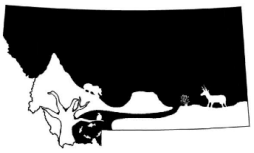


Montana Chapter
Society for Conservation Biology

7th Annual Research Symposium
"Thinking Outside the Box: Diverse Tools for Conservation"
November 18-20, 2015

University of Montana, Missoula, MT

SCHEDULE AND ABSTRACTS

WEDNESDAY, NOVEMBER 18TH
James E. Todd Building Room 203/210:

Registration 12:00 pm - 1:00 pm

Location: James E. Todd Building, Room 203

Science Communication Workshop 1:00 pm - 2:40 pm
Bebe Crouse, The Nature Conservancy

Location: James E. Todd Building, Room 210

Afternoon Break 2:40 pm - 3:00 pm

Location: James E. Todd Building, Room 203

Science Communication Workshop (Cont.) 3:00 pm - 5:00 pm
Bebe Crouse, The Nature Conservancy

Location: James E. Todd Building, Room 210

Registration 5:00 pm - 6:30 pm

Location: James E. Todd Building, Room 203

Plenary Lecture 6:30 pm - 7:30 pm

APPROACHES TO CONSERVATION IN A MODERN WORLD: RAMBLINGS OF AN AGED CONSERVATIONIST

Keith Aune, Wildlife Conservation Society.

The science and practice of nature conservation has progressed during the past 100 years from a focus on saving favored species through restoration and protection to more complex efforts to better understand and safeguard the ecological integrity of large ecosystems. Specifically I discuss recent approaches that I believe have advanced, in both theory and practice, nature conservation in spite of growing threats. Although there is natural tendency for great despair when thinking about conserving nature in the face of growing human populations and pending changing climate I remain optimistic. In the past 40 years I have witnessed innovative conservation approaches, new science tools, better ecological understanding, social awareness, human cooperation and the resolve of conservation champions can greatly influence the future condition of our natural world. In this presentation I will explore the basis for my optimism by sharing examples where new conservation approaches are emerging and novel conservation practices are being implemented to recover grizzly bears and pursue the restoration of American bison. Each of these examples demonstrates the need for a social as well as a scientific basis for successful conservation.

Beer/Wine Reception 7:30 pm - 9:00 pm

Location: James E. Todd Building, Room 203

THURSDAY, NOVEMBER 19TH
James E. Todd Building Room 203/210:

Registration and Breakfast 7:30 am - 8:30 am

Location: James E. Todd Building, Room 203

Session 1: Grassland Conservation 8:20 am - 11:40 am

Location: James E. Todd Building, Room 210

8:20 am - 8:40 am
ASSESSING GRAZING AS A CONSERVATION TOOL IN SAGEBRUSH AND GRASSLAND ECOSYSTEMS
Jessie Golding, University of Montana, Missoula; Victoria Dreitz, University of Montana, Missoula.

Grazing is a potentially powerful tool to address wildlife declines associated with land use conversion in the western United States. Grazing systems can be manipulated to achieve desired vegetation outcomes, preserve native habitat and economically benefit multiple stakeholders. As a result, systems designed to benefit native ecosystems are being widely implemented. However, the benefits of these grazing systems on many wildlife communities remain relatively unexplored. Songbirds provide an ideal study system to test these benefits because they continue to use native habitat that is currently grazed. We compared songbird communities between two grazing systems in eastern Montana: rest-rotation systems and season-long systems. Our results suggest grassland and sagebrush associated species, many of which are of conservation concern, exhibit a mixed response to these two grazing types. Grassland associated species are more abundant in rest-rotation grazing than season-long grazing systems. In contrast, sagebrush associated species show no difference in abundance between the two grazing systems. These results suggest that grazing management may have the largest impact on grassland associated species. In contrast to the idea that different grazing management can have effects on a wide variety species with similar life history traits, such as birds, we found that differences in grazing management only affected a small subset of species. Our findings provide essential information for assessing the suitability of grazing as a conservation tool.

8:40 am - 9:00 am
INVESTIGATING THE EFFECTS OF BISON GRAZING ON GRASSLAND SONGBIRDS
Danielle Fagre, University of Montana, Missoula; Victoria Dreitz, University of Montana, Missoula.

