panther Outreach Team whose membership includes a broad cross-section of federal, state, regional and local agencies as well as non-governmental organizations. The team is collaborating on a number of initiatives in south Florida that are helping to reduce conflict situations.

[1]Defenders of Wildlife, 233 3rd St. N, Ste. 201, St. Petersburg, FL 33701; efleming@defenders.org

TUESDAY, NOVEMBER 17, 1:30 P.M.
LONGS PEAK ROOM
MODERATOR: PETER NELSON

1. Renewable Energy in the California Desert–Is it Compatible with Conservation?

Jeff Aardahl[1]

The 25 million acre California Desert Conservation Area (CDCA) was established in 1976 through a provision in the Federal Land Policy and Management Act, or FLPMA. Federal lands are under the jurisdiction of the Bureau of Land Management (BLM), National Park Service, and Department of Defense. The BLM administers approximately 10 million acres of public land in the California Desert and these lands contain diverse biological communities associated with wetlands and sand dunes; vast expanses of Creosote Bush Scrub; Joshua Tree Woodlands; and higher elevation Pinyon Pine and Juniper Woodlands. The environmental values and biological integrity of much of the CDCA is at risk because of recent commercial interest in building and operating industrial-scale solar and wind energy projects. Beginning in 2007 and continuing through 2008, commercial solar and wind energy companies filed approximately 130 right of way applications with the BLM for solar and wind energy projects covering one-million acres of public land in the CDCA. This abrupt interest in using public lands for solar and wind energy production coincided with two renewable energy utilization mandates from the State of California in 2006 and 2008. Desert tortoise (*Gopherus agassizii*), Mohave ground squirrel (*Spermophilus mohavensis*) and Desert bighorn sheep (*Ovis canadensis nelsoni*) are three keystone species in the CDCA that would be seriously affected if energy projects sought by industry were permitted by the BLM. Hundreds of other species would also be impacted. Defenders and other environmental organizations advocate that renewable energy production is essential in achieving the necessary reductions in greenhouse gas emissions, provided it is combined with aggressive and effective conservation achieved through efficient utilization of electrical energy. This talk will focus on how renewable energy project development could be done in the desert while at the same time protecting the desert's fragile and valuable biological resources and their values.

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TUESDAY, NOVEMBER 17, 1:30 P.M.
LONGS PEAK ROOM
MODERATOR: PETER NELSON

2. Assessing Impacts Of Wind Energy Development On Wildlife: Challenges And Solutions

Aimee Delach[1] and Ed Arnett[2]

At a time of growing concern over the rising costs and long-term environmental impacts from the use of fossil fuels and nuclear energy, wind energy has become an increasingly important sector of the electrical power industry, largely because it has been promoted as being emission free and is supported by government subsidies and tax credits. However, wind energy is not without impacts to wildlife: raptor fatalities have been high at some facilities, and large numbers of bats are being killed, especially along forested ridge tops in the eastern United States. These fatalities raise important concerns about cumulative impacts of proposed wind energy development on raptor and bat populations. I also will discuss challenges and opportunities for developing solutions to assess, avoid and minimize fatalities at wind facilities.

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[2]Bat Conservation International, 500 Capital of Texas Hwy. N, Building 1, Austin, TX 78746; earnett@batcon.org

TUESDAY, NOVEMBER 17, 1:30 P.M.
LONGS PEAK ROOM
MODERATOR: PETER NELSON

3. Renewable Energy and Federal Lands: Structuring Decisions for Wildlife

Peter Nelson[1]

In March 2009 the Interior Secretary Ken Salazar issued a Secretarial Order establishing the development of renewable energy as a priority for the Department. To accomplish the Department's renewable energy goals, the Secretary created a Task Force on Energy and Climate Change to develop a strategy to increase the development and transmission of renewable energy from public lands, while balancing stewardship responsibilities for natural resources. According to the Secretarial Order, the renewables strategy will identify locations best-suited for renewable energy development, including solar, wind, geothermal, and biomass energy, as well as identify electric transmission infrastructure necessary to deliver renewable resources to major population centers.

Renewable energy development of this magnitude will certainly result in impacts to biological resources, including sensitive habitat types and associated fish, wildlife and plant populations. As the Department develops the strategy to move forward with this ambitious agenda, and in order to meet the stewardship objectives of the Secretarial Order, it is imperative that BLM effectively structure renewable siting and transmission decisions. Structured decisions employ consistent and transparent application of science-based planning and decision-making processes, along with well-articulated policy objectives, decision and evaluation criteria that permit stakeholders and the public to understand and support the rationale behind BLM zoning, siting, and mitigation decisions.

While the BLM has clear, affirmative policy direction to conserve biological resources, including fish and wildlife populations and their habitats, these policies have been variably applied in past agency decisions. Existing conservation objectives and strategies found within BLM policy guidance should be prominently elevated and employed in BLM renewable siting and transmission decisions. The Energy and Climate Task Force, along with other policy makers, should investigate whether existing BLM conservation and planning policies are sufficient to achieve dual energy and conservation goals. If necessary, the Task Force should use its authority to revise or create additional policies to meet renewable program objectives.

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TUESDAY, NOVEMBER 17, 1:30 P.M.
LONGS PEAK ROOM
MODERATOR: PETER NELSON

3. The Bush Administration's Energy Legacy Impacts to Wildlife–Oil and Gas Leasing and the West-wide Energy Corridors

Nada Culver[1]

The Bush Administration's eight-year focus on turning our public lands over to the energy industry has left a significant footprint and set up ongoing management priorities that pose a major threat to carnivores and, indeed, the health of most species on the public lands. This presentation will discuss existing and projected impacts from both the oil and gas program and an effort to designate corridors for pipelines and powerlines across the West. I will further discuss efforts underway to repeal some of the most damaging policies prioritizing oil and gas development

As a result of the "lease it all, lease it now" approach of the last administration, we now have more than 47 million acres of the West under lease—largely due to close to 24,000 leases comprising almost 30 million acres that were awarded to the oil and gas industry from Fiscal Years 2001 through 2008.. With more than 86,000 active wells and thousands more that have been abandoned but remain unreclaimed, there are millions of acres of habitat that have been destroyed. The habitat destruction and fragmentation from oil and gas development have led to substantial reductions in big game populations, further affecting carnivores.

To further enshrine the role of our public lands as supporting fossil fuels, in 2005 Congress passed the Energy Policy Act of 2005. Section 390 of the legislation provided new categorical exclusions to permit drilling more oil and gas wells without environmental analysis. In addition, Section 368 directed the Secretaries of Agriculture, Commerce, Defense, Energy, and Interior to designate corridors for oil, gas, and hydrogen pipelines, and electricity transmission and distribution facilities on federal land in the 11 contiguous Western States. The Final Programmatic Environmental Impact Statement for the Designation of Energy Corridors proposed a spaghetti-like network of energy corridors extending across 6,000 miles and encompassing 3 million acres of public lands to energy corridor development. The adopted, finalized network of energy corridors line up almost precisely with existing and proposed coal-fired power plants and other fossil fuel-based energy sources that are located on public lands throughout the West. The potential destruction from both the corridors and the fossil fuel development they will support would have potentially devastating impacts on carnivores.

[1]The Wilderness Society, Central Rockies Regional Office, 1660 Wynkoop Street, Suite 850, Denver, CO 80202; nada_culver@tws.org

TUESDAY, NOVEMBER 17, 3:30 P.M.
MT. ELBERT ROOM
MODERATOR: NICK JANS

1. Predator Control By Any Other Name: How The State Of Alaska Is Increasing Wolf And Bear Harvest On Alaska's National Preserves

Jim Stratton[1]

While Alaska's national preserves are exempt from being included in any state of Alaska Predator Control Area and, therefore, not subject to aerial killing, they are not exempt from other attempts to reduce wolf (*Canis lupus*) and bear (*Ursus* spp.) populations. By liberalizing hunting regulations (season length, bag limits), the state of Alaska is practicing a form of de facto predator control on national preserve lands where sport hunting is allowed. Alaska's national preserves are managed by the National Park Service and these liberalized hunting rules are contrary to Park Service mandates which disallow "manipulation" of wildlife populations to benefit a prey species. My talk will set out this scenario in more detail and talk about what is being done on to restore balanced wildlife management on national preserves to provide for healthy populations of all wildlife.

[1]National Parks Conservation Association, 750 W. Second Ave, #205, Anchorage, AK 99501; stratto@npca.org

TUESDAY, NOVEMBER 17, 3:30 P.M.
MT. ELBERT ROOM
MODERATOR: NICK JANS

2. Predator Control in Alaska and the Bureau of Land Management: The Impact of ANILCA

Julie Lurman Joly[1]

The State of Alaska is currently conducting predator control activities on Bureau of Land Management (BLM) lands in Alaska. Under the National Environmental Policy Act (NEPA), when a federal agency does not make an "overt act," no NEPA requirement to prepare an EIS attaches. However, if some other agency action were mandated under a separate statute in relation to that activity but that action was not taken, NEPA does attach. The Alaska National Interest Lands Conservation Act (ANILCA) presents an independent requirement to formally evaluate the effect of all land uses on subsistence activities on federal lands in Alaska. The BLM has failed to take this mandatory action in connection with the state's predator control activities. This "failure to act" does not relieve the BLM of its duties under either ANILCA or NEPA.

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TUESDAY, NOVEMBER 17, 3:30 P.M.
MT. ELBERT ROOM
MODERATOR: NICK JANS

3. Trends In State Management Of Alaskan Brown Bears: 1975-Present

Sterling D. Miller[1]

Since 1980, hunting regulations for grizzly bears (*Ursus arctos horribilis*) in interior Alaska were increasingly designed to reduce bear abundance with expectations of reduced predation on neonatal moose (*Alces alces*) and caribou (*Rangifer tarandus*) and increased yield of these ungulates for human consumption. We document the liberalization by the State of Alaska of grizzly bear hunting regulations during 1975-2007 in interior Alaska (defined here to include 76% of the state). By 2007, these changes resulted in longer season lengths (100% of interior Alaska had seasons >200 days and 65.6% >300 days), more liberal bag limits (99.6% of interior Alaska with a bag limit ≥1/year and 23% with a bag limit >1/year), and waiver of resident tag fees for hunting grizzlies (waived in 33.1% of interior Alaska). During 1995 to 2007, there were 98 changes making grizzly bear hunting regulations more liberal in interior Alaskan game management subunits and only 2 making them more conservative. In some relatively small areas termed Bear Predation Control Areas, there is no bag limit, grizzly bears can be hunted over bait, and it is legal to sell hides and skulls. Grizzly bear kills by hunters in interior Alaska increased from 392 in 1980 to 781 in 2006 (average kill during year and 3 preceding years). Long-term research efforts on grizzly populations in interior Alaska have, since 2000, been replaced by short-term efforts to document whether desired declines in grizzly abundance have occurred. Professional management of large predators in Alaska is constrained by a 1994 state statute mandating "intensive management" in most areas. Statute implementation is largely directed toward the reduction of large carnivores (wolves [*Canis lupus*], grizzly and black [*U. americanus*] bears). The current intensive management program for grizzlies does not follow recommendations made by the 1997 National Research Council Committee on Management of Wolf and Bear Populations in Alaska.

[1]National Wildlife Federation, 240 N. Higgins, Suite #2, Missoula, MT 59802; millerS@nwf.org

TUESDAY, NOVEMBER 17, 3:30 P.M.
MT. ELBERT ROOM
MODERATOR: NICK JANS

4. Temporal Use Of The Nushagak Peninsula By Wolves, Togiak National Wildlife Refuge, Southwest Alaska

Patrick Walsh[1] and James Woolington[2]

A caribou (*Rangifer tarandus*) population that was established via transplantation in 1988 on the Nushagak Peninsula in southwest Alaska, grew rapidly until peaking in 1997. This population has since declined by ~60%. A potential causal factor, and the factor most often discussed during local public meetings, is predation by wolves (*Canis lupus*). This leads to requests to state and federal wildlife regulatory agencies for wolf population control. However, we hypothesize that wolf predation is not the primary driver for the decline in the Nushagak Peninsula caribou population. To test this, we investigated the time budgets of wolves in the vicinity of the Nushagak Peninsula. Using GPS radio telemetry, we recorded locations of up to nine wolves from three packs at < 3 hour intervals from March 2007 until May 2009. Additionally, we located another four wolves approximately once monthly using conventional radio telemetry. We found two of the packs used the Peninsula 29-42% of the time, while the remaining pack did not use the Peninsula. Most use occurred in the fall (October—December), while little use occurred during the caribou calving season, at which time caribou are particularly vulnerable to wolf predation. Our preliminary conclusion is that wolf predation is not the principal driver for this caribou population.

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[2]Alaska Department of Fish and Game, P.O. Box 1030, Dillingham, Alaska 99576; jim_woolington@alaska.gov

Delineating Wildlife Corridors Using Landscape Genetics

TUESDAY, NOVEMBER 17, 3:30 P.M.
MT. EVANS ROOM
MODERATOR: DAVID GUILLARD

1. Landscape Genetics For Evaluating Corridors, Critical Populations, And Connectivity Of Carnivores*

Michael Schwartz[1], Kevin S. McKelvey[1] and Sam A. Cushman[1]

The field of landscape genetics aims to use spatial genetic data to make inferences regarding movement of individual across a landscape. This relatively new field has seen an explosion of new methods often borrowed from related disciplines such as landscape ecology, mathematics, geology, neurobiology, and computer science. The goal of the symposia is to demonstrate the ways which landscape genetics is being used to inform us about carnivore biology and management. This talk will provide an overview of the brief history of landscape genetics, discuss the current state of the field, and forecast where this field is heading in the future with the technological revolution that is underway in molecular biology. It will provide examples from within the realm of carnivore genetics on how landscape genetic approaches are being used in a practical way to better understand the biology of species, and manage landscapes to enhance connectivity.

[1]U.S. Forest Service, Rocky Mountain Research Station, 800 E. Beckwith Ave., Missoula, MT 59801-5801; mkschwartz@fs.fed.us; kmckelvey@fs.fed.us; scushman@fs.fed.us

*Note: Talk 1 will be a brief into to the topic, followed by 6 regular-length talks

TUESDAY, NOVEMBER 17, 3:30 P.M.
MT. EVANS ROOM
MODERATOR: DAVID GAILLARD

2. Wolverine Landscape Genetics For Building Corridors And Evaluating Reintroductions

Kevin McKelvey[1]

For many species, connectivity between isolated populations is critical for their conservation. Likely increased movement requirements associated with climate change make location and conservation of movement corridors even more critical. Determining dispersal patterns of organisms has, however, proved difficult and the validity of most current corridor maps is unknown. Here we use landscape genetic methods to infer movement paths for wolverines (*Gulo gulo*) in the northern Rocky Mountains. We test the hypothesis that wolverines largely restrict dispersal paths to alpine areas, similar to daily habitat use and denning patterns. Analyses indicate that wolverines have strong aversions to dispersing across low elevation areas and do restrict their movements to high elevation areas. Derived patterns are consistent with previously published spatial structuring of wolverines in indicating that the Crazy Mountains in Montana are isolated. We then use the derived corridor model to evaluate the potential for colonization of Colorado and Utah.

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TUESDAY, NOVEMBER 17, 3:30 P.M.
MT. EVANS ROOM
MODERATOR: DAVID GAILLARD

3. Use Of Empirically Derived Source-Destination Models To Map Regional Conservation Corridors For Black Bears

Sam Cushman[1]

The ability of populations to be connected across large landscapes via dispersal is critical to long-term viability for many species. One means to mitigate population isolation is the protection of movement corridors among habitat patches. Nevertheless, the utility of small, narrow, linear features as habitat corridors has been hotly debated. Here, we argue that analysis of movement across continuously resistant landscapes allows a shift to a broader consideration of how landscape patterns influence connectivity at scales relevant to conservation. We further argue that this change in scale and definition of the connectivity problem improves one's ability to find solutions and may help resolve long-standing disputes regarding scale and definition of movement corridors and their importance to population connectivity. We used a new method that combines empirically derived landscape-resistance maps and least-cost path analysis between multiple source and destination locations to assess habitat isolation and identify corridors and barriers to organism movement. Specifically, we used a genetically based landscape resistance model for American black bears (*Ursus americanus*) to identify major movement corridors and barriers to population connectivity between Yellowstone National Park and the Canadian border. Even though western Montana and northern Idaho contain abundant public lands and the largest wilderness areas in the contiguous United States, moving from the Canadian border to Yellowstone Park along those paths indicated by modeled gene flow required bears to cross at least 6 potential barriers. Our methods are generic and can be applied to virtually any species for which reliable maps of landscape resistance can be developed.

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TUESDAY, NOVEMBER 17, 3:30 P.M.
MT. EVANS ROOM
MODERATOR: DAVID GAILLARD

4. Beyond Counting Bears: Using Genetics To Delineate Subpopulation Structure

Kate Kendall[1]

As part of a study to estimate the abundance and distribution of the threatened grizzly bear (*Ursus arctos horribilis*) population in northwestern Montana, we used data from 33 years of physical captures and a large noninvasive genetic sampling effort conducted in 2004 to identify the genetic structure and potential barriers to gene flow within the population. We identified regional subpopulation boundaries using factorial correspondence analysis (FCA) and FST to estimate genetic differentiation between regions and to examine change in genetic structure over time. To determine gene flow across the major transportation corridor, we used assignment tests to compare multilocus genotypes of individuals on either side of the highway. FCA identified 6 subpopulations. Despite the general absence of geographically delimited genetic discontinuities, genetic differentiation between the northern and the southern and eastern periphery of the study area (16–118 km apart) was similar to or greater than the value observed between our population and one 1,150 km to the north. This genetic distinctiveness, however, decreased over time, indicating an increase in gene flow consistent with demographic recovery. On the portion of the transportation corridor where human density and traffic volumes were highest, genetic differentiation indicated reduced interbreeding. Genetic methods are a powerful tool to monitor changes in gene flow that can signal the success of, or need for further, conservation action.

[1]U.S. Geological Survey, Glacier Field Station, Glacier National Park, MT; kkendall@usgs.gov

TUESDAY, NOVEMBER 17, 3:30 P.M.
MT. EVANS ROOM
MODERATOR: DAVID GAILLARD

5. Landscape Genetics Meets Phylogeography: Evolutionary Relationships, Recent History, Connectivity, And The Trajectory Of Southwestern Red Fox Populations

Benjamin Sacks[1], Marcelle Moore[1,2], Mark Statham[1], Sarah Brown[1], Heiko Wittmer[3], Keith Aubry[4], Sam Wisely[5] and John Perrine[6]

The distribution of genes across landscapes results from and, therefore, illuminates past evolution, recent historical events, and contemporary population genetic and behavioral processes. While phylogeography aims to reconstruct patterns of long-term divergence among populations, landscape genetics emphasizes finer-scale contemporary processes, such as discontinuities in gene flow within populations. Here, we explore a problem at the nexus of these approaches: the recent history of native southwestern North American red foxes (*Vulpes vulpes*) and their relationships to newly established populations of phylogenetically divergent nonnative red foxes. Red foxes historically occurred in the upper montane/subalpine zones of the Rockies, Cascades, and Sierra Nevada mountains, and collectively compose an evolutionarily and ecologically distinct lineage. Although several non-native lowland populations have recently been established in the West, one population, which predates fur farming and inhabits the anomalous desert-like Sacramento Valley, has unknown origins. We employed fast- and slow-mutating mitochondrial markers and nuclear markers to show that the Sacramento Valley red fox, while ecologically distinct from montane red foxes, is nonetheless of the same lineage and probably native to its current range. Comparison of historical and modern samples revealed a reduction over the past century in connectivity among all southwestern native populations and indicated declines in genetic diversity within the critically endangered Sierra Nevada red fox and the Sacramento Valley red fox populations. Lastly, we assess displacement and hybridization between the Sacramento Valley red fox and a parapatric, phylogenetically distinct non-native red fox population.

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[2]California State University-Sacramento

[3]University of California- Davis, Department of Wildlife, Fish, and Conservation Biology, Davis, CA, 95616

[4]U.S. Forest Service, Pacific Northwest Research Station, Olympia, WA

[5]Kansas State University, Division of Biology, Manhattan, KS

[6]California Polytechnic State University, Biological Sciences Department, San Luis Obispo, CA

TUESDAY, NOVEMBER 17, 3:30 P.M.
MT. EVANS ROOM
MODERATOR: DAVID GAILLARD

6. Landscape Genetic Patterns Of American Marten In Northern Idaho

Tzeidle Wasserman[1], Samuel A Cushman[2] and Michael K Schwartz[2]

In order to understand the effects of landscape and environmental features on the genetic structure of American marten (*Martes americana*) in the Idaho Panhandle National Forest (IPNF) in northern Idaho, genetic information was used to model genetic relationships of this marten population with respect to environmental and spatial variables across the landscape. Over three field seasons from 2004-2006, 70 individual marten were detected across the study area. Their genetic similarities were based on the pair-wise percentage dissimilarity among all individuals based on seven microsatellite loci. We compared their genetic similarities with several landscape resistance hypotheses describing a range of potential relationships between movement cost and landcover, elevation, roads, Euclidean distance and barriers. The degree of support for each model was tested with causal modeling on resemblance matrices using partial Mantel tests. Over 160 models were tested in order to effectively describe the genetic structure of this marten population. Hypotheses of Isolation by Distance and Isolation by Barrier were not supported. Isolation by Landscape Resistance proved to be the best model describing genetic patterns of American marten in the IPNF. Elevation at 1600m with a standard deviation of 600m was the most highly supported landscape resistance model correlated to genetic structure of American marten in this landscape. In our case, elevation is a proxy for snowpack and the forest composition at this specific elevation. Correlating genetic similarity of individuals across large landscapes with hypothetical movement cost models can give reliable inferences about population connectivity. By linking cost modeling to the actual patterns of genetic similarity among individuals, it is possible to obtain rigorous, empirical models describing the relationship between landscape structure and gene flow and to produce species-specific maps of landscape connectivity, and can provide managers with critical information to better administer our forests for meso-carnivores and other species of concern.

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[2]U.S. Forest Service, Rocky Mountan Research Station, 800 E. Beckwith Ave. Missoula MT 59801; scushman@fs.fed.us; mkschwartz@fs.fed.us

TUESDAY, NOVEMBER 17, 3:30 P.M.
MT. EVANS ROOM
MODERATOR: DAVID GAILLARD

7. Applications Of Graph Theory To Carnivore Landscape Genetics

Colin J. Garroway[1], Jeff Bowman[2], Denis Carr[1] and Paul J. Wilson[3]

Key goals of the emerging field of landscape genetics are to understand how processes such as migration, genetic drift, and the distribution and connectivity of populations affect genetic structure. In many complex systems, patterns of connectivity give rise to system-level properties that are not apparent from analysis of pairwise relationships between components. The ability to characterize these system-level properties, along with the local properties of individual landscapes, could improve resource management in complex, natural ecosystems. Using a sample of fishers (*Martes pennanti*) from Ontario, Canada, we demonstrate how a graph theoretic approach to landscape genetics can be used to reveal landscape quality, gene flow, and population structure. The relationships among genotypes sampled from landscapes defined a network of genetic structure with nodes representing landscapes and links representing genetic distances between nodes. Network structure was characterized by highly clustered nodes, a short mean path length connecting node pairs, and a resiliency to the loss of highly connected nodes. This suggests that alleles are efficiently spread through the system and that chance extirpations and conservative harvest will not significantly affect their spread. Measures of node centrality were negatively related to the proportion of immigrants and snow depth in a node suggesting density-dependent dispersal of fishers in the study area produced a pattern of fishers migrating from habitats of high suitability to those of low suitability.

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[2]Ontario Ministry of Natural Resources, Wildlife Research and Development Section, Peterborough, ON, Canada

[3]Trent University, Biology Department, Peterborough, ON, Canada

Mountain Lions, People and Policy: Improving our Prospects for Effective Conservation of a Keystone Predator

TUESDAY, NOVEMBER 17, 3:30 P.M.
GRAYS PEAK ROOM
MODERATOR: CHRISTOPHER PAPOUCHIS

1. Roundtable Overview

The management of mountain lions (*Puma concolor*) in the western U.S., like that of other large carnivores, is embroiled in intense social and political conflict and controversy that is hindering effective conservation of the species. Participants in lion management sharply disagree over how this charismatic animal should be treated by humans and who should determine policy. Research suggests that the growing conflict and controversy in mountain lion management is being fueled by broad-scale shifts in public values and attitudes towards nature and wildlife, demands by non-traditional participants for authentic participation in management decisions, reluctance by traditional participants to share power in decision-making, and other factors. In this and other environmental policy arenas, science has become highly politicized as participants selectively utilize and interpret research in ways that satisfy their normative beliefs and established interests. In light of this situation, professionals inside and outside the formal wildlife management establishment have called for reforming our current approach to wildlife governance so that it is more participatory and better able to develop policies that integrate scientific knowledge and the diverse array of human values in ways that clarify and serve our common interests. To this end, this roundtable discussion brings together experienced mountain lion advocates, researchers and agency managers to discuss: 1) problems in mountain lion management; 2) how we might better integrate scientific knowledge and human values into decision-making; and 3) ways that participants might collaborate to improve our prospects for effectively conserving and co-existing with mountain lions in the western U.S

TUESDAY, NOVEMBER 17, 3:30 P.M.
GRAYS PEAK ROOM
MODERATOR: CHRISTOPHER PAPOUCHIS

2. Biographical Information for Roundtable Participant Christopher Papouchis[1]

Chris Papouchis works as an independent wildlife conservation scientist and as an adjunct professor of Natural Resources at American River College in Sacramento, California. He is a co-founder of the Wild Felid Research and Management Association, a member of the association's governing Council, and managing editor of its newsletter, the *Wild Felid Monitor*. From 2001 to 2006, he served as the conservation biologist for the Mountain Lion Foundation, where he implemented community-based programs in rural communities to reduce human-mountain lion conflicts. He is currently working on a PhD at Antioch University where he is focused on identifying common interest approaches to conserving and managing mountain lions in the western U.S.

[1]papouchis@gmail.com

TUESDAY, NOVEMBER 17, 3:30 P.M.
GRAYS PEAK ROOM
MODERATOR: CHRISTOPHER PAPOUCHIS

3. Biographical Information for Roundtable Participant Tim Dunbar[1]

Tim Dunbar is the Executive Director for the Mountain Lion Foundation. Tim started his environmental career in 1990 as a volunteer collecting signatures for California's Proposition 117—the Mountain Lion Initiative. He spent the next few years working for numerous environmental political campaigns before joining the American Farmland Trust as a Field Assistant in 1994. During his tenure with AFT, Tim wrote or co-authored several publications dealing with development issues in California's Central Valley. Tim joined the Mountain Lion Foundation in August 2000 as their Development Director, and became MLF's Executive Director in November of 2008, and is currently helping to shape the organization's vision of itself for the 21st Century.

[1]Mountain Lion Foundation, P.O. Box 1896, Sacramento, CA 95812; tdunbar@mountainlion.org

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GRAYS PEAK ROOM
MODERATOR: CHRISTOPHER PAPOUCHIS

4. Biographical Information for Roundtable Participant Rick Hopkins[1]

Rick Hopkins is Co-Owner of Live Oak Associates, Inc., an ecological consulting firm of 25 scientists based in California. Rick received his B.A. and M.A. from San Jose State University and his PhD in 1990 in Wildlands Resource Science from University of California at Berkeley. As an ecologist, Rick has specialized in population ecology, predator ecology, wildlife/habitat relationships, conservation biology, and in developing conservation strategies for many threatened and endangered species throughout California. Rick sits on the board of directors of the Cougar Fund.

[1]Live Oak Associates, Inc. 6840 Via Del Oro, Suite 220, San Jose, CA 95119; info@loainc.com

TUESDAY, NOVEMBER 17, 3:30 P.M.
GRAYS PEAK ROOM
MODERATOR: CHRISTOPHER PAPOUCHIS

5. Biographical Information for Roundtable Participant Gary Koehler[1]

Gary Koehler is Wildlife Research Scientist with the Washington Department of Fish and Wildlife. He has conducted research and published on pine marten, wolverine, bobcat, lynx, cougars and American black bears in North America, conducted studies of lions in Africa and tigers in China and India, and initiated research of cougars that included the participation of local public school students and community members in a program known a Project CAT (Cougars and Teaching). He is presently principle investigator of cougar research in the Blue Mountains of SE Washington and lynx research in the northern Cascades of Washington.

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koehlgmk@dfw.wa.gov

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GRAYS PEAK ROOM
MODERATOR: CHRISTOPHER PAPOUCHIS

6. Biographical Information for Roundtable Participant Jerry Apker[1]

Jerry Apker has worked for the Colorado Division of Wildlife since 1982 and currently serves as the Statewide Carnivore Biologist, coordinating most aspects of large and small carnivore management actions in the state. Before taking his current position in 2000, he worked as an Area Wildlife Manager and District Wildlife Manager. Jerry has received several professional awards including the Colorado Chapter of The Wildlife Societys Jim Olterman Award for Professional Achievement in Wildlife Management (2006), CDOWs Outstanding Achievement award (1988), and CDOWs SE Region Excellence and Dedication award (1985, 1986). He holds a BS in Wildlife Biology from Colorado State University.

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TUESDAY, NOVEMBER 17, 3:30 P.M.
GRAYS PEAK ROOM
MODERATOR: CHRISTOPHER PAPOUCHIS

7. Biographical Information for Roundtable Participant David Mattson[1]

David Mattson is a Research Wildlife Biologist and Station Leader with the USGS Southwest Biological Science Center, Lecturer and Visiting Senior Scientist at the Yale School of Forestry and Environmental Studies, and Western Field Director of the MIT-USGS Science Impact Collaborative. David received degrees in Forest Resource Management and Forest Ecology and a doctorate in Wildlife Resource Management from the University of Idaho. Dr. Mattson has studied large carnivores for the last 30 years, focused on puma ecology and human-puma interactions in Arizona and the conservation and behavioral ecology of grizzly bears in the Yellowstone ecosystem of Wyoming, Montana, and Idaho.

[1]U.S. Geological Survey Southwest Biological Science Center, Colorado Plateau Research Station, P.O. Box 5614, Northern Arizona University, Flagstaff, AZ 86011-0001; david.mattson@nau.edu

TUESDAY, NOVEMBER 17, 3:30 P.M.
GRAYS PEAK ROOM
MODERATOR: CHRISTOPHER PAPOUCHIS

8. Biographical Information for Roundtable Participant Sharon Negri[1]

Sharon Negri has worked with government and nongovernment organizations on natural resource issues since 1980. She directs WildFutures, an Earth Island Institute project she founded in 1994, with the purpose of bridging the gap between science and conservation. As director of WildFutures she co-produced the award-winning film *On Nature's Terms* (2001) and published the *Cougar Management Guidelines* (2005), a scientific resource for wildlife professionals. She co-founded the Mountain Lion Foundation in 1986 and served as its director until 1990. She also co-founded the Wild Felid Research and Management Association in 2008 and serves as a Council member. Sharon has a B.S. in Environmental Policy and Planning.

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TUESDAY, NOVEMBER 17, 3:30 P.M.
GRAYS PEAK ROOM
MODERATOR: CHRISTOPHER PAPOUCHIS

9. Biographical Information for Roundtable Participant Ron Thompson[1]

Ron Thompson is the statewide big game habitat manager and large carnivore biologist for mountain lions and black bears within the Game Branch of the Arizona Game and Fish Department. He is a graduate of the University of Arizona with a Bachelor of Science in Wildlife Biology and has worked as a wildlife biologist and range conservationist for the U.S. Forest Service. Ron is a co-founder of the Wild Felid Research and Management Association and member of the governing Council. He is also a member of the Cougar Working Group for the Western Association of Fish and Wildlife Agencies.

[1]Arizona Game and Fish Department, 5000 W. Carefree Highway, Phoenix, AZ 85086; rothompson@azgfd.gov

TUESDAY, NOVEMBER 17, 3:30 P.M.
LONGS PEAK ROOM
MODERATOR: TOM SERFASS

1. Seasonal Variation In Detections Of Forest Carnivores In Western Maryland Using Remote Cameras

Julia Smith[1], Zoë L. Hanley[1] and Thomas L. Serfass[1]

Low population densities and elusive behavior associated with many carnivores present a challenge in obtaining sample sizes adequate for deriving meaningful conclusions about population characteristics. Most studies conducted to determine the presence and distribution of carnivores based on established detection techniques (e.g., sooted track-plates and remote cameras) have been conducted during summer. However, seasonal variation in behavior and weather could affect the detectability of carnivores and seldom have been considered or assessed as part of these projects. To identify seasonal and circadian patterns of detection success, we used remote sensing cameras to sample 40 sites each month in a 120-km^2 region of Savage River State Forest in the central Appalachian mountains of western Maryland from August 2008 to July 2009. Occupancy theory and log-linear analysis are being used to compare detection rates based on season, time of day, and habitat type. We detected nine species of carnivores, most frequently black bears (*Ursus americanus*), raccoons (*Procyon lotor*), and fishers (*Martes pennanti*). Notably, fisher and gray fox (*Urocyon cinereoargenteus*) detections were higher in winter than other seasons, whereas black bear and raccoon detections were highest during summer. The majority of fisher detections (>90%) occurred during nocturnal and crepuscular periods (1800 to 0800 hours). This is the first in-depth evaluation of the fisher population occurring in western Maryland, which established following a 1969 reintroduction to West Virginia. Our results indicate disparities in detection rates among seasons and species, suggesting that researchers should consider the seasonal differences in detection rates of carnivores when designing research projects.

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jsmith@frostburg.edu; zlhanley@frostburg.edu; tserfass@frostburg.edu

TUESDAY, NOVEMBER 17, 3:30 P.M.
LONGS PEAK ROOM
MODERATOR: TOM SERFASS

2. Spatial And Temporal Distribution Of Bobcat And Fisher Detections In Western Maryland

Zoë Hanley[1], Julia Smith[1], Thomas L. Serfass[1] and J.E. McDonald, Jr.[2]

By the early 1900s human induced landscape alterations and unregulated harvest caused severe declines in bobcat (*Lynx rufus*) populations and the extirpation of fishers (*Martes pennanti*) in Maryland. Bobcats historically ranged in Maryland from the eastern shore to the Appalachian Mountains, but occur primarily in mountainous regions of western Maryland. Fishers became re-established in the state through expansion of a population reintroduced in West Virginia during 1969 and now occupy a range similar to the bobcat. To date, no research has been conducted on the status, distribution, and habitat associations of either population. We are using remote-sensing cameras to determine the degree of sympatry in habitat use by bobcats and fishers in western Maryland. Beginning in August 2008 we established a 144 km^2 grid comprised of 40 camera sites within Savage River State Forest (SRSF), Garrett County, Maryland. Monitoring of cameras sites will continue through July 2009 to record presence-absence information for both species. SRSF is primarily deciduous forest (74%), but also includes mixed (16%) and coniferous (10%) patches of various structural classes. Our project is designed to assess if certain habitat-related factors (e.g., forest stand characteristics, topography, and human disturbances) are useful in predicting where bobcats and fishers are distributed in the landscape. We will use a Geographic Information System (GIS) to identify habitat characteristics within 100-meter and 500-meter radii surrounding each camera site. These GIS-derived data will be used to develop overall and single-season occupancy models for predicting conditions associated with bobcat and fisher detections and the degree their distributions are determined by habitat and seasonal conditions. Preliminary results demonstrate that bobcats and fishers both occupy the study area, with detections at 35% and 45% of sites, respectively. However, only 5% of the detection sites included detections of both species.

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[2]U.S. Fish and Wildlife Service, Wildlife and Sport Fish Restoration Program, 300 Westgate Center Drive, Hadley, MA 01035

TUESDAY, NOVEMBER 17, 3:30 P.M.
LONGS PEAK ROOM
MODERATOR: TOM SERFASS

3. Genetic Analysis Of Formerly Extirpated Carnivores In Northwestern New Jersey

Charles Kontos[1]

Fishers (*Martes pennanti*) have recently been verified in the northwestern portion of New Jersey after an absence of over 100 years, while bobcats (*Lynx rufus*) were successfully reintroduced by the NJ Division of Fish and Wildlife in the late 1970s. The successful reintroduction of fishers in nearby states including Pennsylvania, Connecticut, and New York can be attributed to sufficient prey density, suitable habitat availability, and outstanding wildlife management practices. As a result, fishers may be re-colonizing similar habitat in New Jersey within their historical range and potentially interacting with bobcats and other carnivores. Furthermore, the re-established bobcat population in this region requires more extensive monitoring, as their range appears to be severely constrained by major highways. In order to assess the fisher and bobcat populations in northwestern New Jersey, genetic analyses were conducted by implementing a hair-snare survey along the Kittatinny Ridge. First, genetic analyses were conducted to elucidate natural dispersal patterns from other regional fisher and bobcat populations. Second, fisher density and abundance were estimated based on individual identification to determine their conservation status in New Jersey. Potential fisher-bobcat interactions were evaluated utilizing co-occurrence data analysis and remote camera traps. Finally, fisher and bobcat distribution data were analyzed to assess existing wildlife corridors and assist in planning and establishing future connections. Overall, these initiatives help provide insight into the recolonization processes of formerly extirpated mid-sized carnivores at a regional scale.

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TUESDAY, NOVEMBER 17, 3:30 P.M.
LONGS PEAK ROOM
MODERATOR: TOM SERFASS

4. Distribution Of Fishers Occupying Small Fragmented Forests In Eastern North Dakota

Maggie Triska[1], Steve C. Loughry[1] and Tom L. Serfass[1]

Fishers (*Martes pennanti*) are typically associated with forested areas containing extensive canopy cover. However, a potentially self-sustaining fisher population exists in relatively small patches of deciduous forest throughout much of eastern North Dakota. We are evaluating the distribution of this population through the use of simulation modeling and presence/absence sampling. Fishers were historically present in northeastern North Dakota, but were extirpated by the early 1900s. Recently this region has seen an increase in the number of verified fisher sightings. We conducted a pilot study during summer 2008, monitoring remote camera/track plate sites along riparian forests of the Red, Pembina, Tongue, Park, Forest, Turtle, and Sheyenne Rivers in eastern North Dakota. Study sites were maintained for approximately 10 days and were re-baited once. Overall, there were 55 detections of fishers among the 196 sites. A simulation model, Jwalk, was then used to predict potential dispersal routes of fishers from the core population in Minnesota to North Dakota. From the projected arrival points in North Dakota we subsequently modeled various scenarios to predict likely dispersal pathways within the state and will associate distribution data obtained during 2008 and 2009 field sampling to assess performance of the various models. The primary parameters used to simulate dispersal were maximum travel distance, probability of movement and mortality based on habitat, and angle of movement. Outcomes of initial field sampling and modeling indicate that fishers are occupying forest patches of minimal size with limited canopy cover and are crossing open areas to traverse the region.

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TUESDAY, NOVEMBER 17, 3:30 P.M.
LONGS PEAK ROOM
MODERATOR: TOM SERFASS

5. Distribution And Habitat Use By A Pioneering Fisher Population In Eastern North Dakota

Steve Loughry[1], Maggie D. Triska[1] and Tom L. Serfass[1]

Historically, fishers (*Martes pennanti*) occupied scattered, forest areas in eastern North Dakota. However, populations declined and became extirpated by the early 1900s because of extensive alterations in the landscape (loss of forested habitats due to intensive agricultural development) and unregulated harvest. We are evaluating habitat associations and distributions of a fisher population that is believed to have begun pioneering eastern North Dakota during the last 10 years through expansion of a well-established population in Minnesota. Our project, which is being conducted during the summers of 2008 and 2009, involves the use of remote sensing cameras and covered, sooted-track plates placed at 10 km intervals along riparian forests throughout the Red River of the North Drainage. During Summer 2008 we surveyed approximately 400 km of the Red, Pembina, Park, Forest, Sheyenne, Tongue, and Turtle Rivers in the eastern North Daktoa with 196 camera and track-plate sites, each of which were maintained for a least 8 days unless a detection was acquired earlier in the sample period. Fishers occupied the entire sample area, with detections occurring at 55 of the 196 sample sites. From our 2008 surveys, fishers appear to be well established in eastern North Dakota and are occupying what most would regard as minimal habitat conditions (e.g. limited canopy cover, small isolated patches, and deciduous forest). Our final assessments will focus on evaluating occupancy rates of fishers based on size, isolation, composition, and position in the landscape (based on stream order) of riparian forest patches.

[1]Frostburg State University, Frostburg, MD 21532; scloughry@frostburg.edu; mtriska@frostburg.edu; tserfass@frostburg.edu

TUESDAY, NOVEMBER 17, 3:30 P.M.
LONGS PEAK ROOM
MODERATOR: TOM SERFASS

6. A Genetic Approach To Determine River Otter Abundance And Effects On Fish Populations In Missouri

Rebecca Mowry[1], Lori S. Eggert[1], Matthew E. Gompper[1] and Jeff Beringer[2]

The reintroduction of apex predators can precipitate direct and indirect ecosystem responses that are often poorly understood. The reintroduction of the river otter (*Lontra canadensis*) to Missouri streams has sparked controversy due to unanticipated effects on fish populations. The Missouri Department of Conservation has initiated river otter trapping seasons to address angler concerns, but estimates of river otter populations have been highly variable and potentially inaccurate, sparking additional controversy. To address these issues, we propose to develop a model to accurately estimate river otter populations based on latrine site counts validated by fecal genotyping, and to study the effects of otter depredation on fish populations by monitoring both predator and prey abundances across several watersheds in Missouri. A closer understanding of this situation is crucial for the development of publicly and ecologically acceptable management activities for the long-term maintenance of Missouri's aquatic ecosystems.

[1]University of Missouri-Columbia, Columbia, MO 65211; ram5g8@mizzou.edu; eggertl@missouri.edu; gompperm@missouri.edu

[2]Missouri Department of Conservation, 1110 S. College Ave., Columbia, MO 65201; Jeff.Beringer@mdc.mo.gov

Tuesday Evening Events

POSTER SESSION AND BOOKSIGNING
TUESDAY, NOVEMBER 17, 5:30 P.M.
IMPERIAL BALLROOM AND FOYER

All conference attendees are invited to an evening reception following Tuesday's breakout sessions. Light hors d'oeuvres will be served and a cash bar will be available. Poster presenters will be on hand in the Imperial Ballroom foyer to discuss their work with attendees and to answer questions. The Exhibit Hall will also be open during this time. We are also pleased to welcome several book authors who will be on hand to sign their most recent work, including:

Nick Jans
The Glacier Wolf: True Stories of Life in Southeast Alaska
The Grizzly Maze: Timothy Treadwell's Fatal Obsession with Alaskan Bears

Robert Long and Paula Mackay
Non-Invasive Survey Methods for Carnivores

Marco Musiani
A New Era for Wolves and People: Wolf Recovery, Human Attitudes, and Policy

BANQUET
TUESDAY, NOVEMBER 17, 7:00 P.M.
CAPITOL PEAK BALLROOM

Biographical Information for Joel Sartore[1]

After more than 15 years and 26 stories with the National Geographic Society, Joel has covered everything from the remote Amazon rain forest to beer-drinking, mountain-racing firefighters in the United Kingdom. Joel's work focuses on endangered species, natural history and land use issues. His interest in wildlife started in childhood, when he learned about the very last passenger pigeon from one of his mother's *Time-Life* picture books. His first *National Geographic* assignments introduced him to nature photography, and also allowed him to see human impact on the environment first-hand. In his words, "It is folly to think that we can destroy one species and ecosystem after another and not affect humanity. When we save species, we're actually saving ourselves." He has authored several books including *Photographing Your Family*, *Face to Face with Grizzlies*, and *Nebraska: Under a Big Red Sky*. Besides the work he has done for National Geographic, Joel has completed assignments for *Audubon Magazine*, *Time*, *Life*, *Newsweek*, *Sports Illustrated* and numerous book projects. Joel and his work have been the subject of several national broadcasts including *National Geographic's Explorer*, the *NBC Nightly News*, NPR's *Weekend Edition* and an hour-long PBS documentary. He is also a regular contributor on the *CBS Sunday Morning Show* with Charles Osgood. Joel is always happy to return to home base from his travels around the world. He lives in Lincoln, Nebraska with his wife Kathy and their three children.

[1]Joel Sartore Photography, www.joelsartore.com

WEDNESDAY, NOVEMBER 18, 8:00 A.M.
MT. ELBERT ROOM
MODERATOR: EVA SARGENT

1. The Value Of Private Partnerships And Private Funding To Make Possible Mexican Wolf Recovery In The Wild

Patrick Valentino[1]

The Mexican Wolf Recovery Program has relied heavily on private partnership and investment including the direct participation of 48 private institutions, holding and breeding endangered wolves throughout the United States and Mexico. In addition, there are numerous private organizations that participate in education, fundraising and advocacy. Today there are about 320 Mexican wolves (*Canis lupus baileyi*) in 48 captive facilities in the U.S. and Mexico, and there are 8 packs in a reintroduced population in Arizona and New Mexico. The robust captive population is the result of bi-national partnerships, government agency and non-government organization partnerships, and professional zoo, private animal holding facility and university partnerships organized through the Association of Zoos and Aquarium's (AZA) Species Survival Plan (SSP) program. The wild population has faced more than its fair share of challenges, including livestock depredation resulting from the overlapping uses of the land by wolves and humans. The majority of funding to resolve or prevents conflicts comes from private sources. By way of example, the Mexican Wolf Fund, formed in August of 2006, has raised more than $240,000 in funds for field activities relating to conflict avoidance and resolution. This presentation will explore the benefit of the private partnerships involved in Mexican wolf recovery showing the direct benefits to one of the rarest land mammals in the world.

[1]Mexican Wolf Fund, San Francisco, CA 94109; patrick@mexicanwolfconservationfund.org

WEDNESDAY, NOVEMBER 18, 8:00 A.M.
MT. ELBERT ROOM
MODERATOR: EVA SARGENT

2. Will Politics Or Science Govern The Future Of The Mexican Gray Wolf?

Michael Robinson[1]

From the era of extermination to the age of reintroduction, official tolerance of Mexican gray wolves (*Canis lupus baileyi*) has increased only modestly. In 1950, the U.S. Fish and Wildlife Service (FWS), having killed all the wolves in the western U.S., exported poison and personnel to wipe out wolves in Mexico. After passage of the U.S. Endangered Species Act, the last five wolves in Mexico were trapped for emergency captive-breeding between 1977 and 1980. Unfortunately, the 1998 reintroduction project has reverted to a trapping and shooting program, which included the 2004 shooting of a genetically irreplaceable wolf and the 2007 shooting of a wolf for killing a cow in an area of the Gila National Forest closed to grazing. Other wolves are repeatedly "controlled" after being drawn to vulnerable stock through first scavenging on non-wolf-killed cattle and horse carcasses. The upshot is low wolf numbers and inbreeding depression. The FWS has not acted on recommendations of independent scientists who repeatedly urged changed management and presciently warned of the Mexican wolf's current plight. The FWS is stalling development of a scientifically valid Mexican wolf recovery plan and promulgation of improved management rules. The agency manipulated data in its internal 2006 review and is pursuing future management to include loosening criteria for private individuals to legally kill wolves, continuing to restrict wolf movements, capping the joint Arizona and New Mexico wolf population at 125 animals, and wiping out wolves that may enter the U.S. from a reintroduction effort in Mexico.

[1]Center for Biological Diversity, P.O. Box 710, Tucson, AZ 85702; michaelr@biologicaldiversity.org

WEDNESDAY, NOVEMBER 18, 8:00 A.M.
MT. ELBERT ROOM
MODERATOR: EVA SARGENT

3. Estimating Population Size Of Reintroduced Mexican Gray Wolves On The Fort Apache Indian Reservation, Arizona

Sarah Rinkevich[1] and Melanie Culver[2]

Answers to some of the most important questions in wildlife conservation and management require reliable data on species' numbers, as well as what they eat. One approach for detecting and estimating abundance of rare wildlife species is noninvasive genetic sampling. Species identification and diet information can be obtained by extracting DNA from scat. Fecal DNA is obtained from sloughed intestinal epithelial cells. Noninvasive fecal DNA sampling has the potential to provide a wealth of information necessary for monitoring and managing endangered species, while eliminating the need to capture, handle or observe rare individuals. Locating enough scat samples for statistical reliability, however, can prove to be difficult. A novel scat collection method using specially trained domestic dogs (*Canis lupus familiaris*) has proven successful in previous carnivore studies. We used scat detection dogs to find fecal samples of reintroduced Mexican gray wolf (*C. l. baileyi*) to estimate population size and diet of the wolves on the Fort Apache Indian and San Carlos Apache reservations. Scat detection dogs were trained using scenting techniques similar to those for narcotics, bomb, and arson detection, as well as search and rescue. The extraordinary sample collection abilities of scat detection dogs, when coupled with the amount of information available from scat, lend considerable strength to these noninvasive genetic approaches in wildlife science.

[1]U.S. Fish and Wildlife Service, 201 N. Bonita Ave., Suite 141, Tucson, AZ 85745; Sarah_Rinkevich@fws.gov

[2]Arizona Cooperative Fish and Wildlife Research Unit, School of Natural Resources, University of Arizona, Tucson, Arizona

WEDNESDAY, NOVEMBER 18, 8:00 A.M.
MT. ELBERT ROOM
MODERATOR: EVA SARGENT

4. Mexican Wolf Recovery, Or Lack Thereof: An Assessment Of Problems And Solutions

David R. Parsons[1]

The Mexican gray wolf (*Canis lupus baileyi*), a subspecies of the gray wolf, is the rarest wolf in North America. First listed as an endangered species in 1976, the Southwestern "Lobo" came within 7 animals of going extinct. It was rescued from near certain extinction through a well-managed captive breeding program under the Species Survival Plan program of the Association of Zoos and Aquariums. Reintroduction of Mexican wolves to the 7,000-square-mile Blue Range Wolf Recovery Area (BRWRA) along the New Mexico/Arizona border began in 1998. The reintroduction plan called for the release of about 70 wolves through the year 2002 with a goal of establishing a self-sustaining population of at least 100 wolves by the end of 2006. The reintroduced population was classified as an experimental, non-essential population under Section 10(j) of the Endangered Species Act, allowing the U.S. Fish and Wildlife Service to adopt discretionary management measures for managing conflicts arising between wolf recovery and human activities, especially livestock grazing, on public national forest lands which comprise 95% of the BRWRA. At the end of 2008, 100 Mexican wolves had been released from the captive population, but the wild population stood at an estimated 52 animals and only two breeding pairs. The population was lower at the end of 2008 than at the end of 2003. To date agency-mandated wolf control has been the primary factor limiting population growth. Solutions for achieving recovery of the Mexican gray wolf are presented.

[1]Rewilding Institute, P.O. Box 13768, Albequerque, NM 87192; ellobodave@comcast.net

WEDNESDAY, NOVEMBER 18, 8:00 A.M.
MT. ELBERT ROOM
MODERATOR: EVA SARGENT

5. Mexican Wolf Reintroduction in Northwestern Mexico

Oscar Moctezuma[1], Helí Coronel Arellano[1], Alejandro González Bernal[1], Nalleli Lara Díaz[2] and *Carlos A. López González[2]

Mexican wolf (*Canis lupus baileyi*) reintroduction to Mexico has been discussed by several groups in Mexico and the US since the late 1980s. In 2006, an initiative from the Mexican government identified six geographic areas for potential release; in 2008 both prey and social attitudes were assessed toward reintroduction goals. From this, two sites Sierra San Luis (Sonora/Chihuahua) and central Chihuahua was identified as the best sites. The site with the least negative attitude was Sierra San Luis, and the Mexican government decided this to be the first site for release in 2009. Naturalia, a Mexican NGO was designated as the entity to carry out the reintroduction. To date this effort include the identification and rehabilitation of wolves to be released, the continued monitoring of potential prey throughout the region, meetings with landowners, development of UMAs, and other government incentives to reduce the impact of wolves on the ranching industry. Prey numbers are sufficient to maintain the number of wolves projected to be released. As expected, prey is not evenly distributed through the landscape making it a need to increment prey in certain areas to reduce conflict with livestock. Compensation for depredation includes strategies to manage livestock different.

[1]Naturalia, A. C. Amores 1104, Col. Del Valle Mexico D.F. omoctezuma@naturalia.org.mx,

[2]Universidad Autonoma de Querétaro, Cerro de las Campanas s/n, Querétaro C. P. 76010, Mexico; Cats4mex@aol.com

*Presenter

WEDNESDAY, NOVEMBER 18, 8:00 A.M.
MT. ELBERT ROOM
MODERATOR: EVA SARGENT

6. The Mexican Gray Wolf Conservation Assessment- Where Do We Go From Here?

Buddy Fazio[1]

The U.S. Fish and Wildlife Service is completing its Mexican gray wolf (*Canis lupus baileyi*) conservation assessment in 2009. The document openly (and bluntly) explains the progress, setbacks and challenges of Mexican wolf recovery during past years. With the pending publication of additional documents, many people are asking, "Where do we go from here in Mexican wolf recovery?" During this brief talk, the new USFWS Mexican gray wolf recovery coordinator provides glimpses of potential paths in future Mexican wolf recovery. Among these, partnerships, interagency cooperation, outreach, and addressing public needs will continue to play vital roles in Mexican wolf recovery success.

[1]U.S. Fish & Wildlife Service, Mexican Wolf Program, 2105 Osuna Road NE, Albuquerque, NM 87113-1001; buddy_fazio@fws.gov

WEDNESDAY, NOVEMBER 18, 8:00 A.M.
MT. EVANS ROOM
MODERATOR: JOHN HADIDIAN

1. From Extirpation To Coexistence: Wolves And U.S. Environmental Policy

Lynne Nemeth[1]

Extirpation of wolves (*Canis lupus*) in most of the continental U.S. was completed by the 1970s. Federal and state agencies, private bounty hunters, individual farmers, and ranchers trapped, shot, and poisoned wolves as a policy for more than 300 years. Just when the last wolves were killed, they were listed as endangered and captive breeding programs began. Today, surveys show that a majority of U.S. citizens support wolf recovery and reintroduction. What happened? I will demonstrate that a number of factors converged to activate modern environmentalism in the 1960s and 70s and to change worldviews with regard to wolves. I will examine the philosophies underlying colonialism and manifest destiny, and trace environmental conservation from Thoreau, Theodore Roosevelt, the Great Depression, and Aldo Leopold through the decades of environmental protection and on to the backlash of the Sagebrush Rebellion, Wise Use movement, and anti-environmentalism of the 1980s and 90s. Wolves and other large carnivores reaped the benefits of modern environmentalism. Once extirpated, wolves, along with the idea of wilderness, became romanticized. We could afford to protect them because they were gone. But now they are back. Although we have made much progress, the roots of utilitarian environmental thinking remain, as do centuries-old myths, and both continue to threaten wolves' conservation status.

[1]Prescott College, 8783 E. Neptune Drive, Flagstaff, AZ 86004-1160; lynnenemeth@npgcable.com

WEDNESDAY, NOVEMBER 18, 8:00 A.M.
MT. EVANS ROOM
MODERATOR: JOHN HADIDIAN

2. "The Language Of Success": What Does It Mean to the Delisted Wolf?

Karlyn I. Atkinson Berg[1]

The intention of the Endangered Species Act (ESA) is to bring species back from peril and delist them when they are recovered. This presentation will examine the language used to hail the success of recovery efforts and to query whether wolf (*Canis lupus*) populations are indeed safely recovered. The discussion will analyze the delisting process and the state plans, including proposed management systems. Are these new strategies going to effectively maintain wolf recovery? Will state wolf plans that include increased depredation control, landowner killing, recreational hunting and/or efforts to reduce wolf populations render wolf recovery short-lived? Will management be driven by pressures from special interest groups, designed by legislators, or founded in science and ecology? This presentation will discuss wolf history and how negative perceptions of wolves are often rooted in old beliefs and rarely based upon scientific knowledge of wolf biology. Opinion surveys describing low social carrying capacity or negative perceptions should not be used as an excuse to abandon the critical biological and ecological needs to protect a species. Nor should the unwillingness of some humans to coexist with wildlife be used as a scientific or ecological measure of how many wolves can successfully occupy a habitat. The presentation will examine the proposed management and the challenges and litigation rationale posed by environmental groups.

[1]Wildlife Education Program and Design, 44781 Bittner's Point Road, Bovey, MN 55709; karlyn@northlc.com

WEDNESDAY, NOVEMBER 18, 8:00 A.M.
MT. EVANS ROOM
MODERATOR: JOHN HADIDIAN

3. The Effect Of Civilization On Wolf Habitat And Wolf Populations

Tamara Gregg[1]

To determine how society and cities affect the survival of wolves (*Canis lupus*), I researched information on wolf habitat, relationships between humans and wolves and legislation on wolves. I have concluded that the most important factor in the viability of wolf populations is human acceptance and human attitudes.

[1]McGill University, 2135 Hingston, Montreal, QC H4A 2H9, Canada; tamara.gregg@mail.mcgill.ca

WEDNESDAY, NOVEMBER 18, 8:00 A.M.
MT. EVANS ROOM
MODERATOR: JOHN HADIDIAN

4. Re-Creating Eden: Scientific Information In The Depiction Of North American Predators In Contemporary Informational Books For Young People

Debra Mitts-Smith[1]

Contemporary informational books for young people provide factual information on the world. Based on research by biologists, animal scientists and zoologists, books featuring other species describe the animal's anatomy, diet, behavior and habitat. More than just conveying information about the animals, however, these works often embed other messages, advocating the preservation of other species. Thus, these books often use scientific information to support environmental or political agendas. Building on my previous study of the visual images of the wolf in contemporary nonfiction for children, this paper expands the analysis to look at bears, mountain lions, wolves and other predators. Since images, especially photographs, play an important role in these books, my presentation will suggest the ways in which they serve as visual evidence of scientific data as well as the ways in which they help form our emotional response to individual species. Finally, I will consider how underlying environmental and political perspectives shape scientific information for their own means.

[1]University of Illinois Urbana-Champaign, Graduate School of Library and Information Science, 600 S Mathews Ave, Urbana, IL 61801; dmittssmith@gmail.com

WEDNESDAY, NOVEMBER 18, 8:00 A.M.
MT. EVANS ROOM
MODERATOR: JOHN HADIDIAN

5. Facts And Values: The Objectivist Stance In Wildlife Management

Kirk C. Robinson[1]

A common belief among wildlife managers is that good wildlife science requires objectivity, and that this, in turn, precludes making value judgments concerning, for example, whether sport hunting is a morally acceptable practice. They see their job as one of using science to illuminate the facts and to fulfill mandates set forth in statutes, not as one of advocating for a particular morality. This view is more likely to be expressed whenever the issue becomes controversial, as predator management usually is. I call the view that scientific objectivity requires a suspension of valuating the "objectivist stance." Implicit in it is the idea that in order to get at the facts of nature, one must eschew all valuation, lest it distort one's perception of, and taint one's representation of, the bare facts. Underlying this view is the tacit assumption that there is an unbridgeable metaphysical gulf between fact and value: that the objective, scientific world—the world as it is in itself, so to speak—consists only of facts, while values are all subjective or "in the mind." I call this view "fact-value dualism" and argue that it is false. Certain general conclusions follow for the objectivist stance and for wildlife management.

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WEDNESDAY, NOVEMBER 18, 8:00 A.M.
MT. EVANS ROOM
MODERATOR: JOHN HADIDIAN

6. Conserving Urban Carnivores: Modeling Humane Treatment

John Hadidian[1]

The rural to urban demographic transition of the last century is often cited as a principal influence for the attitudinal shift by Americans away from predominantly utilitarian to predominantly protectionist sentiments. While such a shift has undoubtedly occurred, there is also little question that the attitudes people hold toward wild animals, and carnivores in particular, are widely open to change. As carnivores become more common and numerous in urban environments, negative interactions with them are on the rise. Depending on their severity, as well as outcome, the experiences urbanites derive from such interactions will increasingly shape how they come to view certain species of carnivores, and ultimately perhaps how they come to support the protection and conservation of carnivores everywhere. It is important that human-carnivore conflicts in urban environments be resolved effectively with lasting, environmentally responsible and humane resolution strategies. This is both a concern for the welfare of the animals themselves as well a concern for creation of better public understanding and support of broader conservation objectives. A model for humane treatment for urban carnivores is proposed, based on best management practices in wildlife damage control, ethical considerations, and the practical need for welfare assessments that can reduce ambiguity in the understandings held by various stakeholders as to what "humaneness" means.