The National Bison Range (NBR) in the Mission Valley of Montana manages a herd of 325-350 bison. Bison are rotated through eight grazing pastures, which consist mostly of intermountain grassland. This creates different grazing intensities, based on length of time grazed, season grazed, and density of bison. Grazing is considered to be an important source of disturbance in grassland systems. However, different grazing intensities may create more or less favorable conditions for grassland breeding songbirds, a suite of birds that has declined drastically over the last few decades. This research investigates the interaction between bison grazing and songbird abundance. We present preliminary results from a pilot season in the summer of 2015. The outcomes will culminate into a concrete, local monitoring program for the NBR to support conservation of grassland songbirds. This project contributes to this year's conference theme because it applies data to policy and management decisions of the NBR. Furthermore, the research will illuminate the relationship between a native grazer and grassland birds. While domestic livestock have largely replaced native grazers on grasslands, numerous reintroduction efforts of bison have been proposed. This study will help inform the expected outcomes and management objectives of those

reintroduction efforts.

9:00 am - 9:20 am

RANGELAND CONSERVATION AT SCALE: WWF'S "PLOWPRINT," SUSTAINABLE RANCHING INITIATIVE, AND GRASSLAND BIRDS

Kevin Ellison, Northern Great Plains Program, World Wildlife Fund-US; Jeff Nelson, Northern Great Plains Program, World Wildlife Fund-US; Anne Gage, Northern Great Plains Program, World Wildlife Fund-US; Sarah Olimb, Northern Great Plains Program, World Wildlife Fund-US.

Songbirds are often good indicators of ecosystem health. It is therefore of concern that "rangeland" (grassland and sagebrush-steppe) birds are the most imperiled continentally. Populations of ten species have decreased by >50% the past 47 years. Habitat loss to cropland conversion is associated with the declines; of the remaining 139.5 million acres (within >180 million acres), >1% were lost annually, 2010-2014. Because >77% of the land in the region is privately owned, WWF and partners are focused on working with ranchers to decrease habitat loss and degradation to better conserve birds and all wildlife that use rangelands.

WWF has initiated a Sustainable Ranching Initiative, designed to improve the sustainability of ranching to maintain rangelands in the face of cropland conversion pressures. WWF's key strategies are to build: 1. partnerships with ranching communities and 2. support (financial, as well as an informed constituency) for ranching in the marketplace. WWF surveyed birds (38 1-km2 16-point grids) at 22 participating ranches in focal areas in Montana, South Dakota, and Nebraska. Our priorities were to build landowner trust, quantify species occurrence on private lands, and to help document the conservation value of ranching. We recorded 17 (94% of possible), 12 (92%), and 14 (88%) species of grassland birds at ranches in Montana, South Dakota, and Nebraska, respectively. We provide an overview of our ranch-based programs and how we plan to use our bird data with Joint Ventures as a nexus between agencies and ranchers to better leverage together for bird and rangeland conservation.

9:20 am - 9:40 am

ADVENTURE SCIENCE ON MONTANA'S GREAT PLAINS

Colleen Ferris, Adventurers and Scientists for Conservation; Mike Kautz, Adventurers and Scientists for Conservation.

For the last two years citizen---science volunteers from Adventurers and Scientists for Conservation (ASC) have been collecting a diverse set of wildlife data on the American Prairie Reserve (APR) in northeastern Montana. These volunteer crew members have come from 31 states and 7 countries to spend two---month stints maintaining networks of remote camera traps, walking wildlife transects, surveying sage grouse leks and mapping prairie dog colonies. Volunteers are selected for their outdoor skills, demonstrated sense of adventure, and creative interests (photography, writing, painting). The crew conducts work 12 months a year in a remote landscape that sees temperature extremes of ---40F to +110F.

ASC volunteers have worked alongside and provided data to APR, U.S. Fish and Wildlife Service, Montana Fish Wildlife and Parks, and the World Wildlife Fund. They have also become part of the prairie community, attending brandings on area ranches and playing pick---up basketball in Malta.

Volunteers collect data on tablet computers, feeding wildlife data directly into a real---time database used to establish baselines on a 300,000---acre mosaic of public and private land. Data is shared with multiple NGO's, Federal and state agencies to inform wildlife management decisions.