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WEDNESDAY, NOVEMBER 18, 8:00 A.M.
GRAYS PEAK ROOM
MODERATOR: J. CHRISTOPHER HANEY

1. Stable Isotopes Reveal Temporal Variation In Foraging Ecology Of Bottlenose Dolphins From Central West Florida

Sam Rossman[1], Nélio B Barros[2], Hasand Gandhi[1], Peggy H. Ostrom[1] and Craig A. Stricker[3]

For nearly forty years, the Sarasota Dolphin Research Program has generated data on ecology, life history, and behavior of bottlenose dolphins (*Tursiops truncatus*) resident to Sarasota Bay, Florida. Further insights into the ecology of these animals and extended temporal records of foraging were obtained by stable isotope analysis of muscle and teeth from stranded animals. Carbon isotope values ($\partial^{13}C$) indicate fidelity to prey dependent on seagrass (-8') or phytoplankton (-20'), while nitrogen isotope values ($\partial^{15}N$) correlate with trophic level, and sulfur isotope values ($\partial^{34}S$) are useful in distinguishing pelagic (21') from nearshore (~0') ecosystems. Isotope data are good indicators of seagrass dependence, as indicated by the correlation between isotope findings and feeding observations. For example, dolphin FB19 frequently foraged in seagrass (42% of feeding observations) and had a $\partial^{13}C$ of -13.0' while FB195 rarely fed in seagrass (2% of observations) and had a $\partial^{13}C$ of -16.0'. Data from teeth annuli record information over the dolphin's lifetime with the tip representing the oldest dietary signature. Given the longevity of bottlenose dolphins (some live 50 years or more), data for teeth dating back multiple decades facilitate consideration of long-term changes in foraging behavior. While $\partial^{15}N$ hasn't changed since 1955, $\partial^{13}C$ decreased (-9.5' to -12'), indicating a reduced dependence on seagrass possibly associated with reduced abundance of seagrass or changes in foraging location over time. Similarly, muscle $\partial^{34}S$ values (reflecting more recent feeding history) increased during 1991-2006 (5 to 12'), corroborating the interpretation of reduced seagrass dependence.

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WEDNESDAY, NOVEMBER 18, 8:00 A.M.
GRAYS PEAK ROOM
MODERATOR: J. CHRISTOPHER HANEY

2. Assessment Of Felid Diet And Abundance Using Fecal DNA Analysis To Address Predation Management Concerns At The Kofa National Wildlife Refuge, Arizona

Ashwin Naidu[1], Lindsay Smythe[2], Melanie Culver[3] and Ron Thompson[4]

Felid predation has been shown to depress and limit vulnerable prey populations, and this is a concern especially for bighorn sheep (*Ovis canadensis*) populations at the Kofa National Wildlife Refuge in southwestern Arizona. As survey results from the years 2000 to 2008 show, the refuge bighorn sheep population estimates have declined by about 50% of the population estimate in 2000. Refuge personnel have determined the presence of bobcats (*Lynx rufus*) and at least 5 individual pumas (*Puma concolor*) on the refuge using remote cameras in 2007, but their diet and abundance on the refuge are little known. To aid in the assessment of the possible additive or compensatory mortality impact of predation on bighorn sheep by pumas and bobcats on the Kofa National Wildlife Refuge, we are carrying out DNA analyses on non-invasively collected felid fecal samples across the Kofa mountain complexes. Mitochondrial DNA recovered from 72 felid fecal samples collected to date has been used to confirm species identity. The following prey species have been identified from bone fragments inside 27 confirmed puma fecal samples to date - mule deer (*Odocoileus hemionus*), domestic sheep, bighorn sheep, American badger (*Taxidea taxus*) and gray fox (*Urocyon cinereoargenteus*). Microsatellite DNA analysis on the confirmed puma samples has revealed the presence of five unique genotypes. Our immediate objectives are to obtain a minimum population size estimate of pumas on the refuge and also generate a diet profile based on samples belonging to each puma identified. Our long-term objective is to describe seasonal variation in prey selection by both pumas and bobcats on the refuge.

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WEDNESDAY, NOVEMBER 18, 8:00 A.M.
GRAYS PEAK ROOM
MODERATOR: J. CHRISTOPHER HANEY

3. American Badger Diet Evaluation In A Shrub-Steppe Environment In Southeastern Oregon

Katrina L. Huck[1] and Gerald L. Zuercher[2]

The American badger (*Taxidea taxus*) has a reputation for aggressive behavior and is subsequently maligned as a useless nuisance in many places. Moreover, the ecological role that badgers play throughout their range is poorly understood. Badgers are thought to be opportunistic predators. This label may result from a highly plastic diet within the species throughout its range. However, questions of prey selectivity are warranted in specific habitats. Badger diets are not well documented in general. We sought to evaluate the badger's diet in the shrub-steppe environment at Hart Mountain National Antelope Refuge in Southeastern Oregon. In addition, we sought to determine whether prey selectivity occurs. A total of 66 badger scat samples were collected along eight 1-km transects between June and August in 2004 and 2005. Additional badger scat was collected along wandering transects at badger burrows in 2005. Small mammal trapping occurred off of the scat transects in 2004 in order to compare prey selection by badgers with the available small mammal community. In both 2004 and 2005, a large proportion of the badger diet was pygmy rabbit (*Brachylagus idahoensis*), which is a "Species of Special Concern" in Oregon. Under discussion will be diet composition and variation between years and among sites, as well as the implications of badger predation on pygmy rabbits.

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WEDNESDAY, NOVEMBER 18, 8:00 A.M.
GRAYS PEAK ROOM
MODERATOR: J. CHRISTOPHER HANEY

4. A Spatial-Temporal Analysis Of Coyote Diet And Human-Coyote Interactions, With A Focus On Urban Greenspaces In Calgary, Alberta

Victoria Lukasik[1] and Shelley M. Alexander[1]

Coyotes (*Canis latrans*) are behaviorally plastic, which allows them to exploit nearly every habitat type across North America, including urban ecosystems. Unfortunately, when carnivores live in close proximity to people, conflict often arises. Human residents in many urban centers have expressed concern that coyotes threaten their safety. Calgary, Alberta (Canada) is no exception; negative attitudes towards coyotes have been fueled by verified accounts of coyote "attacks" on humans and pets. While never studied in Calgary, it has been postulated that the presence of anthropogenic food sources, particularly garbage, may increase the chance of conflict. To provide a baseline analysis of coyote diet in Calgary, we collected scat in seven study sites from August 2006 to September 2007. Study sites were centered on urban greenspaces that had known coyote activity. Diet was compared across seasons and study sites. Using a Geographic Information System (GIS), we plotted the location of coyote conflicts that were reported by Calgary community members and examined the spatial distribution of conflict type. Our scat analysis indicated that Calgary's coyotes consume primarily wild prey, particularly small rodents and vegetation. Garbage and domestic pets were also found in some scats. Diet changed significantly between sites and between seasons. Our spatial analysis of conflict reports showed that event types were spatially clustered. Future analysis will examine spatio-temporal relationships between conflict and diet. Our findings will be presented to the City of Calgary to establish management practices that promote human-coyote coexistence.

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WEDNESDAY, NOVEMBER 18, 8:00 A.M.
GRAYS PEAK ROOM
MODERATOR: J. CHRISTOPHER HANEY

5. Activity Patterns Of Gray Foxes Coexisting With Coyotes And Bobcats

Damon Lesmeister[1], Clayton K. Nielsen[1], Eric M. Schauber[1] and Eric C. Hellgren[1]

Differences in temporal activity patterns are one form of niche partitioning in guilds of several taxonomic groups including carnivores. Gray foxes (*Urocyon cinereoargenteus*) are ecologically and economically important mesocarnivores that occur sympatrically throughout much of their geographic range with coyotes (*Canis latrans*) and bobcats (*Lynx rufus*). Although gray fox habitat selection may be influenced by presence of larger carnivores, it is unknown whether gray foxes alter their temporal activity patterns in sites where coyotes and bobcats are present. Using 120 remote cameras, we surveyed for these three species in 274 2.6 km^2 sections during winters of 2008 and 2009 in the 16 southernmost counties of Illinois, USA. We measured gray fox activity by the frequency of detection in patches known to be occupied and used Poisson regression models to test whether sympatric occurrence with coyotes and bobcats is associated with differences in daily gray fox activity patterns. We analyzed 173 (67% nocturnal, 32% crepuscular, 1% diurnal) photographs of gray foxes in 55 sections, 105 photographs of coyotes in 41 gray fox-detected sections, and 37 photographs of bobcats in 19 gray fox-detected sections. Gray foxes were primarily nocturnal, and the temporal pattern of activity was apparently not affected by the presence or activity of coyotes or bobcats. Given the lack of significant daily activity pattern results, the mesocarnivore guild in southern Illinois may be more spatially than temporally partitioned.

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WEDNESDAY, NOVEMBER 18, 8:00 A.M.
GRAYS PEAK ROOM
MODERATOR: J. CHRISTOPHER HANEY

6. A Conditioned Taste Aversion Protocol to Reduce Conflict Between Large Predators and Domestic Livestock when Predators Are Released into Habitats with Agricultural Activity

Lowell Nicolaus[1] and Dan Moriarty[2]

Free-ranging predators that consume meat baits with a hidden dose of an illness-inducing aversion agent can form a conditioned aversion to prey that have the same taste and scent. Since treated predators typically avoid these prey at a distance wherever they are encountered, this process has been proposed as a means of mitigating conflicts between predators and domestic livestock. A new, relatively tasteless, effective and humane aversion agent, Thiabendazole (TBZ) was consumed in meat baits by captive wolves at the California Wolf Center. All of the wolves (*Canis lupus*) recovered fully within six hours and none were attacked by others in their pack while under the temporary influence of TBZ. Though the intended mean dose of TBZ was 120 mg TBZ/Kg wolf body weight, recovery was complete even for elderly and small wolves that consumed as much as 200 mg/Kg body weight. Subsequent to treatment, all wolves, including those that consumed less than the intended dose of TBZ, demonstrated obvious aversion to the taste and scent of the meat baits in over as many as 14 separate one-hour trials spanning several weeks and in occasions when TBZ was no longer present in baits. Observations suggested several measures to improve fidelity between taste and scent of TBZ treated meat baits consumed in captivity so that released predators adequately express aversion to the taste and scent of livestock.

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WEDNESDAY, NOVEMBER 18, 8:00 A.M.
LONGS PEAK ROOM
MODERATOR: GERALD ZUERCHER

1. Road Avoidance In The Calakmul, Mexico, Using Remote Cameras And Tracking

Typhenn Brichieri-Colombi[1] and Shelley Alexander[1]

In 2007, the Mexican government started to widen a major highway (Highway 186) that traverses the Calakmul Biosphere Reserve, Mexico, from two to four lanes. Roads have many negative effects on wildlife that can propagate into the area on either side of roads (called road effect zone). One of these is road avoidance. We compared the distribution of jaguar (*Panthera onca*), puma (*Puma concolor*), ocelot (*Leopardus pardalis*) and grey fox (*Urocyon cinereoargenteus*), and their prey, including white-tail deer (*Odocoileus virginianus*), red-brocket deer (*Mazama americana*), and collard peccary (*Pecari tajacu*) within a 2-km road effect zone of Highway 186. We expected that sensitive species would occur at greater distances from the highway, which may indicate road avoidance. Our objectives were to compare relative activity (RA) of wildlife species at increasing distances from the highway, and to examine differences amongst years and between seasons. From May to August 2008 and April to August 2009, we placed 25 cameras on 10 roads perpendicular to the highway at 50m, 750m and 2000m from the highway. In addition, each road was walked weekly to record tracks and signs of wildlife. RA of a species at a camera station was calculated as the number of photos of that species divided by the number of functional camera days. Differences in species distribution within the road effect zone, amongst years and between seasons, were examined using chi-square and Kruskal-Wallis H-test, respectively. RA of focal species differed by distance from the highway. Differences between years were observed but cannot yet be attributed to road widening; these results provide the baseline data necessary for such analysis.

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WEDNESDAY, NOVEMBER 18, 8:00 A.M.
LONGS PEAK ROOM
MODERATOR: GERALD ZUERCHER

2. Jaguar Paradise? Human Boundaries In Conservation Management And Consequences Of Limited Protection

David Jones[1], Sara Tiago Calçada[1] and Rebeca A. Chaverri[1]

Recent work in Costa Rica suggests that jaguar (*Panthera onca*) presence is increasing on the beach of Tortuguero National Park, an area identified by "Jaguars in the New Millennium" as being of high priority for jaguar conservation. There are various degrees of protection offered by the area, from the Indio-Maiz Wildlife Refuge in Nicaragua to the adjoining Barra del Colorado Wildlife Refuge, culminating in the National Park at the southern most extent. The greater number of jaguar records inside the park have coincided with an enormous increase in jaguar-predated green turtles (*Chelonia mydas*). One suggestion for this phenomenon is that the staggered degrees of protection have resulted in funneling species towards the haven of the National Park. Unfortunately, as land use changes around the protected areas and vital habitat continues to disappear, a perhaps inevitable and yet unprecedented conflict has arisen, which highlights the limitations of protecting areas in isolation. Latest work indicates that the jaguar ranked among the top three threats to one of the world's largest nesting populations of green turtles. In an area famed for its turtles and associated conservation efforts, lack of scientific understanding could result in a backward step for this vital jaguar population. We discuss the theory and examine possible management strategies and areas of investigation that could allow a greater degree of protection for both flagship species, as it becomes clear that holistic measures are needed to avoid conflict with carnivores as our natural habitats continue to shrink and disappear.

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WEDNESDAY, NOVEMBER 18, 8:00 A.M.
LONGS PEAK ROOM
MODERATOR: GERALD ZUERCHER

3. Epidemiologic Relation Between Jaguars And Domestic Animal Populations In Three Brazilian Biomes: Cerrado, Pantanal And Amazon

Mariana Malzoni Furtado[1,2], Ana Tereza de Almieda Jácomo[1], Leandro Silveira[1], Rahel Sollmann[1], Natália Mundim Tôrres[1], Cassia Ikuta[2] and José Soares Ferreira Neto[2]

Habitat fragmentation and the increasing proximity between humans, domestic and wild animals can result in emergence and re-emergence of diseases, dissemination of pathogens, and alterations in host-pathogen relationships. Diseases have been responsible for recent declines in large felids, however, little is known about their potential role in wild jaguar (*Panthera onca*) populations. This ongoing study surveys the sanitary status of jaguar populations at three sites in distinct Brazilian biomes. Biological samples are being collected from free-ranging jaguars and domestic animals living close to known resident jaguar populations. Samples have already been collected from 46 jaguars and 1474 domestic animals (1246 cattle, 52 horses, 162 dogs, 14 cats) in the Cerrado, Pantanal and Amazon study areas. Serological surveys for antibody detection of *Toxoplasma gondii*, *Leptospira* spp., and *Brucella abortus* have already been performed for 40 jaguars and 859 domestic animals. Preliminary results showed that 100% of the jaguars in the three biomes were seropositive to *T. gondii*; that 37.5% of the jaguars and 71.8% of the domestic animals were exposed to *Leptospira*, both populations being positive for the same sorovars; and that while 10% of the cattle sampled was antibody positive for *B. abortus*, no jaguars were positive for this agent. All captured jaguar were in good physical condition with no clinical signs for any of these diseases. These results suggests that a sylvatic cycle for Toxoplasmosis and possible transmission from domestic animals might exist, which should be taken into account in conservation strategies for jaguar populations in the areas.

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WEDNESDAY, NOVEMBER 18, 8:00 A.M.
LONGS PEAK ROOM
MODERATOR: GERALD ZUERCHER

4. Andean Bear Limitation Of Grassland Bromeliad Use

Kristina Timmerman[1]

Throughout the South American Andes, Spectacled bears (*Tremarctos ornatus*) enter páramo grasslands to consume plant tissue of the giant puya (*Puya clava-herculis*). The goal of this study was to determine if bears use the puya resource equally throughout the páramo or if there are limits to how far they will travel into open, more exposed habitat. The study was conducted in the southern regions of Sangay National Park, Ecuador (January 2006). Two categories of puya were identified; randomly selected plants (N = 25) and consumed plants discovered after extensive searching throughout the reserve (N = 25). Data collected at each plant included: distance to forest, slope, aspect and horizontal visual cover. Of the measured variables, two were significant. Average distance-to-forest in the random and consumed group, respectively, were 152 and 48 meters; this difference was significant ($\square 2 = 28.75$, $p = <0.001$, $df = 1$). Horizontal visual cover was significantly different between the two groups ($t = 21.03$, $p = 0.002$, $df = 1$). There are two primary threats to this species. First, since bears take human agricultural products (corn, livestock), they are shot at by members of mountain communities. Second, continual habitat conversion/fragmentation reduces plant availability. This study documents that bears limit their travel from cover to consume puya and this may be due to the human/wildlife interaction. In addition, habitat conversion to agricultural practices reduces the availability of this plant species and therefore, may have a direct impact in the conservation of this charismatic, flagship species.

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WEDNESDAY, NOVEMBER 18, 8:00 A.M.
LONGS PEAK ROOM
MODERATOR: GERALD ZUERCHER

5. Matrix Matters: Agricultural Expansion And The Plight Of The Maned Wolf In The Brazilian Cerrado

Carly Vynne[1], Mario B. Ramos Neto[2], Ricardo B. Machado[2], Jader Marinho-Filho[3], Anah Jácomo[4], Leandro Silveira[4] and Jonah L. Keim[5]

Emas National Park (ENP), Brazil, has historically been considered a stronghold for the survival of the maned wolf (*Chrysocyon brachyurus*), which is endemic to the grasslands of central South America. Land clearing and agricultural intensification outside of ENP have been rapid and expansive and the Park now stands as a virtual island in a sea of agriculture. This project seeks to assess how these land use practices are affecting this critical population of maned wolves. We employ a number of novel, noninvasive methods to examine the population status and physiological health of the wolves in ENP and the surrounding region. Specially-trained detection dogs were used to non-invasively acquire more than 800 scat samples across a diversity of habitat conditions. DNA analysis of the samples was used to positively identify the species, gender, and number of unique individuals in the population, and spatial analyses and resource selection functions were applied to understand ranging behavior and habitat preferences. Steroid and thyroid hormones extracted from the samples are enabling us to establish profiles of the stress, reproductive, and nutritional health of the wolves in relation to their distance from the park, habitat use, diet, and parasite load. Together, these novel methods are providing critical information on the status and physiological health of an at-risk species on a scale that has rarely been achievable for wildlife. Such information will contribute to the conservation and management of maned wolves, simultaneously providing an important model for similar applications to other threatened species.

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WEDNESDAY, NOVEMBER 18, 8:00 A.M.
LONGS PEAK ROOM
MODERATOR: GERALD ZUERCHER

6. Marine Mammal Habitat In Ecuador: Seasonal Abundance And Environmental Distribution

Julia O'Hern[1], Douglas C. Biggs[1], Keith D. Mullin[2], Kevin Barry[2] and Edwin Pinto[3]

Marine mammals in the Eastern Equatorial Pacific play a vital ecological role in structuring trophic systems and the distribution of commercially valuable prey. However, scientific study of their populations within the waters surrounding Ecuador has been only infrequently conducted and largely neglected over the past decade. Our research is investigating the distribution of marine mammals inhabiting the oceanic areas between the Ecuadorian mainland and around the Galápagos Islands. The first two of six marine mammal surveys took place aboard the Ecuadorian Navy's Oceanographic Vessel the (B/I) *Orion* in September/October 2008 and April 2009. Visual observers documenting marine mammal sightings found both a range of different species positively identified as well as a large proportion of sightings that could not be identified to species using current survey methodologies. This suggests that the diversity and overall marine mammal abundance within Ecuadorian waters may be much higher than previously suspected. Four more surveys covering similar periods of the year will be conducted over the next two years. Oceanographic cruises aboard the *Orion* provide an excellent platform for regular marine mammal surveys to assess the current range of species present in Ecuadorian waters as well as establish a system of surveys that will improve marine resource management in this sensitive ecosystem. These surveys combined with remote sensing data from NASA's Earth Observing Sensor MODIS (Moderate Resolution Imaging Spectroradiometer), will provide useful insight into how the distribution of marine mammals is structured in this region in relation to physical environmental features and the underlying biology.

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WEDNESDAY, NOVEMBER 18, 10:30 A.M.
MT. ELBERT ROOM
MODERATOR: MARCO MUSIANI

1. Socio-Political Ecology Of Wolf-Induced Trophic Cascades

Carlos Carroll[1], David J. Mattson[2], John. A. Vucetich[3], Michael P. Nelson[4] and Mark Hebblewhite[5]

The ecological role of carnivores, including interactions involving wolves (*Canis lupus*), ungulates, and vegetation, have received much recent attention from both scientists and the public. This represents a positive step towards an increased emphasis on ecosystem dynamics rather than single-species management paradigms. However, much uncertainty remains concerning the strength and generality of the ecological effects of wolf restoration. Although the existence of trophic cascades may strengthen arguments for carnivore restoration, overgeneralization of conclusions as to the ecosystem effects of carnivores may ultimately weaken the legitimacy of conservation organizations as science communicators. Claims for the universality of top-down regulation of prey populations may conflict with previous arguments that wolf restoration can occur without numeric impacts to hunted ungulate populations. Basing arguments for species restoration primarily on the utilitarian value of species to humans rather the intrinsic value of species to exist may impact support for broader biodiversity conservation goals. Fluctuations of predator and prey populations, rather than a "balance of nature," are to be expected in ecosystems, and predator restoration may often not be sufficient to recover past ecosystem function and dynamics. The strength of top-down effects will likely depend on the diversity of predator and prey communities, the productivity of an ecosystem, and how "ecologically-effective" predator populations are allowed to become. How can we increase public awareness of ecosystem dynamics without misrepresenting the strength of the data on trophic cascades? How can our increasing knowledge of both the importance and complexity of ecological interactions best influence the development of carnivore conservation policies?

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WEDNESDAY, NOVEMBER 18, 10:30 A.M.
MT. ELBERT ROOM
MODERATOR: MARCO MUSIANI

2. Trophic Cascades Involving Humans, Wolves, Elk, And Aspen: Defining An Ecologically Effective Wolf Population

Cristina Eisenberg[1] and William Ripple[1]

Trophic cascades feature a strongly interacting species that is a top carnivore, which influences the abundance and behavior of its primary prey, thereby indirectly affecting its prey's food consumption. An ecologically effective population of a top carnivore is one capable of triggering trophic cascades. In the case of the gray wolf (*Canis lupus*), this dynamic can shift an ecosystem from a phase state characterized by intensely browsed vegetation, to one in which vegetation thrives and can provide habitat for many species, such as songbirds. The concept of a minimum viable population has been used traditionally to set target population levels for delisting decisions under the ESA. By these measures, it has been argued that the wolf in the northern Rocky Mountains is fully recovered. We suggest here that an ecologically effective population of wolves, defined as a population capable of triggering trophic cascades, may be a more scientifically sound approach. Ecologically effective densities are relative, because ecosystems are complex; however, phase states are measurable using standard vegetation sampling methods. Applying ecological effectiveness to management will involve identifying trophic cascades processes and developing a quantitative protocol for classifying any given ecosystem as supporting an ecologically effective population of a target species. Within this framework, a recovered population of wolves would be defined based on the persistence of a desired phase state. We present the Crown of the Continent Ecosystem in the northern Rocky Mountains to illustrate how this management strategy might work.

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WEDNESDAY, NOVEMBER 18, 10:30 A.M.
MT. ELBERT ROOM
MODERATOR: MARCO MUSIANI

3. A Cross-System Comparison Of The Ecosystem Effects Of Wolves In Banff, Isle Royale, And Yellowstone

Mark Hebblewhite[1], Doug W. Smith[2] and John A. Vucetich[3]

Wolf (*Canis lupus*) recolonization has restored a key ecological process to many ecosystems—predation, generating a wide array of scientific and public interest, both positive and negative. Unfortunately, there have been hasty conclusions about the role of wolves in ecosystems that hampers our scientific understanding. In this review, we use cross-system comparisons to test for ecosystem effects of wolves on ungulates in Isle Royale, Banff National Park and Yellowstone National Park. Wolves acted as an important source of direct mortality on ungulates in all 3 systems. Yet the strength of this direct effect and whether it regulated ungulates to low density remains uncertain. Wolves also appeared capable of changing ungulate behavior indirectly in ways that likely increase mortality through risk-forage trade-offs. In all three systems, wolf predation had cascading effects to a host of other species, yet there was evidence that the cascading effects of wolves 'trickled' down through lower trophic levels. While some species appeared to 'benefit' from wolf predation, wolves may have hastened the extirpation of endangered woodland caribou (*Rangifer tarandus caribou*) in Banff. Especially when considering the long-term data from Isle Royale, it was clear that the strength of ecosystem impacts of wolves will be variable and influenced by the same factors that influence wolf-ungulate dynamics, particularly climate, harvest, and disease. We conclude that conservationists would be wise to consider both potential positive and negative effects of wolves, and accept that the ecosystem effects of wolves will be mediated by changes in ungulate abundance.

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WEDNESDAY, NOVEMBER 18, 10:30 A.M.
MT. ELBERT ROOM
MODERATOR: MARCO MUSIANI

4. Do Wolves Buffer Ecological Communities From Anthropogenic Climate Change?

Christopher Wilmers[1], Doug Smith[2], John Vucetich[3], Rolf Peterson[3] and Eric Post[4]

Anthropogenic climate change threatens to reshuffle the earth's biota as species seek out new habitats in response to underlying changes in the biotic and abiotic environment. Ecosystems with intact top predator guilds might be under stronger biotic regulation than those lacking in predators, and so might be more resistant to climate change impacts. We explore this question in the context of two case studies: the interacting effects of wolves (*Canis lupus*) and climate on 1) scavengers in Yellowstone National Park and 2) moose (*Alces alces*) populations in Isle Royale National Park. In Yellowstone, we find that wolves buffer the impacts of climate change on scavengers by mitigating late winter carrion availability. In Isle Royale, we find that wolves lessen the impact of climate variability on moose population dynamics by reducing competition among moose for forage resources. These results suggest that species inhabiting ecosystems with intact predator communities will be able to adapt to climate change over a longer time scale more commensurate with natural processes.

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WEDNESDAY, NOVEMBER 18, 10:30 A.M.
MT. EVANS ROOM
MODERATOR: TIM DUNBAR

1. Cougar Habitat Use, Social Organization and Human Interactions In Washington

Benjamin Maletzke[1], *Brian Kertson[2], Gary Koehler[3], Robert Wielgus[1] and Hilary Cooley[4]

Residential development in cougar (*Puma concolor*) habitat has increased in recent decades and human-cougar interactions are becoming more common. To understand how residential development patterns and cougar space use may contribute to cougar-human interaction, we analyzed the movements and spatial organization of cougar populations near two Washington State communities, Cle Elum, Kittitas County, and Kettle Falls, Stevens County, from 2001-2008. We captured and outfitted 45 cougars >1 years of age with Lotek 4400 and Televilt Simplex, Posrec, and Tellus GPS collars programmed to attempt a location fix every 4-6 hours. Mortality rates were lower in Cle Elum (0.11 ± 0.04) than Kettle Falls (0.24 ± 0.05), with more consistent home range sizes and configurations. Higher mortality rates in Kettle Falls may have contributed to larger male home ranges and greater overlap between individuals. Despite similar human and livestock densities, the Washington Department of Fish and Wildlife receives fewer interaction reports in Kittitas County (1-11 per year), whereas Stevens County receives 21-50 documented cougar incidents per year. Observed differences between interaction levels may stem from differences between the age structure and space use patterns of the cougar populations coupled with differences between residential development patterns and social tolerance. Preliminary analysis of several individual cougars collared for >4 years display a shift in cougar movements and a withdrawal from areas of large-scale development. Understanding how cougars utilize areas where human development is expanding in cougar habitat may offer tools for managers to potentially minimize human-cougar conflict.

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*Presenter

WEDNESDAY, NOVEMBER 18, 10:30 A.M.
MT. EVANS ROOM
MODERATOR: TIM DUNBAR

2. Cores And Corridors: Mountain Lions At The Edge In Southern California

Winston Vickers[1], Michael J. Puzzo[1], Brian Cohen[2], Scott Morrison[3] and Walter M. Boyce[1]

We monitored the movements and behavior of 11 GPS-collared mountain lions (*Puma concolor*) in southern California at the urban-wildland interface. Despite a hard urban edge, the Santa Ana Mountains south of Los Angeles continue to serve as core habitat for mountain lions. However, the size of this core leaves this refuge susceptible to catastrophic wildfires, and the few viable corridors to other core areas are disappearing. Fire consumed entire lion territories during the course of the study, and no emigration from the Santa Ana Mountains in any direction was documented. Mountain lions frequently tested the urban fringe, both during territory establishment and afterward, in some cases following greenbelts that extend into and around residential areas. Along the urban edge they preyed on deer, skunks, rabbits, raccoons, coyotes and bobcats that may be present in higher densities where greenbelts and landscaping provide nutrition and water in a landscape that would be dry much of the year. Human-related threats to this population include automobile strikes, poaching, rodenticide exposure, arson-caused landscape-scale wildfires, and killing of lions due to depredation of domestic animals or perception of a threat to public safety. Additionally, continued development is likely to lead to further barriers to migration and loss of habitat, posing both short and long term threats to this population.