In this brief overview of the project ASC staff will share lessons learned during the past two years on digital data collection, volunteer management, and the future potential of engaging citizen scientists in

field work.

9:40 am - 10:00 am
DOES IT PAY OFF TO ENVISION CONSERVATION AT SCALE? Y2Y A 20-YEAR RETROSPECTIVE
Jody Hilty, Yellowstone to Yukon Conservation Initiative.

Conservation biologists have long since realized that postage size disconnected protected areas are not likely to conserve the world's biodiversity. There is much literature about doing conservation at landscape and seascape scales, but what does it really mean to achieve conservation at scale? We examine progress toward the vision laid out 20 years ago of "An interconnected system of wild lands and waters stretching from Yellowstone to Yukon, harmonizing the needs of people with those of nature". We quantify progress of increased land protection, awareness of the need to manage natural resources at scale, and discuss lessons learned. Twenty years ago, protected lands in the Y2Y region comprised 15 percent of the area and since that time 30 percent of the land area has seen increased protections of various types, although that is not to say that all those new protections fall into strictly protected areas. At the same time, locally to regionally and to globally, Y2Y has been a clear inspiration for conservation at scale. Despite all this progress, enormous hurdles remain including skepticism, politics, and increased human activities and developments increasing at exponential pace in the region. It is clear that creating a collective vision has influenced the conservation agenda and achievements, but the enormity of the vision means that achieving it will require tackling compounding challenges into the future.

10:00 am - 10:20 am
A CONNECTIVITY DATA ATLAS FOR THE GREAT NORTHERN LCC: MAKING SENSE OF DIVERSE DATA TO INFORM STRATEGIC CONNECTIVITY CONSERVATION
Meredith McClure, Center for Large Landscape Conservation; Dave Theobald, Conservation Science Partners; Tabitha Graves, USGS Northern Rocky Mountain Science Center; John Pierce, Washington Department of Fish and Wildlife; Carl Scheeler, Confederated Tribes of the Umatilla Indian Reservation; Ian Dyson, Alberta Environment and Parks; Bray Beltran, Heart of the Rockies Initiative; Sean Finn, Great Northern Landscape Conservation Cooperative; Matt Heller, Great Northern Landscape Conservation Cooperative; Melly Reuling, Center for Large Landscape Conservation; Sam Williams, Center for Large Landscape Conservation.

The Great Northern Landscape Conservation Cooperative (GNLCC) is a voluntary network of partners that transcends boundaries and jurisdictions by sharing data, science, and capacity to address common landscape conservation goals. The GNLCC's Ecological Connectivity Project addresses one of the cooperative's four strategic goals: conserve a permeable landscape with connectivity across aquatic and terrestrial ecosystems in the face of threats from conflicting land use and climate change.

Our objectives are to compile available connectivity science and data products; survey and grow the diverse partnerships required for effective conservation; compile and share successful strategies and tactics; and generate recommendations for the GNLCC and partners around short- term actions and long-term strategies to conserve connectivity throughout the GNLCC. Here we present the connectivity data atlas, developed to support fulfillment of these objectives and to address a fundamental question: what do we know about connectivity in the GNLCC? The atlas compiles diverse spatial datasets identifying potentially important linkage zones throughout the GNLCC region in order to provide centralized, user-friendly connectivity data access; to support planning and decision-making by GNLCC partners, including land and wildlife managers and private lands conservation practitioners; and to ultimately help inform a GNLCC-wide connectivity conservation strategy.

Key features of the atlas will be presented, including connectivity opportunities, gaps in knowledge, and relative intensity of stressors across the GNLCC. An overview of the different kinds of information available at different scales will be provided, and application of this information to on-the-ground

connectivity management questions will be discussed with examples.

Coffee Break 10:20 am - 10:40 am

Location: James E. Todd Building, Room 203

Session 2: Diverse Tools for Conservation 10:40-11:40

Location: James E. Todd Building, Room 210

10:40 am - 11:00 am
AN ASSESSMENT OF CURRENT STATEWIDE AVIAN MONITORING PROGRAMS IN MONTANA
William Janousek, University of Montana, Missoula; Beth Hahn Aldo Leopold Wilderness Research Institute; Victoria Dreitz, University of Montana, Missoula.