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WEDNESDAY, NOVEMBER 18, 10:30 A.M.
MT. EVANS ROOM
MODERATOR: TIM DUNBAR

3. Mountain Lion Movements And Mortality Relative To Roads And Development In A Fragmented, Urban Landscape In Southern California

Seth Riley[1], Jeffrey A Sikich[1], Eric C. York[1]† and Raymond M. Sauvajot[1]

Urbanization and the resultant habitat loss and fragmentation can have significant impacts on wildlife movement and survival, especially for large carnivores such as mountain lions (*Puma concolor*). From 2002-2009, we used GPS collars to study the behavior, ecology, and conservation of mountain lions (n=12) in and around Santa Monica Mountains National Recreation Area, a national park west of Los Angeles. On average, mountain lion home ranges included less developed areas or natural habitat close to development, and more area >1 km from development, than the study area as a whole. Roads are a critical feature of the landscape, with freeways separating large core habitat areas and secondary and tertiary roads threading throughout remaining natural areas. Mountain lions crossed all types of paved roads through the Santa Monica Mountains, on average 12 times/month and as many as 20 times/month for one adult male. Importantly, lions occasionally crossed major freeways including Highway 118 and once, in 2009, Highway 101, a critical potential barrier separating the Santa Monica Mountains from other habitat to the north. Roads were also a major source of mortality for both collared and uncollared animals. Two animals were killed on a major secondary road through the mountains that other collared lions regularly crossed successfully, and three uncollared lions were killed on busy freeways, including one right above a wildlife underpass. Even though mountain lions inhabit a region near urban areas with many roads and trails and recreating humans, to date there have been minimal encounters and conflicts with people.

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WEDNESDAY, NOVEMBER 18, 10:30 A.M.
MT. EVANS ROOM
MODERATOR: TIM DUNBAR

4. Effects Of Fire On Mountain Lion Movement And Habitat Use In Southern California

Megan Jennings[1], Rebecca L. Lewison[1] and Walter M. Boyce[2]

In the Mediterranean climate of southern California, fire is one of the most important and ubiquitous natural elements that drives landscape-scale changes. Since 2001, over 30 mountain lions (*Puma concolor*) in San Diego County have been captured and collared, and their movements tracked by GPS satellite collars. During this time period, over 20 fires were recorded in areas where collared mountain lions range. We analyzed these spatial data to determine if wildfire and the subsequent change in the landscape directly or indirectly affect mountain lion movement and habitat use. We studied utilization of burned and unburned sites by mountain lions to examine how habitat usage, home range size and overlap in home ranges varied with fire exposure, intensity and magnitude. Data on home range size was estimated with the adaptive kernel and minimum convex polygon methods and plotted in ArcGIS. Habitat use relative to fire parameters was examined with compositional analysis. Using a logistic regression model, we also considered whether patterns of use within the burned areas changed relative to vegetation (cover) and prey populations. We examined metrics such as home range size and location, distances moved, rate of movement, location and timing of dispersal events, and home range overlap to determine responses to burned and unburned habitats. Our analyses highlight the importance of understanding landscape-level responses of sensitive wildlife species, particularly in systems that face the conservation challenge of multiple anthropogenic disturbances.

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WEDNESDAY, NOVEMBER 18, 10:30 A.M.
GRAYS PEAK ROOM
MODERATOR: RICHARD READING

1. The Ecological Role Of The Mammalian Mesocarnivore

Gary Roemer[1], Matthew E. Gompper[2] and Blaire Van Valkenburgh[3]

Large mammalian carnivores are ecologically important because relatively few individuals can cause strong predation-driven direct effects or fear-driven indirect effects that can ripple through communities and ultimately influence ecosystem structure and function. However, most mammalian carnivores are not large; rather, they are small to mid-sized species collectively termed mesocarnivores. Mesocarnivores are more numerous, more diverse and often reside in closer proximity to humans, yet we know little about how they influence communities and ecosystems. We review the ecological role of the mesocarnivore and present examples where mesocarnivores drive community structure and function in roles similar to, or altogether different from, their larger brethren. Together, these examples substantiate the need for an assessment of the ecological role of mammalian carnivores beyond an examination of only the largest species. In particular, we emphasize the need for study of the trophic penetrance of mesocarnivores and how ecological context modulates their functional role.

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WEDNESDAY, NOVEMBER 18, 10:30 A.M.
GRAYS PEAK ROOM
MODERATOR: RICHARD READING

2. Competition And Ecological Separation Between Corsac And Red Foxes In Mongolia

James Murdoch[1], Tserendorj Munkhzul[2], Suuri Buyandelger[3], Richard P. Reading[4] and Claudio Sillero-Zubiri[1]

Competition has the potential to profoundly affect behavior and community ecology. Among canids, competition often occurs and may be reduced by partitioning the use of food, time and habitat resources. However, competition studies have focused mainly on larger species in North America, Sub-Saharan Africa and South America, and details of the competitive relationships between many of the smaller foxes are few. We examined possible competition between the corsac fox (*Vulpes corsac*) and red fox (*Vulpes vulpes*), which live sympatrically across central Asia. We documented survival and mortality and compared food, activity and habitat selection among radio-marked foxes (n = 18 corsacs; n = 17 red foxes) in Ikh Nart Nature Reserve, Mongolia, from September 2004 to September 2007. Survival probability was 0.34 for corsacs and 0.46 for red foxes, and mortality of both species resulted mostly from human hunting, but also from larger canids and unknown causes. Corsac and red foxes exhibited similar diets that consisted mainly of insects and small mammals, but also reptiles, birds, carrion, plant material and garbage. We detected differences in diet during most of the year, except in winter when food resources were scarce. Corsac and red foxes also exhibited similar activity patterns, in that both species were active mainly at night, but fine-scale differences in nocturnal movements were evident. Both species occurred in all major habitats, but we detected differences in habitat selection at multiple spatial scales. Our results suggest that interference competition occurs between species and that competition is reduced through niche separation.

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WEDNESDAY, NOVEMBER 18, 10:30 A.M.
GRAYS PEAK ROOM
MODERATOR: RICHARD READING

3. Incorporating Intraguild Competition Into Mesocarnivore Landscape Models

Matthew Gompper[1]

Carnivore communities are structured by two basic processes: habitat associations of individual species and competitive dynamics among guild members. Habitat ecology forms the basis for most models of carnivore landscape ecology, but interspecific competition has yet to be fully incorporated into efforts to devise predictive landscape models. To address these themes in concert, I discuss our work in the U.S. and India to create predictive landscape models for multiple putatively competing mesocarnivores. In the forested Ozarks of Missouri, USA, we examined: coyote (*Canis latrans*), bobcat (*Lynx rufus*), gray fox (*Urocyon cinereoargenteus*), striped skunk (*Mephitis mephitis*), eastern spotted skunk (*Spilogale putorius*), raccoon (*Procyon lotor*), and opossum (*Didelphis virginiana*); and in arid rural Maharashtra, India: Indian fox (*Vulpes bengalensis*) and domestic dog (*C. lupus familiaris*). We combined noninvasively derived survey data (in the U.S.) or radiotelemetry data (India) with multiscale habitat and environmental variables to model the habitat associations of each species. We also assessed the effects on models of predicted occupancy by including the presence data for the other guild members during the model building process. For each examined scenario (coyote-bobcat, coyote-gray fox, bobcat-gray fox, raccoon-possum, striped skunk-spotted skunk, Indian fox -domestic dog) where we hypothesized *a priori* that intraguild competition may be an important driver of the probability of landscape occupancy, this prediction was upheld. Inclusion of information on the distribution of potential competitors improved the fit of the models over alternative models that were based solely on habitat associations. Thus, incorporating the predictions of intraguild competition alongside the more traditionally used habitat data provides a more ecologically holistic understanding of the distribution of species.

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WEDNESDAY, NOVEMBER 18, 10:30 A.M.
GRAYS PEAK ROOM
MODERATOR: RICHARD READING

4. Influence Of Predation And Landscape Characteristics On Swift Fox Ecology

Eric Gese[1] and Craig M. Thompson[2]

Trophic level interactions between predators can create complex relationships, including intraguild predation. Theoretical research has predicted two possible paths to stability in intraguild systems: intermediate predators either out-compete higher order predators for shared resources, or they select habitat based on security. The effect of intraguild predation on swift foxes (*Vulpes velox*) is not well understood. We examined the relationships between swift foxes and both their predators and prey, as well the effect of vegetation structure on swift fox/coyote (*Canis latrans*) interactions, between August 2001 and August 2004. In a natural experiment in southeastern Colorado, we documented swift fox survival and density in a variety of landscapes and compared these parameters in relation to prey availability, higher order predator abundance and vegetation structure. Swift fox density varied between study sites, while survival did not. Coyote abundance was positively related to the basal prey species and vegetation structure, while swift fox density was negatively related to coyote abundance, basal prey species and vegetation structure. Our results support the prediction that under intraguild predation, top predator distribution matches resource availability (resource-match), while intermediate predator distribution inversely matches predation risk (safety match). While predation by coyotes may be the proximate cause of swift fox mortality, the ultimate mechanism appears to be exposure to predation moderated by shrub density.

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WEDNESDAY, NOVEMBER 18, 10:30 A.M.
LONGS PEAK ROOM
MODERATOR: C.J. HAZELL

1. Diet Overlap Of Predators In The Greater Blue Mountains World Heritage Area

Jack Pascoe[1] and Robert C Mulley[1]

The Greater Blue Mountains World Heritage Area consists of over one million hectares of contiguous reserves. A complex array of predators, including native and exotic species, inhabits this area of international significance. Their combined presence within shared habitat and proximity to grazing lands creates a suite of environmental and agricultural management issues. The predators under investigation include dingoes (*Canis lupus dingo*), foxes (*Vulpes vulpes*), quolls (*Dasyurus maculatus*), feral cats (*Felis catus*), lace monitors (*Varanus various*) and a number of raptors. This study explores dietary overlap between exotic generalist predators and sympatric native competitors. Results indicate that the apex predator, the dingo, has a high degree of dietary overlap with the fox, and combined diet and passive activity index data suggests the dingo may act as a suppressant to fox populations. Further the fox also has high levels of diet overlap with other native predators, including the spotted-tailed quoll, which has already undergone significant range restrictions. A major concern for management of this area is that ongoing lethal control of dingoes may lead to population increases of exotic mesopredators and subsequent increases in both competition and predation pressure on both native prey and predator species respectively.

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WEDNESDAY, NOVEMBER 18, 10:30 A.M.
LONGS PEAK ROOM
MODERATOR: C.J. HAZELL

2. Declining Wolf Populations And Expanding Golden Jackal Range: An Example Of Mesopredator Release In The Kyrgyz Republic?

C. Hazell[1]

Wolf (*Canis lupus*) populations have been extirpated or are declining in most of their historical range, including in the Kyrgyz Republic, where they have been declining since independence from the Soviet Union in 1991. During that same time period, golden jackals (*C. aureus*) have extended their range in Kyrgyzstan. First recorded in Kyrgyzstan in 1980 on the northern shore of Lake Issyk Kul, they have expanded to almost all of the lower elevation territory in the country with expansion continuing up into the mountains. I investigated the relationship between declining wolf populations and jackal range expansion in the Lake Issyk Kul region from 2002-2005. I recorded track and scat locations of jackals from October-June, and for wolves during the winter when they migrated down from the mountains to the lower elevations where jackals lived year-round. Even though jackals and wolves overlapped in their territory use during the winter, jackal tracks were never found during the same immediate time period with wolf tracks. In 2004 and 2005, wolf presence in the lower foothills declined from previous years. Jackal scat was found on ridgetop trails and local farmers heard jackals howling from the foothills for the first time during that time period. This strong correlation could be evidence for the mesopredator release of jackals. More research is needed on the interaction of wolves and jackals as well as on the impact of jackals on existing ecosystems.

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WEDNESDAY, NOVEMBER 18, 10:30 A.M.
LONGS PEAK ROOM
MODERATOR: C.J. HAZELL

3. Predation From Eurasian Lynx Causes Decline In Roe Deer Population

Henrik Andren[1] and Olof Liberg[1]

We studied the predation rate on roe deer (*Capreolus capreolus*) by Eurasian lynx (*Lynx lynx*), by intensive radio tracking of lynx to get kill rate and by roe deer survey in south-central Sweden (around Grimsö Wildlife Research Station). The overall kill rate was 4.2 roe deer per month and lynx. However, male kill rate (4.2 roe deer/month) was higher than lone females (2.4 roe deer/month). Lynx family groups (mother with one or two kittens) had the highest kill rate (4.7 roe deer/month), but kill rate per lynx was about the same as for lone females. We could not detect selection for sex or age class in the roe deer killed by lynx. The estimated predation rate on a local roe deer population (1200 km^2) was about 10% and we have seen a decline in the roe deer population, from 5 roe deer per km^2 in 1996 to 2 roe deer per km^2 in 2005 (yearly decline by 11% since lynx re-colonized the area in 1997). On a larger geographical scale we have followed the changes in both lynx and roe deer densities during 13 years in 7 regions (between 10,000 and 20,000 km^2). Using prior knowledge of roe deer growth rate and lynx kill rate we fitted the density patterns of lynx and roe deer to a classical Lotka-Volterra predator-prey interaction, which resulted in damped cycles towards low density of both the predator and the prey.

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WEDNESDAY, NOVEMBER 18, 10:30 A.M.
LONGS PEAK ROOM
MODERATOR: C.J. HAZELL

4. Why Has The Cheetah Project Failed In Iran?

M. Karami[1]

The Iran Department of Environment (DOE) recently evaluated the results of the first phase of a project on cheetahs (*Acinonyx jubatus*) in Iran. Prominent biologists had participated in the project, including Dr. George B. Schaller. However, the project seemed to be a total failure in almost all aspects. The National Coordinator of the project has prepared and submitted a rather rudimentary draft for the second phase to the steering committee for approval. The question remains as to why a project that enjoyed so much support, both internally and internationally, should have such disastrous results. What failed and how can we improve big cat conservation and management in Iran? Should we continue relying only on foreign experts or should we develop a network of local and international scientists to carry out such projects? How should we engage people in our conservation projects?

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Lunchtime Talk: A New Era for Wolves and People: Wolf Recovery, Human Attitudes, and Policy

WEDNESDAY, NOVEMBER 18, 12:00 P.M.
MT. ELBERT ROOM

Marco Musiani[1]

Wolves hold an almost mythical status in the cultural history of Europe and North America. For hundreds of years, they have been the subject of fairy tales and other lore, embodying mystery, cunning, and sometimes threat. People are drawn to their beauty, intrigued by their behaviors. Yet for those who live in close proximity to wolves, coexistence is fraught with many serious issues. Wolf management is an excellent model of human-nature interaction and the challenges that come along with it. This talk presents a new book analyzing the crucial relationship between human ethics, attitudes, and policy and the management of wolf populations in Europe and North America. The contributors to this volume assert that these human dimensions affect wolf survival just as much, if not more, than the physical environment. The presentation also includes color photographs of wild wolves and drawings by wildlife artist Susan Shimeld.

This 30-minute talk will begin immediately after the Ecological Role of Wolves session, and will be finished with an hour to spare before the afternoon sessions, in order for participants to get lunch.

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WEDNESDAY, NOVEMBER 18, 1:30 P.M.
MT. ELBERT ROOM
MODERATOR: MARCO MUSIANI

1. Recognizing Ecological Diversity Within Wildlife Populations

Chris Darimont[1], *Paul C. Paquet[2] and Thomas E. Reimchen[3]

How we perceive populations and the diversity within them can directly affect wildlife management and conservation. A large body of theoretical and empirical work suggests that populations are not constructed of homogenous sub-populations, themselves comprised of ecologically identical individuals. Such a perspective on intrapopulation diversity, however, is nearly absent in wildlife management. In western North America, for example, wolves (*Canis lupus*) are primarily regarded as obligate predators of ungulates and homogeneous foragers among geographic areas, packs, and individuals. Here, we confront these assertions with data and the eco-evolutionary concept of the niche. Our focus is on a unique population inhabiting a mainland and adjacent marine archipelago of coastal British Columbia. At the largest scale, we highlight the population's distinctive spatial and trophic niche compared with wolves from other areas. Within this coastal population, we focus on trophic niche diversity; we report how biogeography structures foraging behavior, showing that island wolves become increasingly marine-oriented with island isolation. At the level of the social group, we show how marine resource availability in each territory can predict the diversity in diet among packs. At the finest scale, we highlight the considerable variation in trophic niche among individual pack members in this social carnivore. Such extensive ecological divergence is likely common within and among other wildlife populations across North America's ecologically heterogeneous landscape. Although it adds complexity, such information can better equip managers to address pressing conservation issues, such as habitat and climate change as well as conservation of endangered prey and conflicts with livestock production.

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*Presenter

WEDNESDAY, NOVEMBER 18, 1:30 P.M.
MT. ELBERT ROOM
MODERATOR: MARCO MUSIANI

2. Cascading Effects Of Humans, Through Wolves, In A Multiple Land Use Ecosystem

Tyler Muhly[1] and Marco Musiani[1]

Wolves (*Canis lupus*) have strong influences in terrestrial food webs through predation. Depending on the land use type (e.g. ranching, forestry, oil and gas), humans influence wolf density and distribution. We tested whether human activities affect predator-prey interactions and herbivory in a food chain in Southwest Alberta, Canada. We estimated human distribution using digital camera traps (n = 55). We obtained Global Positioning System telemetry data from wolves (n = 16), elk (n = 110) and cattle (n = 31). We calculated Resource Selection Functions using Generalized Linear Mixed Models (GLMMs) to test the spatial relationship between humans, wolves, elk (*Cervus elaphus*) and cattle and vegetation utilization (n= 148 plots) on the landscape. We found that while elk exhibited anti-predator behavior in response to wolf presence (i.e., drops in distance to cover, $z=7.082$, $P<0.001$, and in food quality of habitat used, $z=4.454$, $P<0.001$), cattle did not. Anti-predator response by elk confirms wolves can exert ecosystem effects through predation. By directly influencing wolf density and distribution, humans may indirectly influence herbivory patterns of ungulates and ultimately, vegetation utilization. Such effects may be different depending on the land use activity. Poor anti-predator responses suggest that cattle are vulnerable to wolf predation and ensuing ecosystem effects are likely different compared to wild ungulates. Furthermore, predation on domestic cattle elicits intolerance by humans, generating a negative feedback that maintains wolves at low densities.

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WEDNESDAY, NOVEMBER 18, 1:30 P.M.
MT. ELBERT ROOM
MODERATOR: MARCO MUSIANI

3. Wolves, Grizzlies, Elk And The Ecosystem: Effects Of Human Activity In National Parks

J. Kimo Rogala[1], Jenny Coleshill[1], Mark Hebblewhite[2], Cliff White[3], Mike Gibeau[1,3] and Marco Musiani[3]

National parks are important for large mammals and for conservation of their habitat, however, intense human activity on trails and roads may limit available habitat. Research on such impacts to wildlife is incomplete, especially at fine spatial and temporal scales. We investigated the relationship between distribution of wolves (*Canis lupus*) (n=12), grizzly bears (*Ursus arctos horribilis*) (n=7), and elk (*Cervus elaphus*) (n=20) and human activity using Global Positioning System (GPS) telemetry locations and hourly human activity on trails and roads (n=137 infrared counters) in Banff, Kootenay, and Yoho National Parks, Canada. We used matched case-control logistic regression to model species' selection of locations near roads and trails. We documented wolf displacement at 400 m from trails and 200 m from roads, and elk displacement at 800 m from trails. Displacement behaviors varied by species. Wolves appeared to respond to increasing activity by moving from distances <400 m to distances >400 m from trails; elk responded by incrementally moving to adjacent areas further away, and ultimately >800 m. Model results were not significant for elk near roads nor for grizzlies near roads or trails, a finding that is consistent with habituation to humans present in some individuals. This study documented cascading ecosystem effects from humans, to mammalian predators and prey; such effects might reach the bottom of the food-web and therefore influence the whole ecosystem. If managers are concerned with human impacts on large mammals or on these species' interactions with the ecosystem, they should consider managing human activity levels.

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WEDNESDAY, NOVEMBER 18, 1:30 P.M.
MT. ELBERT ROOM
MODERATOR: MARCO MUSIANI

4. Level Of Social Trust In Government And Wolf Management

Carly Sponarski[1], Alistair J. Bath[2] and Marco Musiani[1]

Government agencies and residents both attempt to reduce livestock losses by culling depredating wolves. However, depredation continues regardless of the number culled. In addition, perception of conflict may by high regardless of the level of livestock losses. A complementary approach is to focus on people. The managing agency should be able to reduce conflict, because people (including residents and, ideally, all interest groups) feel included and heard. In general, social trust in the agency has been identified as an integral component in environmental management. This research examines the variables affecting social trust in relation to wolf (*Canis lupus*) management issues. Data was obtained through a mail survey of residents of Southwest Alberta, an area important both for livestock production and for wolves. A structural model is used to highlight the relationships between value similarity, social trust and attitudes. We will discuss whether trust is influenced by a disconnect between resident values and the perceived objectives of the government. We will then examine whether distrust affects negative attitudes toward wolves and the management plan. This knowledge could help the agency better their relationship with their constituency in regards to wolves. However, if government agencies align with local residents on wolf depredation management issues, other interest groups could feel alienated from the process and unsupportive of its outcomes. A fruitful area of research should investigate what level of trust by non-local groups could be influenced by increased participation, and what level is due to remaining ideological and ethical differences with local residents.

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WEDNESDAY, NOVEMBER 18, 1:30 P.M.
MT. EVANS ROOM
MODERATOR: CHRISTOPHER PAPOUCHIS

1. Cougar Management: What Would Darwin Do? Evolutionary and Behavioral Considerations

Gary Koehler[1], Robert Wielgus[2], Hilary Cooley[3], Benjamin Maletzke[2], Brian Kertson[4], Richard Beausoleil[1] and Hugh Robinson[5]

Managers use sport harvest to reduce cougar (*Puma concolor*) populations to decrease predation on wild ungulates and threats to humans and livestock. We analyzed demography and spatial use from 106,880 locations of 176 cougar, marked in four concurrent study sites in Washington during 2000-2008 to document effects of sport harvest and natural mortality on age structure, density and behavior of cougars. A cougar population with 11% harvest mortality/year was comprised of older aged (61 ± 4 months) residents, with 18% (± 11) male home range overlap and 17% (± 26) for females and densities of 1.87 ± 0.42 adult cougars/100 km^2. Where harvest mortality was 24%/yr the mean age was younger (48 ± 5 months), overlap among home ranges was greater for males (38% ± 21) and females (23% ± 26) with densities of 1.58 ± 0.17 adult cougars/100 km^2. Natural and human-caused mortalities resulted in home range vacancies that became occupied by males less than 3.5 years of age dispersing more than 300 km from natal areas, resulting in no decrease in male densities, but decreased female densities due to their reduced dispersal probability and distance. Managers should be aware that increased harvest may place the female segment of the population at risk while male immigration may nullify intended objectives to reduce cougar densities, ungulate predation and potential risks to livestock and humans. Management efforts to maintain a stable-aged population structure may better achieve these objectives, maintain the evolutionary integrity of cougar populations and receive widespread support from all stakeholders interested in responsible cougar management.

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WEDNESDAY, NOVEMBER 18, 1:30 P.M.
MT. EVANS ROOM
MODERATOR: CHRISTOPHER PAPOUCHIS

2. Roots of Cougar-Related Human Behaviors and Behavioral Intentions

David Mattson[1] and Elizabeth Ruther[2]

We used a schematic of natureviews and attitudes, developed by Stephen Kellert, to explain orientations toward different cougar-related behaviors and management policies among residents of forested regions in northern Arizona. Our objective was to gain insight into causes of West-wide conflict over cougar management. Our data came from 693 responses to a random survey of households in the study area. Cougars (*Puma concolor*) and surrounding issues were most salient to comparatively new residents who spent considerable time "in the woods" and who held a more pronounced Scientistic/Ecologistic (S/E) natureview. The Humanistic/Moralistic and S/E natureviews were positively related to support four policies that featured non-lethal approaches to cougar management. However, these natureviews were largely unrelated to cougar-related behaviors or behavioral intentions (i.e. having killed a cougar, having hunted, preferring a weapon over non-lethal devices for protection from cougars). Of greatest significance, the Dominionistic/Utilitarian (D/U) natureview had the strongest effect of any variable in all of our models. Those holding more pronounced D/U views expressed little support for conserving habitat for cougars or for non-lethal management policies, and were much more likely to hunt, have killed a cougar and carried a weapon for protection. The D/U natureview was more pronounced among longer-term, older, rural, male and less well-educated residents of our study area. Given the apparent cohort effect on the D/U natureview and the prospect of continuing mobility and increasing urbanization in the West, it is likely that support for non-lethal cougar-related policies and behaviors will increase in our study area.

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WEDNESDAY, NOVEMBER 18, 1:30 P.M.
MT. EVANS ROOM
MODERATOR: CHRISTOPHER PAPOUCHIS

3. The Discourse of Incidents: Cougars and People on Mt. Elden and in Sabino Canyon

David Mattson[1] and *Susan Clark[2]

Incidents are relatively short periods of intensified discourse arising from public responses to symbolically important actions by public officials. We applied a framework for the analysis of international incidents to recent events in Arizona precipitated by the removal or intended removal of cougars (*Puma concolor*) by state and federal agencies in response to public safety concerns. Our objectives were to elucidate elements of key narratives, alliances of participants and differences in narrative focus between incident and background periods. Cougars were mentioned in newspaper articles 13 to 33 times more often during incidents compared to background periods. During incidents, discourses focused on describing problematic human behaviors and advocating related solutions. State wildlife agency commissioners and hunters consistently shared a narrative that featured killing cougars to solve problems, making cougars and those who promoted the intrinsic value of cougars culpable, and retaining power to define and solve cougar-related problems. Personnel from affected state and federal agencies shared a similar narrative. Animal-focused activists and some political officials shared a narrative that defined "the problem" primarily in terms of peoples' behaviors, whether when around cougars or, among agency personnel, when formulating and implementing policies. This narrative also advocated decentralization of power over cougar management. We concluded that differences in perspectives organized around differences in allocations of responsibility and preferences for lethal versus non-lethal methods, which aligned with whether participants were enfranchised or disenfranchised by current state-level management power arrangements. Common ground was evident in shared concerns about habitat and a preference for solutions that featured education.

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*Presenter

WEDNESDAY, NOVEMBER 18, 1:30 P.M.
MT. EVANS ROOM
MODERATOR: CHRISTOPHER PAPOUCHIS

4. Urban And Rural Residents' Attitudes Toward Mountain Lions In Two Midwestern States

Clayton K. Nielsen[1], Mae Davenport[1] and Jean Mangun[1]

Despite the resurgence in the presence of mountain lions (*Puma concolor*) in the Midwest, few researchers have assessed human attitudes towards mountain lions in the region. During 2007-08, we sent 2,000 surveys to residents of urban and rural counties in Kentucky (without breeding mountain lions) and North Dakota (with breeding mountain lions), respectively. The survey instrument integrated a variety of questions regarding human attitudes towards mountain lions and their management. North Dakota residents reported more experiences and perceived a greater likelihood of encounters with mountain lions, but were no more concerned about being attacked by mountain lions than Kentucky residents. Urbanites valued the presence of mountain lions to a greater extent than rural residents, because they perceived mountain lions as a sign of a healthy environment and believed mountain lions will increase their quality of life. Rural residents, being more likely to be hunters and ranchers, were more wary of mountain lions, because they perceived greater risks of livestock and deer predation. Urban residents were more likely than rural residents to support policies that protect mountain lions and to oppose policies that control populations or compensate livestock owners for losses. Residents of both states, and especially Kentucky, would benefit from efforts aimed at educating the public about mountain lions and their management. Given the differences between states and especially between rural versus urban respondents, conservation agencies will have to develop diverse educational and management strategies for mountain lions, should they eventually re-colonize other parts of the Midwest.

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WEDNESDAY, NOVEMBER 18, 1:30 P.M.
GRAYS PEAK ROOM
MODERATOR: JEFF FLOCKEN

1. Alaska Polar Bears and Their Melting World

Karla Dutton[1]

Polar bears (*Ursus maritimus*) range throughout the Arctic Circumpolar Basin. In 2006, the worldwide population was estimated at between 21,000 and 25,000. Only five years ago, most populations of polar bears were considered healthy, even growing. In 2004 came the first report of drowned bears, followed by alarming reports on summer sea ice shrinking and winter sea ice thinning. In the last three years, as sea ice has reached record lows, astonishing reports accumulated: of polar bears swimming miles from shore, of bears drowning and starving, of bears further inland than ever recorded, even of cannibalism. In May 2008, forced into action by a lawsuit from the conservation community, the U.S. Department of Interior officially listed polar bears as threatened under the Endangered Species Act. They predicted that two-thirds of the world's polar bears will die off within the next 45 years. By mid-century, Alaska may lose this icon of the north. Defenders of Wildlife has a new report that summarizes the current status and predicted trends for polar bear populations, with an emphasis on Alaska's polar bears. The report also provides assessments and recommendations on a broad range of actions necessary for immediately protecting polar bears and their shrinking habitat.

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WEDNESDAY, NOVEMBER 18, 1:30 P.M.
GRAYS PEAK ROOM
MODERATOR: JEFF FLOCKEN

2. The Economics of Polar Bear Trophy Hunting: Fact vs. Fiction

Paul J. Todd[1]

In April, 2008 the International Fund for Animal Welfare and the Humane Society International commissioned an independent economist to study the Canadian polar bear (*Ursus maritimus*) trophy hunting industry and its relationship to rural and Inuit economies in Northern Canada. The study was meant to test a number of assumptions that are commonly associated with the economics of the Canadian polar bear trophy hunting program. In particular, the economist was asked to investigate the economic history of polar bear trophy hunting in Canada, the degree to which the economic success of the polar bear hunt depends on U.S. and other foreign hunters, the impact of U.S. laws on the economic success of the polar bear hunt, the economic importance of the polar bear hunt compared to alternate sources of income, whether subsistence quotas contribute to commercial sales of polar bear trophy hunts, and how revenue from polar bear trophy hunting is dispersed within the local communities. While the economic study was commissioned prior to the listing of polar bear under the Endangered Species Act, which reinstated the Marine Mammal Protection Act's ban on the importation polar bear trophies into the U.S., the information that materialized from the investigation is more pertinent than ever as the U.S. Government defends the decision to list polar bear as a Threatened species against lawsuits attempting to reverse or undermine the listing. An accurate and thorough assessment of the economics of the Canadian polar bear trophy hunt will be vital as these cases move forward, and as the global conservation community plans for the long-term survival of the polar bear species.

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WEDNESDAY, NOVEMBER 18, 1:30 P.M.
GRAYS PEAK ROOM
MODERATOR: JEFF FLOCKEN

3. On-going Litigation on Polar Bears: What, Who, Where, When and Why?

Andrew E. Wetzler[1]

Since the U.S. government listed polar bears (*Ursus maritimus*) as an endangered species on May 14th, 2008, a number of important lawsuits have arisen. These cases reflect a wide variety of concerns springing from the listing, and the case parties themselves represent a broad array of interests, including industry groups like the California Cattlemen's Association, governments including the State of Alaska, and non-profit organizations. As of August 2009, in total there are 11 polar bear cases that have been put before the District Court for the District of Columbia, and assigned to Judge Emmet Sullivan. Five of these cases challenge the listing rule itself, two challenge the 4(d) rule which accompanied the listing, and another four are related to the resulting ban on importation of polar bear trophies to the US. Of the five listing cases, four are brought by parties interested in overturning the polar bear threatened listing and one is brought by the Center for Biological Diversity et al., arguing that the Fish & Wildlife Service should have listed polar bears as 'endangered' rather than 'threatened.' Both 4(d) rule cases challenge the Fish & Wildlife Service's decision to limit the protections the polar bear would receive from a 'threatened' listing absent the 4(d) rule. Parties in three of the four trophy import cases allege that the Fish & Wildlife Service wrongfully denied import permits for polar bear trophies under the theory that the Service should have gone through an additional rulemaking to designate the polar bear as "depleted" under the Marine Mammal Protection Act. Plaintiffs in the fourth polar bear trophy import case allege that the Service wrongfully denied their permit where, in the Plaintiff's opinion, the import of polar bear trophies 'enhances' the species' likelihood of recovery. Briefing of all these cases is expected to commence in fall, 2009, and the outcomes will determine if the listing and accompanying protections to the polar bear will be upheld, be revoked, or be altered.

[1]Natural Resources Defense Council, 2 N. Riverside Plaza, Suite 2250, Chicago, IL 60606; awetzler@nrdc.org

WEDNESDAY, NOVEMBER 18, 1:30 P.M.
GRAYS PEAK ROOM
MODERATOR: JEFF FLOCKEN

4. Uplisting Polar Bears to an Appendix I Species at CITES

Teresa M. Telecky[1]

A coalition of groups, including Humane Society International, International Fund for Animal Welfare, Natural Resource Defense Council, and Defenders of Wildlife, are advocating that polar bears (*Ursus maritimus*) be moved at CITES from an Appendix II classification, to the greater protections of an Appendix I listing. CITES—an acronym for the Convention on International Trade in Endangered Species of Wild Fauna and Flora—was established in 1973 in order to create an international body of country members who aim to ensure that the international trade in specimens of wild animals and plants do not threaten their survival. Appendix I species are species that are threatened with extinction and receive the highest protections. The biological criteria for this require the species' wild population is small, restricted or declining. If polar bears are successfully uplisted at CITES, parties to the Convention will be required to issue both import and export permits when non-commercial trade occurs in the species, and all commercial trade will be banned. When issuing the permits for non-commercial trade, the management authority of the exporting country must make assurances that the export of the individual animal or animals will not adversely affect the wild population (called a "non-detriment" finding). According to CITES tracking data, outside of trade in sport-hunted trophies (which are exempted from commercial trade restrictions), there is still significant trade in polar bear parts, skins and non-sport hunted trophies. An uplisting at CITES is necessary to stop this trade, which could be stimulating poaching and an illegal trade in polar bear parts, or could be a direct contributing factor to the decline of the species in the wild.

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WEDNESDAY, NOVEMBER 18, 1:30 P.M.
LONGS PEAK ROOM
MODERATOR: NINA FASCIONE

1. National Geographic's Big Cats Initiative: An Action-Oriented International Program for Conservation, Partnerships, and Funding

L.J. Dollar[1,2,3], S.L. Pimm[1,2], E. Poor[2], B. Joubert[1] and D. Joubert[1]

Large felids are globally threatened. To address this, the National Geographic Society has launched the Big Cats Initiative to support ground-level conservation projects, education and economic incentive efforts, and global public-awareness. The program will first target lions in Africa. While widespread, they face severe and varied threats ranging from poaching to poisoning brought about by ever-increasing lion-human conflict. The first goal of the Big Cats Initiative is to halt lion population declines by the year 2015 and to restore populations to sustainable levels by 2020. As a first step, we are mapping all available data on lion populations, demographics and habitat, and assessing their status. Populations across the Sahel are small and disparate, those in East Africa are numerous but live close to large and increasing human populations, others to the south are extensive, but poorly known, while in South Africa, some live in isolated private preserves. Using that information, National Geographic's BCI Small Grants Program will fund a variety of conservation projects across lions' range. These include innovative projects focused on near-term results for saving lions, including anti-poaching programs and projects testing new techniques and technologies. We encourage proposals for education projects, especially those working directly with community stakeholders to help local populations understand the ecological and economic value of preserving lions and other big cats. Projects that establish economic incentives for local people to ensure long-term survival of lions will also be a priority.

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[3]Pfeiffer University, Misenheimer, NC 28109

WEDNESDAY, NOVEMBER 18, 1:30 P.M.
LONGS PEAK ROOM
MODERATOR: NINA FASCIONE

2. Lion Conservation in Waza National Park, Cameroon

Pricelia Tumenta[1], Jacco C. van Rijssel[2] and Hans de Iongh[2]

The lion (*Panthera leo*) is a flagship species and an important tourist attraction in Waza National Park. Despite conservation efforts put in place about half a century ago, the lion population in this park has considerably declined from 100 in 1962 to 50 in 2002. Fewer than 25 individuals live in the park today. Operating with other factors, the lion-livestock conflict has intensified and is now threatening to wipe out the remaining lions in this former stronghold. This is mainly a result of increased human immigration to the area, including pastoralists from Nigeria and Chad. Semi-nomadic herding activities around this park increase the frequency of interactions between humans, livestock and wildlife, thereby aggravating the lion-livestock conflict. Four lions were collared in May 2007 with GPS Plus collars, equipped with a Very High Frequency (VHF) transmitter and a download function. Lions were monitored for two years through radio telemetry. Analysis of lion location fixes gained from the collars revealed huge home ranges. Lions followed livestock moving out of the park area to villages up to 45 km away from the park limits. A Global Positioning System (GPS) cluster search revealed that lions raided livestock both inside and outside the park. The illegal, retaliatory killing of two out of the four collared lions within one year was recorded. The permanent presence of livestock in and around Waza National Park, fueling the lion-livestock conflict, is the core factor responsible for the present decline of the lion population observed in Waza National Park. Immediate and effective conservation efforts are urgently needed to reverse this trend.

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WEDNESDAY, NOVEMBER 18, 1:30 P.M.
LONGS PEAK ROOM
MODERATOR: NINA FASCIONE

3. Hunting Dog Population Density In Kainji Lake National Park, Nigeria

Abiodun Akinyemi[1]

Small carnivores like hunting dogs (*Lycaon pictus*) represent the most difficult challenge for wildlife conservation in urban areas because they have the greatest spatial needs, and may also come into conflict with humans. A study to identify individuals and packs and to estimate population abundance in Kainji Lake National Park (KLNP) began in 2007. In this study, data from field observations and animal trap-and-release programs were combined and analyzed. Animals that were marked in this way were re-sighted when identifiable features of ear tags or collars were observed during any sighting event. Transects were set at 25km interval at strategic and high activity locations. Data from daytime field observations with high magnifying binoculars compliment the survey. Monthly and diurnal patterns on activity were also determined from repeated sighting events at particular locations. Hunting dog density was highest very close to the boundary of KLNP since communities that border the park have encroached upon the buffer zone with activities like farming and rearing livestock. The density of hunting dogs in KLNP was compared with other population. Maintaining and minimizing human-associated mortality and a human willingness to coexist will all be critical for long term persistence of small predators like hunting dogs.

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WEDNESDAY, NOVEMBER 18, 1:30 P.M.
LONGS PEAK ROOM
MODERATOR: NINA FASCIONE

4. Female Reaction to Male Urine Scents Indicates Mate Choice in Captive Cheetahs

Regina H. Mossotti[1], George A. Feldhamer[1] and Cheryl Asa[2]

Genetic variation in the cheetah (*Acinonyx jubatus*) has become dangerously low because of dramatic population decline and fragmentation. Zoos throughout the world manage captive cheetahs to keep the population healthy and viable. Breeding programs attempt to maximize genetic heterozygosity. Unfortunately, the zoo community has not accomplished consistent breeding success with cheetahs, which may be because of a general lack of information on behavior, especially sociosexual behavior, of this species. Currently, individual cheetahs are assigned mates based primarily on genetic relatedness; however, evidence from many species suggests that allowing animals to choose mates increases breeding success. When animals, primarily females, are allowed to choose mates they will pick the best genetic match. We tested whether female cheetahs can determine their genetic relatedness to males by investigating their urine scents. Voided male urine was collected following scent marking. Urine from three different males was placed on gauze and offered to the females: one from an unrelated male, a good mate choice (A), another from a male that was equivalent to a second cousin, an average mate choice (B), and one from a male that was closely related, equivalent to a brother/father, a poor mate choice (C). Every female was also offered "blank" gauze as a control (D). The scents were offered in a pair-wise forced choice paradigm for a total of six possible combinations. Specific behaviors displayed toward each scent and the duration of those behaviors were recorded. The estrous cycling of each female was monitored through fecal hormone evaluation for the two weeks prior, during, and the two weeks after the urine scent trial. In every pairing except C vs. D, the females spent more time with the better mate choice in the pair. However, only the comparisons with the most genetic distance between them were statistically significant (A>C $p=0.039$ [n=12]; A>D $p= 0.086$ [n=12] and B>D $p=0.044$ [n=9]). This is the first mate choice study with a large mammalian carnivore.

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[2]Saint Louis Zoo, St. Louis, MO 63110

WEDNESDAY, NOVEMBER 18, 3:30 P.M.
MT. ELBERT ROOM
MODERATOR: JESSE TIMBERLAKE

1. Gray Wolves And Livestock In Montana: Solving A Puzzle One Piece At A Time

Carolyn A. Sime[1], L. Bradley[1], E. Bangs[2], J. Steuber[3], Kraig Glazier[3], Paul J. Hoover[3], V. Asher[4], J. Trapp[1], M. Ross[1], K. Laudon[1] and N. Lance[1]

Montana's wolf (*Canis lupus*) population grew from 2 wolves in 1979 to about 500 by late 2008, with roughly 95% of the population living outside national parks. Resolving conflicts, both perceived and real, between wolves and livestock was a dominant social issue during federal recovery efforts, and it remains so today. Agriculture is important to Montana, both economically and culturally. It also secures open space and provides habitat for a wide variety of wildlife. The U.S. Fish and Wildlife Service and now Montana Fish, Wildlife & Parks work with USDA Wildlife Services to reduce depredation risks and address wolf-related conflicts through a combination of non-lethal and lethal management tools. The number of wolf complaints investigated increased as the population increased and expanded its distribution. Montana wolf packs routinely encounter livestock, though wolf depredation was a relatively rare cause of livestock death. From 1987–2008, 56% of all incidents of confirmed losses occurred in 6 counties. At a coarse spatial scale, some areas were more prone to conflict than others. Cattle and sheep were killed on private land in 85% and 89% of incidents, respectively. At a finer scale, some livestock owners experience repeated losses through time. Physiographic landscape features, previous wolf occupancy, and seasonal distribution, density, and size of native ungulate populations compared to livestock appear relevant factors. Spatially, wolf pack territories and the distribution of confirmed losses appear to "ring" intermountain valleys along the public / private land interface. The continued presence of a viable wolf population requires that a wide variety of non-lethal and lethal tools be investigated and implemented. That combination will also be required to maintain local public tolerance of wolves where the two overlap and to foster broad public acceptance of techniques used to minimize conflicts. Long-term solutions to wolf-livestock conflict can be achieved through a multi-pronged, problem-solving approach.

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[2]U.S. Fish and Wildlife Service

[3]USDA Wildlife Services

[4]Turner Endangered Species Fund

WEDNESDAY, NOVEMBER 18, 3:30 P.M.
MT. ELBERT ROOM
MODERATOR: JESSE TIMBERLAKE

2. Comparison Of Electrified Fladry To Fladry For Protecting A Food Resource From Wolves In Captivity

Stewart W. Breck[1], N. Lance[1], J. Shivik[1] and P. Callahan[1]

Non-lethal tools are important for predation management, allowing wildlife managers to optimize human-carnivore coexistence. Fladry is a suspended line of flagging that is used for excluding wolves (*Canis lupus*) from livestock but has limited effectiveness because wolves will habituate to the barrier. Electrified fladry is an extension of fladry where flags are suspended from an electrified wire instead of a rope and designed to provide a negative stimulus that reinforces the fear of fladry and decreases the potential for wolves to habituate to the barriers. Using 10 packs of captive wolves we compared the effectiveness of fladry versus electrified fladry for protecting a food resource. Fladry was effective at excluding wolf groups from protected food resources for up to 1 day whereas electrified fladry was effective up to 14 days (the duration of the trials). Latency to cross and feed significantly differed between fladry and electrified fladry ($\chi^2 = 8.721$, d.f. =1, $P < 0.003$). Our research indicates that electrified fladry may offer a superior tool compared to fladry, though field tests need to be conducted to verify this. We also found that animal learning, motivation, and personality may play important roles in the effectiveness of fladry systems.

[1]U.S. Department of Agriculture - Wildlife Services, National Wildlife Research Center, 4101 LaPorte Avenue, Fort Collins, CO; stewart.w.breck@aphis.usda.gov

WEDNESDAY, NOVEMBER 18, 3:30 P.M.
MT. ELBERT ROOM
MODERATOR: JESSE TIMBERLAKE

3. The Use Of Non-Lethal Tools And Best Management Practices To Reduce Conflict Between Imperiled Predators And Livestock: A Case Study In Preventing The Depredation By Wolves On Sheep In Central Idaho

Jesse Timberlake[1]

More wolves (*Canis lupus*) are killed every year as a result of livestock conflicts than any other cause of wolf mortality in our region. Traditional, exclusive use of lethal control measures only perpetuate an endless cycle of livestock and wolf losses and cost taxpayers thousands of dollars every year. For the last two years Defenders has been involved a project that involves all the major livestock producers and state, federal and county agency managers within the Big Wood River Valley area in central Idaho. This valley provides grazing for over 12,000 head of sheep every summer, and is also home to numerous wolf packs, as well as black bears (*Ursus americanus*) and coyotes (*Canis latrans*). The project partners include the Blaine County Commission, Faulkner Land & Livestock, Idaho Department of Fish and Game, Lava Lake Lamb & Livestock, Plateau Farms, USDA Wildlife Services, USDA National Wildlife Research Center, and the U.S. Forest Service. The project ran the entire duration that sheep were in the valley, from June – October in both 2008 and 2009. Our field crew worked with sheepherders utilizing temporary electrified fladry corrals to corral sheep at night when possible, as well as spotlights, noise devices, radio-telemetry to monitor for wolves, and multiple livestock guard dogs that alerted the crew and herders when wolves were present. This is one of the most comprehensive preventative projects that Defenders has been involved in, utilizing a number of deterrents and a trained field team, and taking place over a large watershed in which many sheep coexist with numerous large predators. Our results suggest that the use of these non-lethal tools and the implementation of best management practices go a long way to addressing conflicts between livestock and predators.

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WEDNESDAY, NOVEMBER 18, 3:30 P.M.
MT. ELBERT ROOM
MODERATOR: JESSE TIMBERLAKE

4. Proactive Projects to Reduce Mexican Wolf and Livestock Interactions in Arizona and New Mexico: An Overview

Chris Bagnoli[1]

The Mexican Wolf Reintroduction Project is a multi-agency effort to reestablish the Mexican wolf (*Canis lupus baileyi*) within the Blue Range Wolf Recovery Area (BRWRA) in Arizona and New Mexico. On-the-ground implementation of management activities is accomplished by an Interagency Field Team (IFT), comprised of the Arizona Game and Fish Department, New Mexico Department of Fish and Game, U.S. Fish and Wildlife Service, USDA Wildlife Services, U.S. Forest Service and White Mountain Apache Tribe. The current population objective for the Project is at least 100 Mexican wolves within the BRWRA. Reintroduction began in 1998 with the release of 11 wolves from captive breeding facilities into the recovery area in Arizona. The current population estimate is a minimum of 52 animals. One of the primary reasons for lack of population growth has been management removal of wolves that regularly depredate on livestock within the recovery area. In 2006, the Project initiated proactive management efforts to reduce wolf-livestock interactions on public and private lands within the BRWRA. These projects are designed to reduce the need to remove wolves and provide affected livestock producers with management options to reduce wolf depredations on livestock. Secondary benefits from these projects include developing trust between livestock producers and the IFT regarding efforts to reestablish this species in the BRWRA. Examples of the projects initiated to date include range riders, electrified fladry, permanent fencing, supplemental feeding assistance, and less-than-lethal projectiles. Funding for these projects is provided by cooperating agencies, livestock permittees, and nongovernmental organizations.

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WEDNESDAY, NOVEMBER 18, 3:30 P.M.
MT. ELBERT ROOM
MODERATOR: JESSE TIMBERLAKE

5. 'Repeatable Environments': Understanding The Role Of Traditional Public Lands Grazing Practice In Relation To Wolf-Livestock Conflicts In The Rocky Mountains

Timmothy Kamminski[1], Charles Mamo[2] and Sarah Dewey[3]

Broad characterization of livestock conflicts with wolves (*Canis lupus*) represented as a percentage of losses to all causes obscures the repeat nature and geographic scale of livestock depredations by wolves and fails to highlight factors involving wolf ecology, livestock behavior and grazing management that contribute to wolf-livestock conflicts. A clearer understanding of these factors contribution to the problem is important to a long-term solution for conserving working ranches beneficial to wildlife and large carnivores in the Rocky Mountains. Livestock allotments represent widespread features of public land management. Consistent in annual stocking and near uniform in location, turnout, and grazing management practice, these conditions represent "repeatable environments" across productive habitats where large carnivores, native ungulates and domestic livestock are sympatric and interact. Predator-prey theory predicts as wolves search for prey within their home ranges and beyond, experience and exposure to vulnerable age livestock that are behaviorally prone to anxiety and flight, widely dispersed and predictably located in fenced pastures would be at risk to predation. Absent consistent vigilance or regular human attendance, such factors above represent management practices that exacerbate livestock vulnerability and contribute to wolves association of livestock as available prey to be tested and pursued. We review more than a decade of wolf-livestock conflict data on cattle that conform to this hypothesis in the Rocky Mountain U.S. and Canada. Data show that: 1) grazing practices that emphasize widely dispersed cow-calf pairs and yearlings are similar throughout public land grazing allotments where vigilance is intermittent or low relative to carnivore presence; 2) wolf predation is selective for behaviorally naïve and anxiety-prone calf and yearling cattle; and 3) regardless of origin and turnover, wolf occupancy of home ranges similarly grazed by cattle are characterized by chronic livestock loss in near identical patterns, suggesting a combination of behavior, biological and human-related factors that predispose vulnerable age cattle to being pursued by wolves and killed. Mechanisms that evolved to facilitate wolf pursuit and capture of prey cannot be separated from environmental influences. Where wolves depredate repeatedly on livestock, wolf behavior and learning combine with traditional grazing practice to exacerbate livestock vulnerability and largely explain chronic patterns of wolf conflicts in the Rocky Mountains. We contend that preventing and reducing wolf-livestock conflicts may be best achieved by manipulating prey vulnerability by adjusting grazing practice than sole reliance on lethally removing their predators. We recommend practical steps to improve vigilance, sustain working ranches and public land grazing while reducing wolf-livestock conflicts.

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WEDNESDAY, NOVEMBER 18, 3:30 P.M.
MT. ELBERT ROOM
MODERATOR: JESSE TIMBERLAKE

6. Economic Impacts Of Wolves And Livestock Montana's Approach To Resolve Conflict

George Edwards[1]

Montana created the Livestock Loss Reduction and Mitigation board and program to address livestock losses and to reduce conflicts. This state program is similar to a program Defenders of Wildlife has been offering for more than a decade. In April 2008, with the help of a large donation from Defenders of Wildlife, a transfer occurred to the state program. A major challenge to the state program has been funding. Montana's legislature created a five million dollar trust fund to fund board operations, provide loss compensation payments and to provide grants for loss prevention efforts. However, they did not provide any funding for the trust fund. During the program's first year of operations, limited funding has only allowed this program to provide livestock loss payments for confirmed and probable wolf-caused (*Canis lupus*) losses. The board has a strong desire to begin funding pro-active loss prevention methods to reduce overall livestock losses. Economic impacts to small livestock producers from predation have a much larger impact on the overall landscape for wildlife. As livestock producers lose their income, subdividing the land becomes a major option for them to stay economically viable. Once the land is removed from agricultural production, it is also lost to the wildlife that depends upon the open spaces. Keep in mind that only a small portion of wolf-caused losses are actually confirmed. This in turn causes further frustration from livestock owners who are looking for options. Adequate funding sources are needed to ensure that options are available to benefit wildlife and livestock.

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WEDNESDAY, NOVEMBER 18, 3:30 P.M.
MT. EVANS ROOM
MODERATOR: AIMEE DELACH

1. Modeling Animal Movement, Functional Connectivity, And Disease Transmission In Fragmented Landscapes

Jeff Tracey[1], Kevin R Crooks[1] and Sue VandeWoude[1]

Human-caused changes in landscapes typically result in the loss, degradation, and fragmentation of animal habitats. These landscape changes alter functional landscape connectivity and, potentially, patterns of disease transmission within and among species. Our ability to anticipate the consequences of anthropogenic landscape change on both connectivity and disease transmission depends in part on our ability to model animal movement behavior in response to landscapes. We present agent-based models for movement behavior by animals and their applications in conservation. We describe approaches to model evaluation including parameterization, model selection by Akaike's information criterion, and goodness-of-fit testing, and present results from such evaluations using GPS tracking data for puma and bobcats. We illustrate movement simulations from parameterized models in the highly fragmented landscape of coastal southern California and methods for visualizing simulation results. In addition, we describe the application of these animal movement models for evaluating functional landscape connectivity and disease transmission among puma (*Puma concolor*), bobcats (*Lynx rufus*), and domestic cats (*Felis catus*) in urbanizing systems.

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WEDNESDAY, NOVEMBER 18, 3:30 P.M.
MT. EVANS ROOM
MODERATOR: AIMEE DELACH

2. Parasite Species Diversity Of North American Carnivores: Hotspots, Host Composition, And Specificity

Nyeema Harris[1] and Rob R. Dunn[1]

Understanding species interactions is a central theme in ecology and is useful for anticipated patterns of diversity across space. Parasites have been largely omitted from this discussion until recently, despite their many species, impacts on hosts, and ecosystem functions. Here, we compile a list of naturally occurring parasites for North American carnivores and use the functional niche of the parasite to determine hotspots of parasite diversity. We also explore how host composition and specificity influence these patterns across space. Total parasite diversity for a given carnivore species ranged 6 - 148 (mean = 34, SE = 6), with the black-footed ferret (*Mustela nigripes*) and common raccoon (*Procyon lotor*) representing the two extremes. At present, our model predicts areas of highest parasite diversity to be mostly concentrating at the border of New Mexico and Texas, and throughout Mexico. Widely-distributed hosts such as the red fox (*Vulpes vulpes*) and black bear (*Ursus americanus*) were disproportionately responsible for spatial patterns of diversity and had a higher number of specialist parasites, even after correcting for sampling effort. Our results are useful for identifying potential areas of high risk for rare species and humans, and provide the necessary baseline information to predict how future range shifts in carnivore species may affect spatial patterns of parasites and the associated diseases they cause.

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WEDNESDAY, NOVEMBER 18, 3:30 P.M.
MT. EVANS ROOM
MODERATOR: AIMEE DELACH

3. Mitigating The Effects Of Plague On Black-Footed Ferrets In Conata Basin, South Dakota

Travis M. Livieri[1], Randall Griebel[2], Scott Larson[3], Greg Schroeder[4] and Tonie Rocke[5] and Bradford Powell[6]

The endangered black-footed ferret (*Mustela nigripes*) is dependent upon prairie dogs (*Cynomys* spp.) for food and shelter. Both species are highly susceptible to the exotic disease plague, caused by the bacterium *Yersinia pestis*. Reintroduced populations of black-footed ferrets have thrived in Conata Basin, South Dakota since 1996 largely due in some part to the absence of plague. In 2005 epizootic plague was detected on Pine Ridge Reservation, South Dakota, approximately 30 miles away from Conata Basin. Black-footed ferret recovery partners anticipated the eventual spread of plague to Conata Basin and responded in a two-fold fashion: dusting of prairie dog burrows with an insecticide to kill fleas, a vector of plague, and injecting black-footed ferrets with a plague vaccine developed by the U.S. Army. In 2008 epizootic plague was detected in Conata Basin and extensive efforts were made to dust and vaccinate to protect prairie dogs and black-footed ferrets. Dusting of 453,560 burrows across 4,550 hectares was completed at a cost of $69/hectare. Vaccination of black-footed ferrets against plague was most effective with a primary and follow-up booster shot 30-days later and we vaccinated 216 ferrets (179 primary only and 37 primary+booster). Preliminary results of titer levels show potentially protective titers in some ferrets with only a primary shot. Protection of the black-footed ferret population in Conata Basin, South Dakota is vital to the international recovery of the species.

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WEDNESDAY, NOVEMBER 18, 3:30 P.M.
MT. EVANS ROOM
MODERATOR: AIMEE DELACH

4. Wildlife Reintroductions: A Review Of Disease Issues And Implications

Mourad W. Gabriel[1], Greta M. Wengert[1] and Ben N. Sacks[1,2]

Over the past century, many attempts were made to reintroduce species to their historic ranges, with mixed success. Multiple factors can influence the outcome of reintroductions, including the health and disease status of both the translocated individuals and the established biological community at release sites. We describe several examples illustrating the importance of *a priori* and *post hoc* monitoring of pathogenic exposure in translocated individuals and discuss developing adaptive management approaches to assist in re-establishing populations. We review a series of reintroduction programs that employed a wide spectrum of pre-introduction screening and monitoring of founder animals, the biological communities, and the environment at the release site before and after reintroductions. We conclude that health and disease screening for zoonotic, domestic animal, and wildlife pathogens should be an integral part of all reintroduction programs.

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WEDNESDAY, NOVEMBER 18, 3:30 P.M.
MT. EVANS ROOM
MODERATOR: AIMEE DELACH

5. Occurrence Of Pathogens In Fishers Throughout Their Range

Mourad W. Gabriel[1,2], Richard Brown[3], Greta M.Wengert[1,2], J. Mark Higley[4], Sean M.Matthews[5], Jeff L. Larkin[6], Craig Thompson[7], Kathryn Purcell[7], Richard Sweitzer[8], Reginald Barrett[8], Janet E. Foley[9], Jeff Lewis[10], Steve Self[11], Richard Callas[12] and Benjamin N. Sacks[1,13]

The population of fishers (*Martes pennanti*) in the Pacific coastal United States was recently listed as a candidate warranting protection under the federal Endangered Species Act. Disease was noted as one of five potential threats to the west coast distinct population segment of fishers. However, there is a paucity of information on potentially population-limiting pathogens in this and other fisher populations. We collected various biological samples from over 250 individuals range-wide that allowed us to examine differences in pathogenic risk throughout the fisher's range. We used serological techniques which included Immunofluorescent Antibody (IFA) tests to evaluate exposures and polymerase chain reaction (PCR) to determine active infections. To date, we report ranges of exposure to canine distemper (0%-17%), canine parvovirus (4%-67%) and *Toxoplasma gondii* (11%-93%), and active infections of canine parvovirus (0%-18%), each of which are likely to pose risks to the survival and fitness of fishers. We discuss the pathogenic risks to fishers and their implications for the multifaceted field of carnivore conservation.

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WEDNESDAY, NOVEMBER 18, 3:30 P.M.
MT. EVANS ROOM
MODERATOR: AIMEE DELACH

6. Collibacillosis in a Wild Dog

Avadh B. Shrivastav[1]

A pack of 12 wild dogs (*Cuon alpinus*) was found dead in Pench Tiger Reserve (PTR), Seoni. Detailed post-mortem examination of one wild dog carcass revealed dark colored muscles, hemorrhages on various organs, pneumonic lung and enlarged and edematous lymph nodes. Presence of haemothorax was also documented. Heart blood and swabs from lungs were collected for culture and isolation of any microbes if present. The microbiological study showed gram negative bacteria, which were identified as *Escherichia coli*. This might have been the first observation and the most possible reason for wild dog mortality at PTR.

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WEDNESDAY, NOVEMBER 18, 3:30 P.M.
GRAYS PEAK ROOM
MODERATOR: JONATHAN PROCTOR

1. Grizzly Bear And Gray Wolf Conservation In The Rockies: Solving Problems, Changing Narratives, Achieving Coexistence

Steve Prim[1], Seth Wilson[1,2,3], Tatjana Rosen[1,3] and Jason Wilmot[3]

Conservation of grizzly bears (*Ursus arctos horribilis*) and gray wolves (*Canis lupus*) in the Rocky Mountains has entered a challenging new phase. Populations of both species grew and expanded in the past >20 years as a result of sustained recovery efforts. Sustaining these gains to ensure viable, inter-connected carnivore populations is a key task. Drawing on lessons harvested from multiple carnivore-human coexistence projects, we outline a bioregional strategy for making durable gains in grizzly and wolf conservation. Attention and resources tend to focus on the ecological dimensions of carnivore conservation. We cannot overlook, however, the cultural and political dimensions of this challenge. People who have lived with recovering and expanding carnivore populations near protected areas have valuable insight and practical knowledge that should inform management and conservation programs. Thus, these areas provide good prospects for designing problem-solving projects adapted to local situations. Capitalizing on such opportunities requires a systematic approach to understanding social context and involving local people in research and planning. Small-scale, participatory projects can provide models for subsequent conservation projects and build political support by demonstrating success. With careful and authentic communication of success stories, small-scale projects can ultimately change the political narrative surrounding carnivore conservation from conflict to cooperation and enculturation of coexistence.

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WEDNESDAY, NOVEMBER 18, 3:30 P.M.
GRAYS PEAK ROOM
MODERATOR: JONATHAN PROCTOR

2. Future Direction of Defenders of Wildlife's Grizzly Bear Proactive and Compensation Programs

Jonathan Proctor[1]

Since 1997, Defenders of Wildlife has spent $193,000 to compensate livestock owners in 240 incidents of confirmed or probable livestock losses to grizzly bears in Idaho, Montana and Wyoming. Since 1999 we have also provided $405,000 in funding for 100 proactive projects throughout the same region that prevent human-grizzly conflicts due to livestock, sanitation or recreation. These programs help build human tolerance for grizzly bears and help keep both grizzlies and humans safe. Defenders will continue our compensation program in areas where grizzlies remain listed under the Endangered Species Act and where no other compensation program exists. We will begin to focus our proactive projects in areas where grizzly population expansion is most important for overall species recovery—connectivity between fragmented populations and future recolonization of the Bitterroot ecosystem—while also actively seeking funding partners in order to increase the number and effectiveness of these projects.

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GRAYS PEAK ROOM
MODERATOR: JONATHAN PROCTOR

3. Combining Landscape Genetics And Least-Cost Path Analysis To Map Regional Conservation Corridors

Samuel Cushman[1], Michael K Schwartz[1] and Kevin S. McKelvey[1]

We combined landscape genetic analysis and least cost path analysis to identify regional conservation corridors for black bears (*Ursus americanus*) at two spatial scales. We used a landscape resistance model identified in previous multi-model landscape genetics analysis in two factorial least cost path analyses. First, we analyzed least cost movement routes from several hundred locations along the Canadian border to several hundred locations at Yellowstone National Park. This enabled us to map major routes for population gene flow and migration between Yellowstone and Canada. The second analysis analyzed movement corridors across northern Idaho under three different scenarios: current landscape condition and potential future landscape involving two secnarios of habitat restoration.

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WEDNESDAY, NOVEMBER 18, 3:30 P.M.
GRAYS PEAK ROOM
MODERATOR: JONATHAN PROCTOR

4. Behavioral Ecology Of Black Bears In The Sierra Madre Occidental, Mexico

Claudia M. Moreno Arzate[1], Sonia Gallina Tessaro[2] and Carlos A. Lopez Gonzalez[3]

Black bears (*Ursus americanus*) are considered in danger of extinction in Mexico, and those populations present in the Sierra Madre Occidental area are the most vulnerable. During 2007, we surveyed two populations, one in the Sierra San Luis (SSL), Sonora, and the other one in Sierra del Nido (SN), Chihuahua. These areas differ in land use. SSL lacks livestock and is dedicated to conservation. The SSL bears' diet is dominated by fruit consumption, while SN bears' diet is mostly carnivorous (including large quantities of livestock). Habitats used by black bears in both areas include open forests, with significant differences between regions. Overgrazing appears to be a significant variable explaining lower population numbers of bears in Sierra del Nido compared to Sierra San Luis. Recovery of the species in the Sierra Madre Occidental should include alternative management of the land by creating habitats rich in Manzanita and Junipers, while reducing livestock and human presence.

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WEDNESDAY, NOVEMBER 18, 3:30 P.M.
GRAYS PEAK ROOM
MODERATOR: JONATHAN PROCTOR

5. Predicting The Acceptance Of Black Bears: Attitudes, Risk Perceptions, Social Trust, And Locus Of Control

Ryan Zajac[1] and Jeremy T. Bruskotter[1]

Wildlife managers can use information about attitudes held by the public toward black bears (*Ursus americanus*) to create management plans with social acceptability. Acceptability of bears is based on psychological variables and contextual factors. The influences of multiple variables make acceptability complex and difficult to predict. This proposed research will identify variables of acceptability and describe their influence. The constructs: attitudes, risk perceptions, social trust, and locus of control are hypothesized to influence the acceptance of bears and the pathways for their impacts on acceptance are to be investigated with this research. This research follows three objectives to understand the acceptability of bears in the state of Ohio (U.S.): (1) Identify the variables that best predict acceptance of bears in Ohio. (2) Determine the role of unknown risk in perceived risk of personal safety and property conflicts related to bears. (3) Identify the impact that salient values similarity and locus of control exert on social trust and ultimately the influence of social trust on acceptance. A mail survey to a stratified random sample of residents is currently in progress (N=9,400). Results will quantify the three research objectives across eight management units. Expected results are that high salient values similarity between an individual and Ohio Division of Wildlife and a high internal locus of control in an individual will lead to reduced risk perceptions of bears resulting in more positive attitudes toward and a higher acceptance of bears.

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WEDNESDAY, NOVEMBER 18, 3:30 P.M.
GRAYS PEAK ROOM
MODERATOR: JONATHAN PROCTOR

6. Foraging Ecology Of Black Bears In A Colorado Urban Setting

Sharon Baruch-Mordo[1], Kenneth Wilson[1],
Stewart Breck[2] and John Broderick[3]

As human development continues to encroach into wildlife habitats, activities such as landscaping and scheduled garbage collection result in increased and predictable habitat productivity. Urbanization has therefore the potential to alter the foraging ecology of wildlife species, including black bears (*Ursus americanus*). Bears are omnivorous and opportunistic foragers that will readily utilize anthropogenic food sources when natural foods fail. Bears also exhibit behavioral plasticity and can habituate to human foods after gaining rewards in urban environments, leading to an increased risk of engaging in conflicts with humans and being lethally removed. Research about urban bear foraging ecology can identify attractants associated with the urban environment and guide management to prevent conflicts. Our objective was to identify attributes associated with urban black bear resource selection in Aspen, Colorado. We deployed >30 downloadable GPS collars, programmed to collect locational data at 30 minute intervals. In 2007-2008 we backtracked to ~2,000 locations within 24 hours of fix acquisition. We sampled over 200 confirmed feeding and associated random locations to quantify use of human and natural food and to model attributes associated with selection of each. Results indicated garbage as the major anthropogenic attractant to bears. In addition, while the proportion of foraging events related to human and natural food sources varied in relations to natural food production, the number of confirmed feedings on garbage attractants remained the same. We present additional modeling results and further discuss management of urban bears, including how to define an urban bear.

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WEDNESDAY, NOVEMBER 18, 3:30 P.M.
LONGS PEAK ROOM
MODERATOR: RODNEY JACKSON

1. Evaluating Methods for Monitoring Elusive Large Carnivores: Snow Leopards in South Gobi, Mongolia

Kim Murray[1], Koustubh Sharma[1] and Tom McCarthy[1]

Snow leopards (*Panthera uncia*) remain the least-studied of the world's large cats and the long-term outlook for this magnificent predator and flagship species of the mountain ranges of Asia remains guarded. As few as 3,500-7,000 are thought to remain in an estimated two million square kilometers of potential habitat distributed across the Himalayas, Karakorams, Hindu Kush, Pamirs, Tien Shans, and Altai ranges. Legally protected in the twelve countries in which they occur, the species nevertheless remains Endangered (IUCN Red List). Snow leopards have been extirpated from some parts of their historic range and their numbers are thought to be declining across much of their range, especially in central Asia. However, without statistically-robust methods to estimate population size and trend, it is difficult to assess the impact of conservation programs, make decisions regarding the allocation of scarce resources, or modify conservation strategies to achieve desired outcomes. Past surveys, which were based on assessments of the relative abundance of snow leopard sign, have proven ineffective for monitoring trends or comparing relative abundance among sites. We will present the results of presence/absence and camera trapping surveys, two methods that hold promise for implementing large-scale monitoring programs, conducted in South Gobi, Mongolia, during summer 2009. Data will be analyzed using occupancy and capture-mark-recapture models. The precision of the estimates produced by the models, as well as the cost effectiveness of both methods, will be compared.

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WEDNESDAY, NOVEMBER 18, 3:30 P.M.
LONGS PEAK ROOM
MODERATOR: RODNEY JACKSON

2. A Comparison Of Noninvasive Camera-Trapping And Genetic Techniques For Estimating Population Size Of Snow Leopards In The South Gobi, Mongolia

Rodney Jackson[1], Jan E. Janecka[2], Bariushaa Munkhtsog[3] and David P. Mallon[4]

We conducted both camera-trapping and noninvasive genetic snow leopard (*Panthera uncia*) surveys in several mountain ranges of the South Gobi desert in Mongolia. The photographic survey covered an estimated area of 552 km^2, detected 4 adults and 3 cubs for a density estimate of 1.27 snow leopards per 100 km^2. However, small sample size precluded reliable population density estimates from capture-recapture models. We collected 180 scat samples believed to be from snow leopards in a 1,035-km^2 area. We obtained species, sex and individual identification of scat using a molecular marker panel. The majority of scat belonged to red fox, with only 60 snow leopard scat among the samples collected. We detected 9 males and 6 females, and estimated the population size to be 15.6-17.0 individuals in the area surveyed, yielding a density estimate of 1.14-1.87 snow leopards per 100 km^2. The noninvasive genetic survey required considerably less field effort and covered a larger area than the camera-trap survey in a shorter amount of time (18 person days versus 140), highlighting the efficacy of monitoring snow leopards, and possibly other rare, cryptic carnivores through the collection of scat. Our results demonstrate that the noninvasive genetic technique has a potential for providing information critical for the conservation of snow leopards by quickly and efficiently enabling the sampling of larger areas (e.g., landscape corridors). These are important advantages, given the limits on field work in the remote, mountainous habitat used by snow leopards.

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LONGS PEAK ROOM
MODERATOR: RODNEY JACKSON

3. Population Structure, Abundance, And Viability Of Asiatic Lions In The Gir Forests, India

Yadvendradev Jhala[1], Nita Shah[1], Shomen Mukherjee[1], Kartikeya S. Chauhan[1], Dave Chittaranjan[1] and Kausik Bannerjee[1]

We estimated the population structure, size, and density of Asiatic lions (*Panthera leo persica*) in the Gir Forests, Gujarat, India in 2001-02. We systematically searched the Gir Protected Area and individually identified 159 lions using vibrissae patterns in a mark-recapture framework. Age and gender of 333 *ad libitum* lion sightings were classified to compute population structure, group size, and sex ratio. Average Lincoln-Peterson estimate of the lion population (>1.5 years) was 289 (SE 58) while the estimate by model Mh (IntJK) in program CAPTURE was 275 (SE 15). Lion density in Gir was 15 (SE 1) per 100 km^2. Ratio of adult male: female was 1:2.6, cub to lioness was 1:2.1 and the litter size was 2.4 (SE 0.17). Cub (n=22) and adult survival (n=7 for 5 years) estimated by telemetry was 51 (SE 1.2) % and 92 (SE 4) %. We used our demographic data to parameterize and run a VORTEX population viability analysis that incorporated drought and disease epidemics as catastrophes, scenarios of lion poaching, high and low carrying capacity, and variable age of first reproduction. PVA results suggest that the Gir lion population had a high probability of persistence (>95%) for the next 100 years provided carrying capacity was maintained over 250 lions. Lion population was sensitive to harvest and could not sustain poaching of more than two lionesses annually in the long term. Establishing other free ranging populations, geographically distant from Gir, should be a priority for the conservation of the species.

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WEDNESDAY, NOVEMBER 18, 3:30 P.M.
LONGS PEAK ROOM
MODERATOR: RODNEY JACKSON

4. Occupancy And Population Estimation Of Tigers In India

Yadvendradev Jhala[1], Qamar M. Qureshi[1] and Rajesh Gopla[2]

We estimate tiger (*Panthera tigris*) occupancy, individual population extent, size, and connectivity in 17 Indian states. All forests were surveyed at approximately 20 km^2 (forest beat) resolution using 88,000 personnel working for 10 days (Nov. 2005 - March 06) for quantifying carnivore signs on trails, prey encounters on transects anthropogenic pressures, and habitat parameters. Twenty layers of information were generated in a GIS from remotely sensed attribute data on landscape characteristics, and the "human footprint." Tiger density using camera traps and ungulate abundance using distance sampling were estimated at 29 sites. Indices of tiger abundance and covariate data were then regressed against tiger densities to predict tiger abundance in a double sampling framework. Tiger pugmarks and scat encounters were highly correlated with tiger density (r = 0.96, 0.85, P<0.001). Tiger occupancy and density was determined by prey abundance, human impact, landscape and habitat characteristics. From 300,000 km^2 of potential tiger habitat 93,700 km^2 was occupied. The Shivalik-Ganegic Plain landscape had 9 tiger populations with 5177 km^2 occupied by 259-335 tigers. Central Indian and Eastern Ghat Landscape had 19 populations with 48,600 km^2 occupied by 486-718 tigers. The Western Ghat Landscape has 6 populations with 34,100 km^2 occupied by 336-487 tigers. The North Eastern Hills and the Brahmaputra Flood Plains had occupancy of 4,230 km^2, while Sunderbans had tiger occupancy in 1586 km^2.

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WEDNESDAY, NOVEMBER 18, 3:30 P.M.
LONGS PEAK ROOM
MODERATOR: RODNEY JACKSON

5. Park-Community Conflicts: Perceptions And Economic Costs Of Conservation In The Deosai National Park, Pakistan Himalaya

Muhammad Akhlas[1], Andrew R. Watkinson[1],
Paul M. Dolman[1] and Noor K. Khan[2]

The high-altitude alpine grasslands of the Deosai Plateau in the western Himalayas support an important population of threatened Himalayan brown bear (*Ursus arctos isabellinus*). Designated as a National Park to protect grassland habitats, primarily for brown bear, the area is also economically important to pastoral communities. This study evaluates the conflicts between brown bear and pastoralist communities including: exclusion from traditional grazing territories and opportunity costs of forgone livestock production; economic impacts of bear predation of livestock; and the perceptions and attitudes of pastoralists to brown bear conservation. During the period 2004 - 2007, costs of livestock predation (mean of 9.5 sheep and goats plus one calf per year) was less than US$ 973 (± 444 S.D.) per year. Costs were borne disproportionately by nomadic pastoralists, with those illegally grazing within the strictly protected core particularly vulnerable. Resident pastoralist communities considered crop raiding a serious problem, but exaggerated losses to 15 – 25 % of potential yield. Both livestock predation and crop raiding have resulted in conflicts between resident pastoralist communities and brown bears. Estimated opportunity cost (2006 and 2007) of forgone livestock production to pastoral communities per hectare was higher in the nomads' grazed core (33.2 US$), compared to nomads in buffer (22.2 US$) and residents in buffer (31.6 US$). From 2000 – 2007, 194.0 (± 132.2 S.D.) foreigners and 834.0 (± 609.6) Pakistani tourists visit the Deosai National Park (DNP), generating 1050.8 ± 171.3 US$ per year in revenue for the park. Foreign tourists are the principal means of income for the Park amounting to 775.3 ± 132.2 US$ per year, compared to the Pakistani tourists (275.0 ± 50.3 US$ per year). A system of fair distribution of funds received from tourism and compensation for livestock losses and crop damage to pastoralists are required to resolve these conflicts. At current predation levels and values, compensation costs for losses of livestock would be modest, estimated at US$ <1,000 per year compared to the opportunity costs to grazing, which is impractical to meet. If grazing fees currently collected from nomads were available to Park Authorities, these could also be spent on Park development or compensation schemes. However, encroachment of pastoralists into core areas and depletion of forage resources required by brown bears remains a serious issue.

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WEDNESDAY, NOVEMBER 18, 3:30 P.M.
LONGS PEAK ROOM
MODERATOR: RODNEY JACKSON

6. Predation Dynamics Of Wolves In Semi-Wild Landscapes Of Deccan Plateau, Maharashtra, India

Bilal Habib[1]

Knowledge of predation is an important aspect for management and conservation of carnivores in semi-wild landscapes where dependence on livestock is prominent. In terms of numbers, livestock contributed 60.72% (N = 68) and wild prey contributed 39.28% (N = 44), whereas in terms of biomass, livestock contributed 45.5 % (549.5 kg) and wild prey contributed 54.5 % (659.5 kg) to the diet of wolves (*Canis lupus*) during the study period. Average consumption per wolf per kill was 4.70 ± 0.23 kg and average consumption per wolf per day was 1.33kg during the study period. Average kill interval of wolf packs during the study period was 3 ± 0.28 days. No significant difference (= 0.117, P = 0.943) in kill interval was seen between seasons. The kill interval varied from 3.83 ± 0.34 days to 2.21 ± 0.34 days when predation on natural prey was followed by predation on natural prey or livestock and vice-versa and the variation showed significant difference (Z = 1.73, P = .005). This means when livestock kill was followed by livestock kill, the kill interval on average decreased by 42.29 % (1.62 days) because of disturbance to wolves on livestock kills. Guarding livestock during grazing decreased the success rate of depredation by wolves to 73.7% but experience of livestock grazers played a more crucial role (Odds ratio: OR 0.04 for 51-60 year age group) than their age (Odds ratio: OR 0.23 for 31-40 year age group) as opposed to the fact that healthy individuals in the middle age group will be more capable as livestock guards. On average, a single wolf caused an annual loss of about $209 with a range from $139 to $279. This variation in the loss of livestock to a single wolf is nearly 50 % and is attributed to decrease in kill interval. We propose the review of the compensation scheme for the long-term conservation of wolves in the semi wild landscapes of the Deccan Biogeographic zone.

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WEDNESDAY, NOVEMBER 18, 3:30 P.M.
LONGS PEAK ROOM
MODERATOR: RODNEY JACKSON

7. Prey Abundance And Food Habits Of Wolves In Rehkuri Blackbuck Sanctuary, Maharashtra, India

Kamlesh Kumar[1], *Bilal Habib[2] and Satish Kumar[1]

Food selection by the Indian wolf (*Canis lupus pallipes*), from scat analysis and density estimation of prey populations through distance sampling, was studied in Rehkuri Blackbuck Sanctuary in Maharashtra during 2005.Analysis of 303 scat samples (winter: 196, summer: 83, monsoon: 24) yielded proportional biomass contributions of different food items in the diet, converted from their frequencies of occurrence (%) using correction factors suggested in the equation Y= 0.0182X+0.217. Blackbuck (*Antilope cervicapra*) contributed the maximum, 50.70% biomass in wolf diet followed by sheep (22.82%), goat (17.58%), ziziphus (3.06%), black-naped hare (*Lepus nigricollis*) (2.35%), rodents (1.77%) and cow (1.59%). Majority of scat (95.1%) contained single food item, while two (4.6%) or more items (0.3%) occurred rarely. Annual prey diversity in diet was estimated at 2.08 using Shannon-Weiner Index, with seasonal differences in the frequency of occurrence of different food items (G test statistic 30.2, df14, P <0.01). Estimated density of the primary prey species: blackbuck within the wolf pack territory was 56 animals/km^2, followed by goat (24.8/km^2), sheep (19.45/km^2), black-naped hare (16.51/km^2) and cow (4.28/km^2). Usage of prey types was disproportionate to their availability (χ^2 =16.22, df 4, P<0.01). Bonferroni's confidence intervals showed selection towards sheep, avoidance of blackbuck and cow, and random use of goat and black-naped hare by the wolf. Such dependence of wolf on domestic livestock would pose challenges for the Sanctuary managers to resolve the potential area of conflict.

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*Presenter

Persian Leopard Distribution And Density In Protected Areas Of Iran

Ali Aghili[1] and James Murdoch[2]

The Persian leopard (*Panthera pardus saxicolor*) is an IUCN endangered subspecies that ranges across the mountainous regions of eastern Turkey, the Caucasus, Iran, southern Turkmenistan, and parts of western Afghanistan. Details on the distribution and abundance on the subspecies are lacking, especially in Iran, where populations are thought to be more robust relative to other regions. We conducted a questionnaire survey of Department of Environment staff to estimate the occurrence and density of Persian leopard in protected areas in Iran. We also reviewed historical records of leopard since the Iranian Revolution in 1979. Persian leopards were present in most of the mountanious protected areas in the country. Most of these areas were characterized by rugged, mountainous terrain, although some included foothills and open plateaus. Persian leopard density ranged from 0.5 to 3 individuals per 100 km^2. Density was highest in the north part of the country, particularly in the northeast, and lowest in the south, particularly the southeast. We also documented records of Persian leopard from historical accounts. Our results suggest that Persian leopards occupy most mountainous regions of the country, including the Alborz, Zagros, Kopet Dagh and the Caucasus ranges, and probably exist as a metapopulation. Protecting leopards will require identifying suitable habitat linkages between protected areas and reducing threats in those regions.

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Mark-Resight Population Estimation Of Bobcats In An Urban Coastal Reserve

Robert Alonso[1], Lisa M. Lyren[2], Erin. E. Boydston[3], Brett T. McClintock[4] and Kevin R. Crooks[5]

Bobcats (*Lynx rufus*) are useful indicators when studying the effects of urbanization and fragmentation on habitat connectivity. In highly developed landscapes, such as coastal southern California, bobcat population sizes and densities are generally unknown. To provide population estimates of bobcats in an urban reserve network in the San Joaquin Hills of Orange County, California, we individually identified animals based on their pelt patterns, ear tags, and GPS collars, and applied mark-capture techniques to photographs of bobcats collected via remotely-triggered cameras. A sampling grid of 30 cameras in core areas and peripheral fragments recorded 224 bobcat photos during 9,595 camera nights from December 2005 through August 2007. Overall, those cameras where bobcat activity was highest were also those that detected the greatest number of individual bobcats. To aid in identification of individuals, we examined images of box-trapped bobcats, animals found dead, and photos of bobcats taken by the public. To analyze our data we used the mark-recapture models in program CAPTURE and the mark-resight models in program MARK. The use of camera trap data for mark-recapture analysis has recently grown in popularity and to date many of these analyses use program CAPTURE to estimate density. The new addition of mark-resight models in program MARK gives biologists another tool to analyze camera trap data. We conclude that remote photography can be a useful method to estimate population sizes of bobcats, particularly when study areas are geographically isolated, reducing the uncertainty in sampling area size.

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Vegetation Characteristics And Status Of Two Wildlife Corridors For Tiger Conservation In Terai Arc Landscape, India

Meraj Anwar[1], Surendra P. Goyal[1] and Qamar Qureshi[1]

Terai Arc Landscape (TAL) harbors the only source population of tigers (*Panthera tigris*) in northwestern India. Increasing human population, exploitation of natural resources and other infrastructure developmental activities have led to fragmentation of the biologically rich and contiguous habitat in the TAL. Corridors help in conserving the tiger at metapopulation level. This study aims to assess the status of corridors with reference to tigers identified in previous studies carried out by the Wildlife Institute of India and Save the Tiger Fund, USA. I describe the status and habitat characteristics of Rajaji-Corbett (RCC) and Gola river corridor (GRC). A total of 463 plots were sampled over 51 transects in RCC. Concentric nested plots of 10m radius for trees, 5m radius for shrubs and 1m quadrants for ground cover and 2*20m for ungulate pellet group counts were laid at every 250 meter on each transect. Similarly, 193 plots over 22 transect were laid in GRC. In RCC, ten vegetation communities were identified from cluster analysis IVI values. Likewise in GRC, six vegetation communities were segregated. In each community, density of tree, shrub, sapling and ungulate pellet group/dung were estimated. Species richness (2-10.2) and diversity (0.9-3.5) of trees were calculated. Sign survey (72.2 km in RCC and 51.5 km in GRC) was also carried out to assess the functionality status of the corridors. Tiger signs were encountered more frequently in RCC than that in GRC.

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Importance Of National Park Management Practices For Jaguar Conservation In The Caatinga Biome Of Brazil

Samuel Astete[1,2], Ana Tereza de Almieda Jácomo[1], Mariana Malzoni Furtado[1,3], Jader Marinho-Filho[4], Rahel Sollmann[1], Natália Mundim Tôrres[1] and Leandro Silveira[1]

With their ecological demands for large intact areas and an abundant prey base, top-chain carnivores such as the jaguar (*Panthera onca*) face increasing conflicts with humans. Little is known about the jaguars in the Caatinga, an 800,000 km² semi-arid biome of northeastern Brazil. With only 7.1% of its area under protection, jaguar status is uncertain. The Serra da Capivara National Park (SCNP, 130,000 ha) is one of the largest protected areas in this biome, surrounded by rural communities where illegal subsistence hunting is common. The objective of this work was to evaluate the effectiveness of park management measures for the jaguar population in SCNP. In 1994, the Park management plan showed that jaguars were almost absent and the large prey species (peccaries and deer) were severely hunted. Since 1994, the Park has implemented a network of artificial water holes and, since 2000, an intensive patrolling system. Results from a camera-trap survey in 1999-2000 showed low number of jaguars and a small population of deer. In 2007, we conducted a camera-trap study in the park and found a comparatively higher abundance of deer, and a jaguar density estimated at 2.67 (± 1 SE) jaguars/100 km², a value higher than in some other Brazilian biomes. Theory predicts than carnivores over 45 kg (as the jaguar) will depend more on prey typically over 10 kg. Considering the quick rate of recovery of ungulates following cessation of hunting pressure, SCNP management measures apparently have positive effects for jaguars.

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Information Sources, Beliefs And Values Of Key Stakeholder Groups In Mexican Gray Wolf Reintroduction

DeLene Beeland[1]

In 1998, Mexican gray wolves (*Canis lupus baileyi*) were reintroduced to a politically-bounded area of federal public lands in New Mexico and Arizona. Citizens' reactions ranged from extremely positive to extremely negative. Today, the program is marked by both stakeholder conflict and restricted growth of the wild population. Three stakeholder groups are most visible in the current reintroduction effort: government employees from the agencies that develop or implement Mexican gray wolf management policies, livestock producers with permits to graze federal lands and wolf conservation advocates. This study explores stakeholder groups' beliefs and values regarding Mexican gray wolves and their reintroduction management, and assesses types of wolf information sources used by stakeholders. The study implemented a qualitative research design and methodology, using in-depth stakeholder interviews and a systematic analysis. Findings revealed that livestock producers tended to most value land rights and land control, whereas wolf conservationists most valued scientific concepts of wolves' role in the ecosystem and the chance to restore an endangered carnivore, and government employees tended to emphasize solving stakeholder issues.

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Ecosystem Effects Following Cougar Population Reductions In Zion And Yosemite National Parks

Robert Beschta[1] and William Ripple[1]

Using historical reconstructions, tree rings, and field plots, we evaluated a potential trophic cascade involving cougar (*Puma concolor*) and mule deer (*Odocoileus hemionus*) in the Yosemite Valley of Yosemite National Park and Zion Canyon of Zion National Park. Increased human visitation in each of these valleys during the early 1900s appears to have reduced cougar densities, which subsequently led to higher mule deer densities, higher browsing intensities, and reduced recruitment of palatable trees, as well as decreases in wildflowers. In Zion Canyon we documented increased stream bank erosion, altered channel morphology, and reductions in the abundance of hydrophytic plants, amphibians, lizards, and butterflies. These results may have important implications with regard to our understanding of alternative ecosystem states and reductions in biodiversity where large carnivores have been removed or where they are being recovered.

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Plague And Wild Felids: Zoonotic Disease In The Western US

Sarah N. Bevins[1], Jeff A. Tracey[1], Sam P. Franklin[1], Virginia L. Schmit[1], Martha L. MacMillan[1], Kenneth L. Gage[2], Martin E. Schriefer[2], Kenneth A. Logan[3], Linda L. Sweanor[1], Mat W. Alldredge[3], Karoline Krumm[1], Walter M. Boyce[4], Winston Vickers[4], Seth P.D. Riley[5], Lisa M. Lyren[6], Erin E. Boydston[6], Melody E. Roelke[7], Robert Fischer[6], Kevin R. Crooks[1] and Sue VandeWoude[1]

Yersinia pestis is the causative agent of plague. Mammalian infections express broad variation in response, with some infections, including those in humans and felids, involving severe morbidity and mortality. Plague transmission from felids to humans has been documented, with more than 25 known cases in the U.S. since 1977. Despite these cases, limited information exists on plague seroprevalence in non-domestic cats. We tested 331 bobcat (*Lynx rufus*) and puma (*Puma concolor*) blood samples from five different locations in the western U.S. for *Y. pestis* antibody. Plague seroprevalence reached 41% in western Colorado. Animal age, season of capture, and location, were all factors associated with *Y. pestis* exposure. Species and sex were non-significant. Further research is needed to understand the ecology and pathobiology of plague in felid hosts to address public health and felid conservation concerns.

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Wolves In The Crosshairs: A Scientific Case Against The Final Fule Of The U.S. Fish And Wildlife Service Removing Northern Rocky Mountain Gray Wolves From The Endangered Species List

Valerie Bittner[1]

I examine the intersection of the life-history strategies of Northern Rocky Mountain gray wolves (*Canis lupus irremotus*) and the mandates of the Endangered Species Act. Concomitantly the paper presents a science-supported position militating against a premature and illegal determination of recovery of Northern Rocky Mountain gray wolves. The illegality stems largely from the U.S. Fish and Wildlife Service's failure to evaluate and utilize the best available science, particularly significant new information concerning the critically important contributions of the social dynamics of extended wolf packs to a genetically and ecologically effective metapopulation.

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Occupancy And Detection Of Sympatric Jaguar And Puma In A Ranching Landscape In Sonora, Mexico

C. Borrego[1], Clayton K. Nielsen[1] and Joseph M. Kolowski[1]

Large carnivores are in decline worldwide due to conflicts with human interests such as livestock ranching. Because jaguar (*Panthera onca*) and puma (*Puma concolor*) are sympatric in Sonora, Mexico, and occasionally depredate livestock, retaliatory predator control has reduced their populations. This is of special concern to jaguars given their already low abundance at the northern edge of their range. Furthermore, although jaguar and puma are sympatric in the region, little is known regarding their ecology as co-existing top carnivores. We are using remote cameras and occupancy modeling techniques to address ecological and conservation questions regarding large predators, prey, and livestock ranching activities in Sonora. We placed 51 remote cameras across 136 km^2 of our study area during 2008. During 2 sampling periods (Sept-Oct and Nov-Dec), 102 sites were surveyed for 50 and 35 days, respectively. Five jaguars (2 M, 3 F) were detected on 18 occasions, but detections were insufficient (detection = 0.131, occupancy = 0.304) to make confident inferences at this time. Puma detections (n = 100) were more widespread (detection = 0.246, occupancy = 0.771), with sympatric overlap of jaguars. Preliminary data analysis indicates that jaguar abundance is likely lower than puma abundance in our study area. In 2009, a second field season will cover a larger area with more cameras to increase detections for both focal species and their prey. Our research will provide conservation implications for large carnivores and their prey, and improve livestock ranching methods in Sonora.

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Jaguar Use Of A Fragmented Cerrado Landscape In Brazil

Analice Maria Calaça[1,2], Ana Tereza de Almieda Jácomo[1], Mariana Malzoni Furtado[1,3], Leandro Silveira[4], Rahel Sollmann[1], Natália Mundim Tôrres[1] and Fabiano Rodrigues Melo[2]

The jaguar (*Panthera onca*) has biological, ecological and behavioral traits which make it particularly sensitive to human disturbances such as loss and fragmentation of habitat. Its distribution covers several habitat types, including the savanna-like Cerrado biome in Brazil, one of the richest ecosystems in the world. The Cerrado is threatened by habitat loss and little is known about how the jaguar responds to these changes. Our objective was to evaluate jaguar distribution in a fragmented environment in the Cerrado. Physical attributes of the landscape such as area and isolation of native habitat patches were related to the presence and absence of the jaguar. Using cameras-traps we sampled 44 points in 13 patches of Cerrado (7 to >6000 ha) in the region of Aruanã, State of Goiás, Brazil. Jaguars were recorded in four patches that do not sustain viable populations, but can be used temporarily as a source of resources. The incidence-area relationship was significant (χ^2= 9.511; p=0.002) and the maximum probability of jaguar occurrence was in an area of 7400 ha. The incidence-isolation relationship was not was significant (χ^2=2.411; p=0.120). The presence of the jaguar is considered an indicator of environmental quality and may indicate that habitat patches are still well preserved, or that the species has not yet responded to the environmental pressure exerted by the loss of habitat in Aruanã. With the majority of patches belonging to private lands, results suggest the importance of private properties for jaguar conservation.

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Using Molecular Scatology To Study The Diet Composition Of Two Wild Felids

Samia Carrillo[1] and Melanie Culver[2]

We used a new molecular genetic method to study the diet of pumas (*Puma concolor*) and bobcat (*Lynx rufus*) in the Nogales area of Arizona, along the Mexican-American border. Scats were collected opportunistically in the field and predator DNA was isolated from the surface of each scat. An analysis was performed, using mtDNA primers for PCR-amplification and sequencing, to identify which felid species deposited the scat. Prey DNA was then isolated from bone fragments contained within each scat that belonged to puma or bobcat. Primers for mtDNA were used (for PCR and sequencing) to identify prey items present in each scat. Predator DNA was successfully isolated for 53 puma scats and 21 bobcat scats. Prey DNA was successfully isolated from bones found in 21 puma scats and 9 bobcat scats. The genetic analysis of bones found in scats is an effective method to identify prey confidently to species-level, although some problems with contamination can occur. It is important to be extremely careful with DNA extraction and PCR amplification in order to avoid errors that will alter the results.

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Jaguar And Puma Movements And Home Range Size And Their Implications For Camera Trapping In Southeastern Peru.

Samia Carrillo-Percastegui[1], Mathias Tobler[2] and George VN Powell[3]

Details of home range size, movements and habitat use by large cats in the Amazon are poorly known. A recent breakthrough in GPS technology allowed us to remotely monitor pumas (*Puma concolor*) and jaguars (*Panthera onca*) in the Lowland Amazon forest of Southeastern Peru for the first time. We are reporting preliminary findings of a study combining GPS and VHF technology to monitor movements by pumas and jaguars with a precision previously impossible. 5 pumas (1 female, 4 males) and 14 jaguars (10 males and 4 females) were captured and fitted with a radio collar with or without a GPS device. From GPS/VHF results, male jaguar home ranges were ~300 km^2, while female jaguar had an average of 125 km^2. Males pumas had an average home range size of ~110 km^2. Several individuals of both species showed a strong preference for riverine habitat. Both, male and female jaguars showed a high home range overlap between individuals of the same and the opposite sex. Male pumas had very well defined home ranges with very little overlap. We will discuss the implications of these results for the design of camera trapping studies.

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Factors Endangering The Bengal Tiger in Bangladesh

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Bengal tigers (*Panthera tigris*) are a keystone species in the Sundarbans of Bangladesh. In the past, tigers were wiped out from other areas. Currently, they are ranked as critically endangered animal due to multi-dimensional impacts. *In situ* tiger survival is a big challenge to Bangladesh. Results from field research, questionnaire surveys and interviews found that the relative abundance of tiger and its prey-base is higher in western Sundarbans. Although the Sundarbans is not settled by humans, conflicts between humans and tigers are severe. Millions of people depend on the Sundarbans' natural resources and many of them have negative attitudes regarding *in situ* tiger conservation. It is a common phenomena in and around the Sundarbans for tigers to kill humans and humans to kill tigers, which is a violation of the Bangladesh Wildlife Preservation Act-1974. A recent cyclone killed tigers and its prey and destroyed its habitat and no authentic record is available. Prey depletion, huge natural resource collection, natural calamities and climate change have direct impacts on tiger population declination. Sea-level rise due to climate change will contribute significantly to eliminate the Sundarbans tiger population forever. Future relocation and reintroduction programs may contribute to tiger survival with dignity in past tiger-land of Bangladesh. New approaches to tiger conservation need to consider the ecological processes of the Sundarbans and involve the local people at all stages of development.

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Central Coast Wildlife Connectivity Project: Identifying and Implementing Connectivity for Wildlife Movement throughout the Central Coast of California

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The landscape of the Central Coast is fragmented by urban developments, agriculture and roads. Further fragmentation of wildlife habitat will result due to numerous proposed development projects. Identifying habitat serving as connectivity for wildlife is critical to maintain viable wildlife populations throughout the region. The mission of the Central Coast Wildlife Connectivity Project is to conserve wildlife and landscape connectivity by integrating formal wildlife tracking methods and remote camera traps with GIS-based landscape connectivity modeling to identify wildlife corridors in need of protection from development. The group has installed wildlife monitoring stations in three regions: Highway 68, Prunedale Bypass and Coyote Valley. Three other monitoring regions are planned: at the Cuesta Grade on Highway 101, in the San Miguel region of Highway 101 and along Highway 17 in the Santa Cruz Mountains. GIS modeling began for three of these efforts and is planned for the others. These targeted conservation actions are critical to the maintenance of wildlife dispersal on California's central coast. We collaborate with a wide range of private organizations and government agencies to implement connectivity designs. This project is being conducted in conjunction with The Big Sur Land Trust. Through this research, critical linkages will be identified for multiple species and will result in a regional landscape map of conservation priorities and ground-truthed linkages that collaborating land trusts and transportation agencies can use for land acquisition, conservation easements and mitigation.

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Development of the Wolf Centre of Excellence

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As the newly created University College of the North (UCN) becomes a more established academic institution in the "heart of the boreal forest," its mandate is to be an organization devoted to community and northern development, and reflective of Aboriginal reality and the cultural diversity of Northern Manitoba, Canada. UCN has begun partnering with stakeholders to build a community centered research facility. The stakeholders who have worked at making UCN a success have been Elders, contiguous communities, education authorities, UCN instructors and both Northern aboriginal and non-aboriginal individuals. Degree offerings are expanding to include Aboriginal and Northern Studies, English, Sociology, and a planned Science degree. Furthermore, with construction of a new campus in Thompson, UCN is expanding partnerships with community stakeholders, such as Spirit Way, Thompson Unlimited, Thompson Zoo, the Province of Manitoba and the City of Thompson. The Spirit Way organization approached UCN for input and assistance with the initiative of making the City of Thompson the Wolf Capital of Canada. UCN has considered the commitment and collaboration they can make in developing a Centre of Excellence in conjunction with this designation. A "Wolf Centre of Excellence" would be an academic hub that would distinguish UCN. It would promote innovative wolf research in the science, social science, humanities, and aboriginal and northern studies areas, to ensure students who graduate are equipped to make a positive difference in the natural world and to create teaching approaches that appeal to the increasing diversity of students in the north.

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Ecology Of A Recolonizing Gray Wolf Pack In North-Central Washington, USA

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Gray wolves (*Canis lupus*) were believed to have been extirpated from the state of Washington by the 1950s. In 2008, a wolf pack was confirmed to have established in the Methow Valley in north-central Washington. Two adult wolves from the pack, believed to be the alpha male and female, were subsequently radio-collared and blood was collected for genetic analyses. The pack was confirmed by remote cameras to have at least six young, and an additional two adult wolves were photographed without radio-collars, resulting in an estimated pack size of 10 individuals. We will present information from 15 months of monitoring the first confirmed wolf pack to re-establish in Washington in over 50 years. Information will be presented on genetics, seasonal space-use, movement patterns, food habits and human-wolf conflicts.

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Method For Evaluating The Effectiveness Of Camera Traps And Track Plates In An Arid Grassland Ecosystem To Detect The San Joaquin Kit Fox

Jessie Golding[1], Susan E. Townsend[2] and Camilla H. Fox[3]

Non-invasive survey techniques have become increasingly popular as a method for detecting carnivores. Several studies have evaluated the efficacy of these techniques in forested ecosystems, but few have been completed in grasslands. To detect the federally-endangered and California state-threatened San Joaquin kit fox (*Vulpes macrotis mutica*), the U.S. Fish and Wildlife Service recommends using baited camera stations, track plates and spotlighting. The aim of our pilot study was to determine if kit fox investigated camera stations and track plates prior to being detected by them. In order to determine if this was the case, we used infrared (IR) video triggered by motion and heat differential to monitor our track plates (3x3 foot metal plates with blue chalk and contact paper) and camera stations (TM 1550) in the Carrizo Plain National Monument in central California, which supports a healthy kit fox population. Kit fox were detected by camera stations each night and avoided the track plate only on the first night. Our video clips show how kit fox investigated the track plates prior to stepping on them. We spotlighted in the vicinity of our track and camera stations to determine which members of the carnivore community were present and if spotlighting had any effect on visitations. No other mammalian carnivores were detected besides kit fox, and kit fox visited our stations while we were spotlighting. We aim to use this method to evaluate how kit fox and other carnivores react to these survey techniques and latency to detection in grassland ecosystems.

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Genetic Variability And Successful Distemper And Parvovirus Seroconversion In Raccoons

Matthew Gompper[1], Ryan Monello[1] and Lori Eggert[2]

Inverse correlations between genetic variability and parasitism are important concerns for conservation biologists, but this relationship is rarely examined in large outcrossing populations. We examined correlations between genetic variability and survival following exposure to canine distemper virus (CDV) and feline parvovirus (FPV) in a large-scale study of raccoons (*Procyon lotor*). Over three years there was a strong relationship between age and seroconversion. Most young animals were seronegative to CDV and FPV, but the oldest age class was >80% seropositive to both viruses. Thus, all individuals will eventually be exposed to these pathogens, and must mount an immune response (i.e., become seropositive) to survive. CDV seropositive animals had greater heterozygosity and lower measures of inbreeding compared to CDV seronegative animals. This relationship was strongest among the youngest animals and did not occur during a one year CDV epidemic. In contrast, FPV seropositive animals only had significantly lower measures of inbreeding for one year, perhaps because FPV associated mortality occurs among very young individuals which were underrepresented in our sampling. These results suggest that even in large outcrossing carnivore populations, animals with lower heterozygosity and higher measures of inbreeding are less likely to successfully mount an immune response when challenged by highly pathogenic microparasites.

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Patch-Corridor-Matrix Fragmentation Model To Evaluate Jaguar Habitat Requirements In Central Brazil

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The area and isolation of habitat fragments are the basic variables currently used to explain the distribution of species in a landscape. The effect of these variables was evaluated for the jaguar (*Panthera onca*) along the Araguaia River, central Brazil, using a patch-corridor-matrix model. In 27 randomly chosen sampling units of 10x10 km along the 1,800 km river course, presence/absence of jaguar was evaluated from interviews with local residents (5 interviews/ sampling units). Landscape structure for the sampling units was evaluated based on the landscape metrics: total area of natural vegetation (m^2), grouping (m), landscape shape index (m^2) and largest patch index (m^2). The matrix was evaluated for human density (unit/km^2), cattle density (unit/km^2) and agricultural production (t/km^2). The model was an equation based in logistic regression. Agricultural production and cattle density were good predictors of jaguar presence (χ^2=14.9, p=0.0001 and χ^2=3.7, p=0.05). Jaguar presence was primarily determined by the matrix around patches of native vegetation and not by patches themselves, indicating the existence of an isolation effect and the absence of an area effect. Agricultural production had a negative effect on jaguar occurrence, indicating that agricultural areas can be barriers for its dispersal. Cattle density had a positive effect, indicating that the jaguar can use a matrix comprised by cattle ranching; however, this can lead to human-wildlife conflict. Jaguar conservation requires recovering of native habitat in regions where remaining habitat patches are surrounded by agriculture, and study and management of human-wildlife conflict for regions where habitat patches are surrounded by cattle ranching.

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A Study On Population Estimation Of Striped Hyena Using Camera Traps In Sariska Tiger Reserve, Rajasthan, India

Shilpi Gupta[1], Krishnendu Mondal[2], K. Sankar[2] and Qamar Qureshi[2]

We used camera traps results combined with closed population models and capture recapture data to estimate the striped hyena (*Hyaena hyaena*) population in Sariska Tiger Reserve (STR), Rajasthan, India. Twenty-five days of camera trapping was done in four 20 km^2 blocks, resulted in sampling efforts of 1675 trap nights from January-April (2008). Camera traps yielded a total of 85 photographs of individual hyena (considering the right flank profile was higher). A total of 26 individual hyenas were captured within an effective trapping area (ETA) of 138.44 km^2. We developed the capture matrix using photos of left flank and found that the closed captured heterogeneous Jacknife model Mh was the best fitted in estimates with the capture probability (P) of 0.66. We thus estimate population size (N) of 26 individuals (34.1 ± 5.4) with the density of 24.5 ± 4.3 hyenas/100 km^2. The estimated sampling effort required for hyena population in terms of sampling occasions amounted to 20 days/block to get reliable estimates of population. The study revealed that the camera trapping using the capture and recapture framework was an effective tool for assessing the population size of striped hyena in STR.

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Tracking Cougars In Midwestern North America: Clues In Claw Isotope Ratios

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Cougar (*Puma concolor*) presence has increased dramatically in Midwestern North America during the past decade, due to dispersal of subadults from western source populations. However, wildlife biologists need empirical knowledge of dispersal paths of these elusive large carnivores to develop effective conservation strategies. Previous work has demonstrated that stable isotope measurements in migrant or dispersing animals can be used to infer origin. However, this technique has not yet been used to recreate dispersal patterns at local scales for large carnivores. We show that claw tissue integrates dietary and habitat information over a suitable temporal scale to allow the path of dispersing large carnivores to be assessed. We predicted the origin of four western cougars and predicted their dispersal paths (with mortality location as the endpoint) into the Midwest using stable hydrogen isotopic values along their claws. We established isoscapes of white-tailed deer (*Odocoileus virginianus*) tissue, the cougar's likely primary prey species in the Midwest, for the region. Various dispersal corridors from potential western sources to each cougar mortality location in the Midwest also were calculated using least-cost path methods. We extrapolated deer isotopic ratio for various locations along these routes. Using a Bayesian approach, we then determined the probability that cougars originated from the predicted source areas. Our method correctly predicted the origin of two cougars captured and radio-collared by biologists (and thus with verifiable source locations). Our technique provides a new approach for studying large-scale movements of carnivores and quantifying habitat connectivity to promote linkages among populations.

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Factors Influencing Reproductive Success Of The Maned Wolf In Captivity

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Attempts to breed maned wolves (*Chrysocyon brachyurus*) in captivity have been largely unsuccessful, and reproductive rate is currently sub-maintenance. The maned wolf's distinctive feeding ecology, physiology, and social structure all present challenges for the design of optimal husbandry protocols. In addition, zoos are frequently are forced to rely on aged individuals as breeding stock. In this study, a survey of zoos participating in the maned wolf Species Survival Plan breeding program was conducted. Data on daily diet, exhibit design, and animal care practices were collected and compared with Species Survival Plan studbook records, in order to identify specific husbandry features that correlate to reproductive output (pups per breeding) and pup survival rate (ratio of pups surviving to adulthood out of total born). In addition, average reproductive output and rates of pup survival were calculated for each age class. Maternal age was negatively correlated with reproductive output ($P = 0.028$), but paternal age had no effect. Number of open sides per exhibit was positively correlated with reproductive output ($P = 0.005$). Within the dietary analysis, dog chow was negatively correlated with survival of pups ($P = 0.043$). Hours per day on exhibit, exhibit area, holding area, type of adjacent species, vegetation features, and produce and meat in diet showed no significant correlation. Average reproductive output was 1.15 pups/breeding, and average rate of pup survival was 0.61. The challenges facing *ex situ* breeding of maned wolves are multifaceted and possibly synergistic, and the results of the present study highlight the need for more research on how these aspects of husbandry interact to effect reproductive fitness.

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The Alaskan Sled Dog: Breed And Performance On A Genetic Level

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The Alaskan sled dog (*Canis lupus familiaris*) presents scientists with a rare and exciting opportunity to examine genetic factors that contribute to performance. The Alaskan sled dog was created strictly for performance, not for appearance, setting them apart from the modern interpretation of a breed. A variety of known breeds have been crossed into the sled dog population to enhance different aspects of their performance. By ascertaining the breed composition of dogs at varying performance levels, we can identify the breeds which contribute to the successful sled dog. Then by evaluating the breed composition, pedigree structure, heritability, and skeletal composition we can define genetic and physical profiles of athletic attributes such as speed, endurance, body structure, and mental strength in the Alaskan sled dog. Towards these goals, blood samples have been collected on 310 Alaskan sled dogs. Of these, 265 dogs have been rated on six phenotypic characteristics; speed, endurance, heat tolerance, stress tolerance (physical and mental) and work ethic. Gait style is also being identified for speed and efficiency. In addition, twenty-one physical body measurements have been recorded for each dog. Breed components of the sled dogs are being assessed using both a panel of 96 microsatellite markers and a panel of several hundred single nucleotide polymorphisms (SNP's), both developed for breed identification. These genetic profiles are analyzed using the program Structure. We are currently assessing the differences in breed composition of sprinting dogs versus distance dogs to determine which breeds have contributed components of speed and which have contributed enhanced endurance. Defining the genetic breed composition of Alaskan sled dogs is an integral starting point to understanding the foundation of their athletic abilities. Additionally, physical measurements will be used to relate skeletal composition to performance. Heritability, inbreeding coefficients, and breeding values will be assessed based on the transmission of phenotypic traits within the pedigree structure. We believe this data will provide insight to the genetic complexity of athletic performance.

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Giant Otter Radio-Telemetry In Cantão State Park, Northern Brazil

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The giant otter (*Pteronura brasiliensis*), endemic to the rainforest and wetlands of South America, is the largest species of otter. Despite its ecological importance as a top predator, little is known about the biology, ecology and conservation of the species classified range-wide as endangered. This study was conducted from September 2007 to September 2008 at Cantão State Park, Tocantins State, Amazon-Cerrado ecotone in Northern Brazil. One male giant otter was captured in nets installed at the entrance of its den, had a radio-transmitter surgically implanted in the intraperitoneal cavity and was subsequently monitored by radio-telemetry. The animal was anesthetized with 3 mg/kg of tiletamine-zolazepam. It weighed 26kg and had a body length of 1.73 meters. After recovery from anesthesia, the animal was released, and in 48 hours returned to its original social group of four individuals. The group was monitored for 12 months and 636 radio-localizations were recorded. Using a fixed Kernel estimator with 95% of the locations, its home range was estimated at 16.25 km². The animals left their dens on average around 6 a.m. and returned at 6 p.m.. The dens were used for consecutive or alternate days, and the group returned to the same den in intervals exceeding 30 days. Although widely used in other otter species, this was the first time a radio-transmitter has been implanted in a giant otter. The technique provided a library of important and previously unknown information about the ecology and movement patterns of this species.

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Effects of Captive Experience on Carnivores Released Into the Wild

Kristen Jule[1]

Given the rapid decline of many carnivore species in the wild, coupled with the increasing necessity of using captive-bred animals in reintroduction, there is an urgent need for research on the effects of captivity in carnivores. The study of *ex situ* conservation is particularly important because many carnivore species respond poorly to captivity, as demonstrated by poor breeding success and high levels of abnormal behaviors. This paper presents a review of carnivore reintroduction projects since 1990, which revealed that captive-bred carnivores are significantly more likely to suffer fatalities when released into the wild than their relocated wild counter-parts. Results show that captive-bred carnivores are particularly susceptible to starvation, unsuccessful predator and/or competitor avoidance and disease. The implications of these results to future *ex situ* conservation efforts are discussed.

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Wolf Recovery: Endangered Species Success Or Ecological Trap For Wolves, Livestock And Ranching In The Rocky Mountain West?

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As the USFWS prepares to delist the gray wolf (*Canis lupus*) in the northern Rocky Mountains, government emphasis on numbers of wolves distributed over suitable habitat as a Recovery measure accents wolf fecundity and resilience, but obscures the role of life history characteristics and social behavior as factors central to wolf management. This narrow emphasis confuses public understanding of the recovery goal intended to highlight the importance of well-distributed and connected breeding pairs; discounts that most wolf packs occur in productive habitats where they overlap livestock in contrast to Park and wilderness areas; and shapes the precept for agency management of repeated livestock conflicts, an original cause for decline of the wolf throughout its historic range. I propose that this contracted view, coupled with traditional grazing and wildlife management practice, pose unfavorable conditions that perpetuate ongoing and cyclic livestock losses followed by wolf removal, a conservation problem to both working ranches and large carnivores. I characterize this dilemma as an "ecological trap," and argue mechanisms that evolved to facilitate wolf pursuit and capture of prey cannot be separated from environmental influences. These management practices were originally purported to be essential for increasing tolerance by removing wolves per flexibility permitted under ESA (1982) amendments for returning listed species to portions of their former range. Continued reliance on them instead contributes to the patterns, scope and scale of wolf depredation on livestock. This serves neither livestock producers nor carnivore conservation, fosters acrimony and resentment between urban and rural residents that weakens support for large continuous ranch operations beneficial to wildlife, and undermines a socially acceptable conservation and management strategy for sustaining the working ranch, large carnivores, and native ungulates in the Rocky Mountain West. I examine wolf-livestock conflict data and review the ecological trap concept in the context of wolves, ranching and working landscapes. I offer an alternative to delisting under the experimental population rule (1982) to advance science-based solutions and social capacity for linking protected areas with the working landscapes that surround and connect them. In this merger of policy and interest, 10(j) flexibility and federal funding would be sustained to support state-led wolf management to promote wolf conservation and reduce conflicts consistent with Section 10(j) provisions for a 5-year duration that parallels the monitoring period identified under the 1988 (McClure) amendments. Biennial, multi-stake and peer evaluations would appraise state-led efforts, traditionally applied in piecemeal fashion, to lead comprehensive efforts to link biology and theory with sustainable agriculture and predator prey systems ecology. Funding emphasis in support of state-led conservation and management would include: 1) coordination with federal land management agencies to facilitate funding, latitude and support mechanisms to ranchers interested in modifying and systematically evaluating grazing practices designed to reduce livestock vulnerability; and 2) application of a comprehensive interagency data analysis to a conservation and management design of an integrated, inter-state and adaptive management approach benefitting to working ranches, native ungulates, big game and wolf conservation on public and private lands in the mountain West.

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An Assessment Of Spatial And Temporal Behaviors Of Adult Male Red Wolves Using GPS Collars

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Knowledge of red wolf (*Canis rufus*) ecology and behavior is mostly limited to the population reintroduced to the Albemarle Peninsula in North Carolina in the late 1980s. Long-term assessments of the species' biology, preferred habitat, territory size and associations with other red wolves have been limited to VHF telemetry data, which lack both temporal and spatial precision in data collection. In this study, GPS collars were used to study the temporal and spatial behaviors of five male red wolves. For all wolves, multiple locations were collected per day over a 12-20 month period. Minimum distance traveled per day, travel speed and spatial and temporal relationships between the wolf's location in its territory and land use/land cover type were analyzed by time of year and by time of day. For two of the wolves that were pack mates, five locations per day were collected to study spatial relationships between them during a 15-month period. Preliminary results reveal an average minimum distance traveled per day of 8.38 km^2 during the pup-rearing season, 10.23 km^2 during the mating season, and 11.26 km^2 during the non-mating season. Preliminary assessments of the pack mate's respective locations show that they were within 100m of each other more often during night time hours than day time hours. During mating and pup-rearing seasons, the majority of GPS points indicated that the pack mates were greater than 100m apart, while during the non-mating season, there was a greater proportion of points less than 100m apart.

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America's Unsavory Secret: Federally-Funded Wildlife Extermination

Wendy Keefover-Ring[1]

Within the U.S. Department of Agriculture (USDA) is a government program that literally flies under the radar—in aerial-gunning crafts. Called "Wildlife Services" (WS), it specializes in mortality—including eliminating breath-taking numbers of mammalian carnivores: 124,414 in 2008 at the behest of livestock growers, the timber industry, and others. An ugly economy of killing requires unsuspecting taxpayers to foot the bill at every level of government. WS aerial guns, traps and snares, and broadcasts a panoply of dangerous toxicants. Sodium cyanide and Compound 1080, used as chemical weapons by Hitler and Hussein, respectively, were banned in 1972 by President Nixon for carnivore killing. Those poisons returned under Ronald Reagan's watch, and have been subjects of controversy since. WS employs various trapping methodologies that cause injuries and pain, physiological trauma, dehydration, exposure, and predation. Between 2001 and 2006, WS failed several safety audits. It did not contain or inventory hazardous chemicals, leaving them vulnerable to theft and unauthorized access. Of the WS sites inspected in 2006, none were in federal compliance. Furthermore, WS's aerial gunning program has resulted in dozens of accidents: 10 fatalities and 28 injuries. Non-selective and biologically harmful, large-scale carnivore eradication does little to help agribusiness grow its bottom line. Producers have more to fear from free trade than free predators.

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Density And Demography Of The Indian Fox In Kutch, Gujarat

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Though the Indian fox (*Vulpus bengalensis*) has a wide distribution across the semi-arid habitats of the Indian Sub-continent, ecological information is lacking. We estimated the breeding pair density by mapping active dens through intensive search in the Kutch landscape and aspects of fox demography by radio-telemetry (n=6 foxes). Breeding pair density was estimated at 0.25/km^2 (SE 0.02, n= 47 breeding pairs). The average distance between two breeding pairs was estimated to be 1.81km (SE 0.14). Dens were excavated by enlargement of the gerbil (*Tatera* spp.) colonies, or dugout by foxes. Fox dens were near water sources with average distance to water being 1.19 km (SE 0.08, n=50) and away from human habitation (2.14 km, SE 0.11, n=55). Pups were born in winter (January-February), and were usually moved between 1-12 (7.60±1.60SE) dens excavated within a radius of 500 meters during the next 4-5 months. Though foxes foraged solitarily, both sexes participated in pup rearing. The average litter size was estimated to be (2.97±0.19 SE, n=38) but differed between years ($F(4,33) = 12.04$, $p<0.001$) with lowest litter size of 1.75 (SE 0.25, n= 4) in 2005, and highest of 4.17 (SE 0.21, n=12) in 2008. Pup survival till dispersal age (4 months) was 0.75 (SE 0.02, n=26) while recruitment was estimated at 48.78 pups/100 km^2 respectively. Fox density, litter size and recruitment were determined by recourse availability as indexed by rainfall in this semi-arid region.

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Evidence Of Reduced Gene Flow Among Bobcats Due To Habitat Fragmentation In Southern California

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Human activities, such as urbanization, can result in the fragmentation of once contiguous natural habitat, resulting in patchy habitat interspersed within and around a growing urban landscape. When the urban matrix separating patches is hostile, movement between habitat patches is reduced. Mammalian carnivores with large home ranges, such as bobcats (*Lynx rufus*), may be particularly affected by habitat fragmentation. Restricted movement between habitat patches can lead to reduced gene flow, inbreeding, and a loss of genetic diversity through genetic drift. The current study seeks to determine if human development—including two major highways—is reducing gene flow between habitat patches in metropolitan areas south of Los Angeles. Seventeen microsatellite loci were amplified to allow genotypic analysis of 106 bobcats from three core habitat patches separated by large freeways. Population genetic analyses indicate that population substructure does exist in association with landscapes fragmented by urban development, and that 2 distinct subpopulations exist within our study location. This finding suggests that urbanization and a large highway (Interstate –5) are barriers to gene flow, preventing admixture of the two subpopulations. Substructure was not detected between habitats separated by another highway (SR 91) which may be due to population mixing in these areas. Further analysis will be conducted on genotypic structure of a retrovirus (Feline Immunodeficiency Virus) infecting approximately 20% of the genotyped animals to evaluate the utility of tracking barriers to gene flow using a genetic marker with higher mutation rates than the host genome.

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Evaluating Highway Barriers To Carnivore Movement In The Washington Cascades

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The permeability of road networks is a key determinant of the ability of carnivores to move and disperse. Too many roads and high levels of vehicle traffic can create "fracture zones" that are detrimental to carnivore populations because they increase mortality and inhibit natural patterns of animal movement. This scenario becomes all the more dire in the context of global climate change, which will require large geographical shifts for some populations. Interstate 90 (I-90) and U.S. Route 2 are two major highways traversing Washington's Cascade Range. We employed noninvasive survey methods to collect DNA samples from American black bears (*Ursus americanus*), American martens (*Martes americana*), and bobcats (*Lynx rufus*) located adjacent to and between I-90 and Route 2. During our 2008 field season, we surveyed 15 sites with scat detection dogs and collected a total of 45 scat samples from putative black bears (n=41) and martens (n=4). Dogs were not trained to detect bobcats. We also snagged hair samples from putative black bears at 33 barbed-wire corrals designed for sampling ursids, and from putative bobcats at 11 rub pads designed for sampling felids. Our limited attempts to snag hair from martens were unsuccessful during the summer/fall months, but we have since collected numerous samples from devices deployed during the winter. Sampling for 2009 is currently underway, and we tentatively plan to expand our efforts to State Highway 20 through North Cascades National Park. Genetic samples will ultimately be used to evaluate population barrier effects via landscape genetic analyses.

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Design of an Image Classification System for Jaguar and Puma Track Recognition

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Jaguar (*Panthera onca*) tracks can be confused with those of pumas (*Puma concolor*), making it difficult to determine priority areas. There has been some attempt to obtain a formula to differentiate between the two species; however, this can be time-consuming and requires some experience. We propose the use of a computer-based vision system in order to facilitate studies with this species. A set of 44 footprints from jaguar (23) and puma (21) was obtained in Sonora. The latter was used to generate a program based in a Generalized Linear Model that uses a boundary-based orientability measure along with another shape descriptor (boundary length). From the existing data set it was possible to obtain an accuracy of 75% for each footprint. The program is being refined as more footprints are being found and we expect to increase its accuracy. This will provide a low-cost method for conducting further studies.

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Possible Triggers For Vomeronasal Organ Use In Captive Gray Wolves

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Wolves' (*Canis lupus*) olfactory power and precision may be their most vital key to survival, as it is the tool they use most to communicate with one another, explore their environment and find food. Although equipped with the same olfactory hardware as all other mammals, wolves' olfactory systems are much more sensitive to environmental stimuli than those of most animals; the olfactory centers in their brains are more than forty times larger than those of humans. Made up of two distinct pathways, a wolf's olfactory system is a finely tuned processing mechanism. By simply taking air in through their nose or mouth, wolves can discern the species, sex, location and physiological state of conspecifics, competitors and prey animals, whether they passed through the area minutes, hours or weeks before. The nasal pathway, made up of nasal passages whose sensitive membranes allow scent molecules to pass through them and be processed by the brain's olfactory center, are used in the same way most other large mammals' nasal pathways. In contrast, wolves' vomeronasal pathways are markedly more sophisticated than those of most other mammalian species. Made up of an opening in the roof of the oral cavity, vomeronasal cartilage and the vomeronasal, or Jacobson's organ, this pathway allows wolves and other animals to read chemical compounds emitted by other animals, known as pheromones. Although many ungulates and felids use this organ to detect the presence of sex hormones emitted by conspecifics of the opposite sex, canids such as wolves use this organ to detect complex information about members of other species, as well as their own. Because the vomeronasal organ (VNO) opening is in the roof of the mouth, wolves must expose the opening to the air in order to process pheromones in their environment. Although wolves open their mouths to perform many behaviors, such as vocalizing, eating and drinking, when using their VNO, wolves will sometimes open their mouths, take in air and move it around their mouths, inflating their cheeks in the process. This cheek inflation is conspicuous and can be seen from a distance, making it an ideal behavior to look for when studying the frequency of wolves' VNO use and its possible environmental triggers. This study investigates the frequency of cheek-inflation behavior in a group of captive-bred wolves and some examples of environmental stimuli that may be involved in triggering this behavior.

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Factors Affecting Risk of Puma Attacks on Humans

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Puma (*Puma concolor*) attacks on people in Canada and the United States have increased substantially since the 1970s, and at the same time stakeholders have become increasingly conflicted over the appropriateness of lethal methods to prevent and resolve threats to humans. We report an analysis of puma attacks and close encounters based on 386 cases, of which 171 resulted in physical contact and 29 resulted in human death. Our goal was to provide insights that would enhance options for increasing human safety. Pumas involved in close encounters and attacks were mostly juveniles and disproportionately young and unhealthy. Given a close encounter, females were more likely than males to make physical contact; and, given physical contact, adults were more likely than juveniles to kill the human victim. Our results confirm the vulnerability of children to attack regardless of group size, the importance of intervention by nearby adults in preventing death and the efficacy of aggressive reactions. We identify for the first time the large effect of weapons and the complex effects of dogs on odds of physical contact and the effects of human activity level and puma sex and age on odds of both contact and death. The 15% human fatality rate from our sample of puma attacks is low compared to fatality rates from attacks by other large carnivores worldwide. Overall, puma attacks are very rare compared to numbers of attacks by other large carnivores and despite the proximity of pumas to literally millions of people.

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Locating Potential Cougar Corridors In New Mexico Using A Least-Cost Path Corridor GIS Analysis

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While a wildlife movement barrier assessment and several regional wildlands network designs have been completed in New Mexico, scientifically rigorous, spatially explicit least-cost corridor analyses had not yet been performed to identify potential dispersal corridors for any wide-ranging species. This study, funded by the New Mexico Department of Game and Fish (NMDGF) Share With Wildlife Program, utilized ArcGIS 9.2 and the Corridor Designer tools, developed by the School of Forestry at Northern Arizona University, to identify potential cougar (*Puma concolor*) dispersal corridors throughout New Mexico. The corridors were modeled based on a cougar habitat suitability model produced by Bird's Eye View in 2006. A total of 26 potential corridors were modeled. The corridors were then compared with cougar and other large carnivore roadkill records obtained from the New Mexico Department of Transportation (NMDOT) and the results of the 2003 Critical Mass Workshop. The NMDOT roadkill data showed carnivore roadkills had occurred within 13 of the 26 potential corridors. Of those 13 potential corridors, 9 showed carnivore roadkills occurring within the most optimum corridor swaths. The results were also visually compared with habitat data for other large and medium carnivores to look for preliminary indications of whether they might be utilized by other species.

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Dietary Partitioning Between Three Sympatric Species: Coyote, Red Fox And Gray Fox In New York

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Sympatric carnivores in the same community often partition dietary resources as a means to reduce competition. I examined the diet of coyote (*Canis latrans*), red fox (*Vulpes vulpes*), and gray fox (*Urocyon cinereoargenteus*) through scat analysis (n =605) collected in two sites in upstate New York, one less developed and one suburban. Identification of species was based on fecal DNA. Relative abundance of prey items, and the Shannon and Horn index were used to compare dietary abundance, diversity and overlap between carnivore species. Results indicate that sympatric species significantly utilize resource partitioning when sharing the same community with other carnivores by varying the prey species they consumed and the relative proportions of the prey in their diet. Mammal species, specifically cottontail (Sylvilagus sp.), dominated all three diets, but made up 23% of red fox diet, 34% of coyote diet, and 35% of gray fox diet. However, coyote diet was also dominated by deer (*Odocoileus virginianus*), red fox diet was also dominated by small mammals, and gray fox diet was also dominated by black cherry (*Prunus serotina*). Dominant prey items were similar for the less developed area and the suburban area, but overall coyote diet was significantly different in the two sites. The main difference was the increase in plant material in coyote diet in the less developed area. Understanding how communities are structured through diet is especially important in managing coyote populations as they continue to expand their range and impact other canids and possibly prey populations.

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Foraging Ecology of Gray Wolves in Chilcotin, British Columbia: Is the Feral Horse a Prey Species?

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The decline of large carnivores including wolves has disrupted ecosystems, causing cascading changes that have resulted in the relaxation of predation as a selective force. These changes have enabled large increases and wide expansion of herbivore populations, the spread of zoonotic disease and the decrease of biodiversity. The reduction or extirpation of predators has enabled U.S. feral horse (*Equus caballus*) populations to expand with annual rates of increase of up to 20%, making free ranging feral horses one of the most controversial topics facing today's wildlife managers. In an effort to expand our knowledge on the ecology of gray wolves (*Canis lupus*), this study is acquiring baseline data on their feeding behavior in the Chilcotin area in order to assess the possibility of dietary shifts between seasons and to examine the potential existence of predatory interactions between these wolves and feral horses. Wolves are flexible and opportunistic predators that are adapted to feeding on a diverse array of foods. Since they have been known to regularly feed on feral horses in Spain and Mongolia, these carnivores may bear influence on horse populations. Wolf predation on large herbivores has been well documented, but predatory interactions between gray wolves and feral horses has not been investigated in North America. This study uses non-invasive techniques through sampling wolf scats and collecting hair samples to give insight on wolf diet composition. This study will fill a knowledge gap to help address ecosystem management within this relatively undisturbed area.

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Wild Cats Home-Range And Capture Methods In The Brazilian Cerrado

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We have been using radio telemetry to study wild cats in Grande Sertão Veredas National Park in the Brazilian Cerrado since January 2006. Two different kinds of traps are being used: snares and boxtrap. So far three pumas (*Puma concolor*), four ocelots (*Leopardus pardalis*), one jaguarundi (*Puma yagoauaroundi*) and one tiger cat (*Leopardus tigrinus*) were captured. Pumas were only captured in snares and the small cats only in boxtraps. The first puma (PC-01) was captured in April 2006 using snares. This was the first puma captured by snares in Brazil. The second puma (PC-02) was captured in April 2008 and third (PC-03) in January 2009. Our preliminary results show that snares set on roads and trails are the most efficient method to capture large felids in the study site. From August to December 2008, three ocelots (LP-01, LP-02 and LP-03), one jaguarundi (PY-01) and one tiger cat (LT-01) were captured. The fourth ocelot (LP-04) was captured in January 2009. All cats were monitored constantly through the triangulation method. The home range for each individual was analyzed by Kernel 95%. Home range size for pumas PC-01, PC-02 and PC-03 was 641.1 km^2, 122.3 km^2 and 73 km^2 respectively. The home-range for ocelots LP-01, LP-03 and LP-04 was 30.8 km^2, 7.24 km^2 and 32.1 km^2 respectively. It was not possible to estimate home-range area for LP-02 because of the low number of localizations. The tiger cat home-range was 71.1 km^2 and the jaguarundi was 69.8 km^2.

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Isolation Of Chemical Constituents In Canid Urine To Aid In Development Of Anti-Predation Tools

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The conflict between humans and wolves, resulting primarily from livestock predation issues, represents a challenging problem faced by wildlife managers engaged in predator conservation. Management strategies for the wolf and other large predators have involved both lethal and non-lethal methods, but as public attitude toward conservation gained favor, more emphasis has been placed on non-lethal control methods. Many of these rely on chemicals to induce sickness, irritation, or fear, and artificial stimuli such as strobes and lights to deter predation. We find that a more focused approach may be to target specific aspects of wolf ecology. Because scent marking plays such an integral role in wolf ecology and seems to be a means of delineating and determining movement patterns, scent seems to merit further investigation as avenue of controlling wolf-livestock interactions. Wolf urine seems especially important in this context and may contain chemical constituents which, once isolated, could be used to develop more effective anti-predation tools. A comparison of these compounds among various canid species, including red wolf (*Canis rufus*), gray wolf (*Canis lupus*), domestic dog (*C. l. familiaris*), coyote (*Canis latrans*), and wolf-dog hybrids), will identify species specific compounds, facilitating development of potential anti-predation tools.

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Jaguar Abundance In The Amazon Agricultural Frontier, Central Brazil: What Camera Traps Can Reveal

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The jaguar (*Panthera onca*) is the largest felid in the Americas and is classified Near Threatened by International Union for Conservation of Nature (IUCN) due to habitat destruction, prey depletion and direct persecution. The Amazon basin is the largest continuous block of habitat within its range, but the species' status remains unclear in this region. Especially in the so-called arc of deforestation, an area of intensive agricultural expansion along the Amazon-Cerrado frontier, the species potentially faces severe threats. To study jaguar population status in this region, we used camera trapping in combination with capture-recapture analysis to estimate jaguar density in two study areas—a private forest reserve on a cattle ranch and a state park—throughout several seasons. 175 jaguar pictures were obtained during 7,929 camera trap nights. Twenty-two different individuals were identified. Jaguar capture rate did not differ between years and seasons, but was higher in the private reserve than in the state park. Average jaguar density was 5.608 indiv/100km^2, higher than densities observed so far for other Brazilian biomes except the Pantanal. In spite of strong anthropogenic pressures, the landscape composed of intact forest tracts and large cattle ranches still supports comparatively high jaguar densities. Results also suggest the importance of large private reserves for regional jaguar conservation. However, as proximity of cattle ranching to jaguar habitat predisposes an area to jaguar-livestock rancher conflict, this aspect should be investigated in order to design appropriate landscape management guidelines for jaguar conservation.

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Jaguar Feeding Ecology In The Southern Pantanal, Brazil

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Being a top predator, jaguar (*Panthera onca*) abundance depends on abundance of its prey. Therefore, understanding how the jaguar uses food resources is fundamental for its conservation. This study aimed to describe jaguar diet through analysis of feces in the Miranda region of the Pantanal of Mato Grosso do Sul state, Brazil, and to verify whether diet varied between wet and dry season and whether prey species were consumed according to their abundance and overlap of activity pattern with the jaguar. Feces were collected using scat detector dogs, and camera traps were used to determine prey abundance and activity patterns. 38 and 98 scat samples were collected in wet and dry seasons, respectively. Jaguar diet differed between seasons: During wet season, the species most frequently consumed were agoutis (*Dasyprocta azarae*) (24.0%), armadillos (*Dasypodidae* family) (10.0%), deer (*Cervidae* family) (8.0%), and capybara (*Hydrochaeris hydrochaeris*) (8.0%). During dry season, species most frequently consumed were agoutis (*Dasyprocta azarae*) (17.6%), cattle (17.6%), deer (10.0%) and white-lipped peccaries (*Tayassu pecari*) (9.2%). While jaguars took prey species according to their abundance, overlap of activity pattern with prey species did not influence the frequency of consumption. This study affirms the opportunistic feeding behavior of the jaguar. Although the study area is well preserved and jaguars fed primarily on wild prey species, cattle were an important food source for the species. Thus, regional jaguar conservation depends not only on maintaining the natural prey community, but also on management of the conflict between jaguars and cattle ranching.

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The Jaguar in Puebla: Presence and Human Relations

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The state of Puebla in central Mexico is an important junction for the northeastern and southern populations of jaguars (*Panthera onca*) in Mexico. Therefore, determination of whether jaguars are present here has important implications for the connectivity of the species. A 2005 paper reports the presence of a jaguar in a protected area in the northeastern part of Puebla. This project will determine the presence and distribution of this felid along the state, as well as its relation with human populations in the area. Maps were studied to determine names of topographical characteristics or towns with predator names. Surveys among Government offices, NGOs, Ranchers Associations and local communities were made to determine jaguar presence. Camera traps were used to survey different points in the state in order to determine felid presence. At least 10 government and local ranchers' associations were asked for information on big felid evidence or attacks; 3 of them had information on jaguar. 90 persons have been surveyed along the state and 83 felid mentions have been recorded, from which 25% correspond to jaguars, 22% to pumas (*Puma concolor*), 13% to ocelots (*Leopardus pardalis*), 12% to margay (*Leopardus wiedii*) and 10% to "panthers" (dark-colored animals, species indeterminate). Confident jaguar reports were from Hueytamalco in northeastern Puebla (Villareal et.al, 2005) and from 2009 in a Protected Area in Northwestern Puebla. Camera trapping proved the existence of ocelots and trough photographic records of other organizations, was possible to determine the existence of bobcat (*Lynx rufus*), tigrillo (*Leopardus tigrinus*), and puma in the southern area. Despite the lack photographic evidence, track reports of the species in several years (1994, 2005, 2009) indicate the possibility of vagrant individuals using the natural corridors present along the mountainous range. This indicates that jaguar populations in Mexico are distributed continually along the former range despite a high level of fragmentation.

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Effect Of Past Disturbances On Present Environments: The Case Of Ancient Mayas Affecting Jaguar Distribution

O. Eric Ramírez Bravo[1]

Big predator conservation often overlooks possible effects of past environmental modifications over the landscape. Furthermore, most carnivore studies are biased because they are carried out in high density areas. In the case of the jaguars (*Panthera onca*), some of the highest recorded densities belong to areas that were highly perturbed in the past in part of the Mayan Area (Southern Mexico, Belize, and Guatemala). I present evidence suggesting that Mayas' landscape modifications are affecting jaguar distribution is presented. During the Maya Classic Period (A.D. 250-900) the landscape was highly deforested and modified by the construction of different agricultural features that in the long term created a highly heterogeneous environment. The created uneven prey distribution, which in turn affects jaguar movements, habitat use and concentration along the landscape. This is especially important as understanding factors creating high density areas can boost jaguar conservation along the continent.

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Ocelot And Tiger Cat Density In Two Protected Areas Of Southeastern Brazil

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Ocelot (*Leopardus pardalis*) and tiger cat (*Leopardus tigrinus*) are two species of small cats that occur in the Brazillian savanna, known as Cerrado. Two protected areas in this ecosystem were evaluated: Grande Sertão Veredas National Park (GSVNP) and Veredas do Peruaçu State Park (VPSP). Absolute abundance and density for so-called "closed" populations were estimated for both species, also activity pattern and abundance index were calculated. Three adjacent areas (areas 1, 2 and 3) were evaluated in GSVNP. In area 1, five ocelot individuals were recorded and the estimated density was 0.08 indiv/km^2 while only one individual tiger cat was recorded. In area 2, three ocelot individuals were recorded and the estimated density was 0.04 indiv/km^2 while nine individuals of tiger cat were recorded and the estimated density was 0.29 indiv/km^2. In area 3, ocelot was not recorded and two individuals of tiger cat were recorded. In VPSP two areas were evaluated (4 and 5). In area 4 two ocelots were recorded resulting in a density of 0.04 indiv/km^2 and the tiger cat was not recorded. In area 5 only one individual of ocelot was recorded and seven individuals of tiger cat were recorded, resulting in a density of 0.67 indiv/km^2. The abundance index suggests a slightly higher probability of capture ocelots than tiger cats using camera-traps. An inter-specific competition between the target species might be occurring, resulting in a possible ecological release of tiger cats in an area where ocelot density is low.

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Application Of Electrified Fladry To Protect Cattle From Wolves In Montana

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Wolf (*Canis lupus*) predation on livestock causes economic hardships for individual livestock producers, increases animosity towards wolves, and complicates the balance between various public interests. Because wolves receive special federal and/or state protection, regulations guide the actions of livestock owners and wildlife managers alike when addressing wolf depredation on livestock. We field-tested electrified fladry as a behavior deterrent to reduce wolf predation on livestock. We identified 12 cattle pastures on 9 ranches with a history of confirmed wolf depredations. Six calving pastures received electrified-fladry to protect approximately 40–300 acres per pasture, and 6 control pastures did not. Electrified-fladry was installed when young calves were most vulnerable. All 12 pastures were monitored for injured or dead cattle and wolf activity. Electrified-fladry supplies cost $3,252 per mile, without the charging system. Installing the fence averaged 51.21 person-hours/mile, with a mean of 49.17 minutes per visit to fix systems that had become inoperable. Wolves were detected by radio telemetry during 55-65% of visits to inspect both protected and unprotected pastures. Following the field trials, we surveyed all participants to learn more about their experiences and willingness to integrate electric-fladry into their operations in the future. We learned that cost, as well as the time and labor to install and maintain an electric fladry system, may be limiting factors for livestock owners. Modifying the design can decrease the direct and indirect costs and may increase willingness to use it. Solutions to wolf -livestock conflict need to stem from understanding and balancing the biological, environmental, economical, and sociological contexts in which the conflicts exist.

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Population Status Of The Jaguar In The Cerrado Of Central Brazil

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Widely distributed throughout central and south America, the jaguar (*Panthera onca*) also inhabits the savannah-like Cerrado biome of central Brazil. Since the 1960s, this biome has suffered extensive agriculture occupation, with remaining habitat consisting primarily of isolated fragments. While classified range-wide as Near Threatened, little is known about the jaguar in this environment. In 2008, we implemented a camera trapping survey and analyzed data with mark-recapture models to estimate jaguar abundance and density in Emas National Park (ENP). With 1320 km², ENP is one of the most representative Cerrado reserves. During 9,000 camera-trap/nights, we accumulated 107 pictures of 10 distinct jaguars, five males and five females. We estimated that 11 adult jaguars inhabit ENP, resulting in a density of 0.67 individuals/100km². Jaguar density in ENP is lower than published estimates from any other Brazilian study site. Despite being the only considerable reserve in the region, ENP alone does not support a long-term viable jaguar population. The situation of the population is further complicated by the high degree of isolation of the study area; while three different river systems extend potential jaguar habitat beyond the park border, only one of them—the Araguaia River—provides a dispersal opportunity beyond the immediate local scale. This situation probably reflects the reality for most other Cerrado reserves and requires land management outside of protected areas to create connections between otherwise isolated jaguar populations. In the surroundings of ENP, the Araguaia River basin should be targeted as a priority area for jaguar conservation.

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Comparison Of Corsac Fox And Red Fox Diets Between Steppe And Semi-Desert Ecosystems In Mongolia

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The corsac fox (*Vulpes corsac*) and red fox (*Vulpes vulpes*) range sympatrically across northern and central Asia. Both species are generally regarded as opportunistic foragers, as they consume a variety of food items. However, few detailed accounts of the food habits of either species exist in Asia. We quantified and compared corsac fox and red fox diets in two ecosystems in Mongolia, including "grassland steppe" and "semi-desert steppe," based on an analysis of scats collected during the early summer months of 2005, 2006 and 2007. We collected and analyzed 241 corsac fox and 33 red fox scats from a grassland site in the Eastern Steppe, and 395 corsac fox and 374 red fox scats from a semi-desert site in Ikh Nart Nature Reserve. Corsac and red fox diets in the Eastern Steppe were moderately broad, highly overlapping and consisted mainly of small rodents, but also birds, reptiles, insects and plant material. By comparison, corsac and red fox diets in Ikh Nart were moderately broad, highly overlapping and consisted mainly of small rodents and insects, as well as birds, reptiles, plant material and garbage. We detected intraspecific differences between sites and interspecific differences within and between sites in the frequency of food items consumed. Our results suggest that corsac and red foxes exhibit flexible diets and that potential competition between species may be reduced through dietary partitioning.

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Wolf Prey Selection And Food Availability In The Multi-Prey Ecosystem Of The Majella National Park

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Prey selection is a critical component of foraging ecology of wolves (*Canis lupus italicus*) that could aid in predicting the effects of these predators on prey populations. Our objective was to examine how habitat features and spatial relationships between wolves and ungulates may influence selection and vulnerability of prey for providing a better prediction of the environmental impact of wolves in the Majella National Park in Abruzzo, Italy. Wolf food habits relative to nine different pack territories were assessed by scat analysis from November 2007 through November 2008. Wild ungulates were the main source of food, occurring with 91% frequency, whereas livestock reached just 5.87%. Percent occurrence of different prey types in scat samples were compared through Principal Component Analysis (PCA). Prey selection was investigated by correlating the Principal Components with seasonal patterns, distribution, and relative abundance of the most common wild ungulates of each wolf pack territory. Since selection of prey species and age class is partially affected by their relative abundance, other factors that could influence their vulnerability were investigated. Thus, the physical features of the pack territories were analyzed by multidimensional statistics (PCA and Cluster Analysis), giving rise explanatory components that in turn were correlated with the principal components arising from the scat composition analysis. Physical features of the territory and food habits were correlated to give a consistent depiction of wolf ecology in Majella National Park.

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Density And Effective Population Size Of Black Bears In Mexican Sky Island Populations Using Non-Invasive Sampling And Molecular Markers

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We used non-invasive DNA sampling to estimate the relative density and population size for black bear populations (*Ursus americanus*) from the sky island region of Mexico. We obtained scat or hair samples from a population of the endangered black bear in Sierra San Luis (Sonora-Mexico). We extracted DNA and amplified 10 nuclear microsatellite DNA markers, and one sex-determination marker. We used the genotypes to estimate the population size and relative density for both populations. We compared two analysis methods to estimate population size based on fecal/hair sampling: rarefaction analysis and capture-mark-recapture estimators. Also, we compared the estimates with previous density results obtained from camera trapping in the Sierra San Luis population. The results of these analyses will be discussed in the presentation.

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One Too Many: Numerical Anomalies and Transitional Vertebrae in Wild Wolves From the Great Lakes Region, U.S.A.

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Lumbosacral transitional vertebrae have recently been reported as a congenital anomaly in wild gray wolves (*Canis lupus*) from Sweden and Isle Royale, U.S.A. (Rikkonnen and Peterson, 2008). The condition has been attributed to inbreeding in these island populations. This congenital condition and its locomotor complications, has caused concern to wildlife managers, that wolf populations may crash if new genetic stock (introduction of unrelated wolves) is not implemented. The Wolf/Moose Study Program on Isle Royale attempts to minimize human intervention and the artificial introduction of wolves to the island is in direct opposition to the mission of the study (Mech 2008, Peterson, 2007). Examination of other wild *C. lupus* skeletal remains from the Great Lakes region other than from Isle Royale, housed in the University of Wisconsin zoological Museum includes examples of lumbosacral and sacrococcygeal transitional vertebrae as well as numerical anomalies of the vertebral column. These were observed in approximately 78 gray wolves (*C. lupus*) obtained from free ranging populations on the Canadian mainland, the parent population that provided the gene pool for the founding population of wolves on Isle Royale. The presence of transitional or numerical anomalies in the vertebrae in extant mammals is present in mammalian groups. The condition has been reported in domestic dogs and other species including equids, primates, bears, felids, ungulates, humans and the ceteartiodactyla. Lumbosacral transitional vertebrae have also been observed in the extinct dire wolf (*Canis dirus*) from Rancho La Brea, CA (Ware, 2005), indicating that the condition has been present in the Canidae for some time. The presence of numerical anomalies and transitional vertebrae in the canid fossil record and in extant wild wolves, domestic dogs and other species indicates that this is not a condition restricted to a small inbreeding island wolf population, but may be evidence of phenotypic plasticity. Consequently, its presence in a population may not be anomalous nor provide an *a priori* reason to assume inbreeding depression in a geographically restricted population. The need to add new breeding stock to genetically revive the population may not be useful as a management strategy.

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Multi-Scale Habitat Relationships of American Martens In Northern Idaho

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We used non-invasive hair snaring to detect American marten (*Martes americana*) northern Idaho, USA. Individuals were genetically analyzed using seven microsatellite loci and individuals were the units of observation. We used multi-model inference in a logistic regression framework and Akaike Information Criterion to model multiple-scale habitat selection by American marten within our study landscape. The study area is a 3,000 square kilometer section of the Selkirk, Purcell and Cabinet Mountains encompassing the Bonners Ferry and Priest River Ranger Districts of the Idaho Panhandle National Forest. *A priori*, we selected several variables we believed would be strongly related to American marten occurrence based on previous research. These variables included elevation, seral stage, percent canopy closure, road density and probability of occurrence of the three dominant tree species: Douglas fir (*Pseudotsuga menziesii*), Western red cedar (*Thuja plicata*), and Subalpine fir (*Abies lasiocarpa*). These variables were modeled over a variety of spatial scales, and landscape metrics were used to describe a variety of habitat features.

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The Nez Perce Role in Wolf Recovery

Jami Wright[1]

The 1995/6 reintroduction of gray wolves (*Canis lupus*) into the northern Rocky Mountains has proven to be controversial and volatile. Idaho's Wolf Recovery Program was headed by the Nez Perce, who are largely responsible for the survival of wolves in Idaho. The State of Idaho actually enforced legislation prohibiting the expenditure of funds for state wolf recovery while fighting on behalf of the interests of ranchers and hunters. Nez Perce involvement in Wolf Recovery was necessary for the revival of the gray wolf in Idaho, in turn, the gray wolf served to revitalize important parts of Nez Perce culture. In this case, cultural diversity played a significant role in fostering biodiversity. Conversely, biodiversity revitalized cultural diversity. Thus, cultural variation is a part of, and benefits from, biodiversity.

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Maned Wolves In Eastern Paraguay

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The Mbaracayú Forest Nature Reserve is the core protected area within the Mbaracayú Forest Biosphere Reserve in the Canindeyú Department, Paraguay. The reserve is located in the eastern half of the country and contains one of the last significant remnants of Atlantic forest in Paraguay. Also protected by the reserve is a naturally occurring cerrado remnant that is home to maned wolves (*Chrysocyon brachyurus*). We have been opportunistically studying maned wolves in the reserve since 1999. Through scat collection, track monitoring and remote cameras, we have assembled a picture of maned wolf diet and activity. The maned wolf's diet consists mostly of fruit (~65% occurrence), but also contains occasional medium- to large-sized mammal prey, including paca (*Cuniculus paca*), red brocket deer (*Mazama americana*), and tamandua (*Tamandua tetradactyla*). Tracks and scat are detected throughout the year but are most common during the winter months (May through August). In recent years, maned wolf tracks have been encountered deeper in the forested region of the reserve. In addition to these insights, we are left with many questions that we hope will lead to future studies.

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Island Fox Monitoring and Research on Naval Auxiliary Landing Field, San Clemente Island, California

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The U.S. Fish and Wildlife Service (FWS) listed four of six subspecies of the island fox (*Urocyon littoralis*) as Endangered in March 2004. Although the San Clemente Island (SCI) subspecies (*U. c. clemente*) was not listed, the FWS and the Department of the Navy signed a conservation agreement (FWS-LA-3287.1) on January 10, 2003. This document outlines proactive measures to conserve the SCI subspecies due to concerns for the population's welfare and decreases in the number of foxes captured on trapping grids between 1998 and 2002. Included in this conservation agreement were measures to provide more accurate and sensitive estimates of island fox population numbers. We implemented a monitoring strategy that included a mark-recapture design on 12 trapping grids during June and July 2007, 2008, and 2009. We captured >200 foxes in each year. We extrapolated the SCI fox population estimate at 727 (95% CI = 690-765) in 2007, 1094 (1019-1169) in 2008, and 1075 (1003-1147) in 2009. We found fox density higher in clay grasslands than in other habitats. We found no difference in density near or far from roads. Our estimates indicate a growing population (lambda > 1). SCI fox densities may remain below density dependent effects and indicate capacity for continued increases. The primary factors limiting SCI fox populations and driving dynamics remain unknown and additional years of monitoring and research will be required to assess these factors and verify population trends. This research was conducted under contract to NAVFAC Southwest, support provided by Commander, U.S. Pacific Fleet.

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