Birds are a highly diverse group consisting of species that use a wide-range of available resources. Therefore bird communities are thought to represent the natural complexity of ecosystems. In recent years, groups of birds and individual species have been recognized as indicators of environmental change. Even with all the potential benefits of conserving bird populations, considerable declines of avian populations in the US have been well documented. These losses highlight the need for continued large-scale monitoring programs. The North American Breeding Bird Survey (BBS) and the Integrated Monitoring in Bird Conservation Regions (IMBCR) are independent large-scale programs conducted within the US to monitor populations of birds. Each of these programs is uniquely designed to provide different types of information to resource managers within the state of Montana. We examined the current products available from BBS and IMBCR programs and the methodology employed. We also compared how each monitoring program assesses population change at the Montana state level across a variety of species to investigate potential program inconsistencies. If programs work equivalently we would expect abundance trend estimates to be in the same direction (positive or negative) and of similar magnitudes. Preliminary results suggest 94% (104/111) of species analyzed exhibited some difference in their abundance trend estimates between monitoring programs. Inconsistencies found within our species comparisons reflect inherent differences in the programs. Our results reiterate the importance for users to carefully consider the unique design, intention, and sources of bias ascribed to each program before applying monitoring data to ecological questions.

11:00 am - 11:20 am
DEVELOPMENT OF TOPOGRAPHICALLY RESOLVED HISTORICAL DAILY GRIDDED AIR TEMPERATURE DATA WITH DISTRIBUTED SENSOR NETWORKS FOR THE US NORTHERN ROCKY MOUNTAINS
Zachary Holden, United States Forest Service; Alan Swanson, University of Montana; Anna Klene, University of Montana; John Abatzoglou, University of Idaho; Solomon Dobrowski, University of Montana; Jared W. Oyler, University of Montana; Samuel Cushman, United States Forest Service; John Squires, United States Forest Service; Gretchen Moisen, United States Forest Service.

Gridded temperature datasets are typically produced at spatial resolutions that cannot fully resolve fine-scale variation in surface air temperature in regions of complex topography. These data limitations have become increasingly important as scientists and managers attempt to understand and plan for potential climate change impacts. Here we describe the development of a high resolution (250 meter) daily historical (1979-2012) temperature dataset for the US Northern Rocky Mountains using observations from both long-term weather stations and a dense network of low-cost temperature sensors. Empirically based models for daily minimum and maximum temperature incorporate lapse rates from regional reanalysis data, modeled daily solar insolation and soil moisture, along with time invariant canopy cover and topographic factors. Daily model predictions demonstrate excellent agreement with independent observations, with mean absolute errors of less than 1.4 °C for both minimum and maximum

temperature. Model outputs capture important features of topoclimate, including cooler temperature on shaded north-facing slopes and cold air pools in narrow valley bottoms. Topographically resolved temperature data may prove useful in a range of conservation applications related to hydrology, fire regimes and fire behavior, and habitat suitability modeling. The form of the models may provide a means for downscaling future temperature scenarios that account for potential fine-scale topographically-mediated changes in near-surface temperature.

11:20 am - 11:40 am
GREATER INTEGRATION OF DETECTION DOGS IN ONGOING RESEARCH AND MONITORING CAN BENEFIT SCIENCE, CONSERVATION AND POLICY
Aimee Hurt, Working Dogs for Conservation Foundation; Ngaio L. Richards, Working Dogs for Conservation Foundation.

Specially trained detection dogs have long been incorporated into certain types of conservation work (e.g., in New Zealand to protect vulnerable, endangered kiwi and kakapo populations). Around the world, detection dogs represent the visible face of enforcement efforts to combat poaching, smuggling and other related illegal activities harmful to imperiled wildlife and human communities. They are also tremendously effective ambassadors, creating unique opportunities for engagement with the public during educational outreach. Equally important, but perhaps lesser known, is that dogs are also a highly versatile and valuable tool that researchers can harness to recover increased numbers of high quality samples (e.g., scat) for genetics, overall health and fitness, dietary and environmental contaminants exposure analysis, and to determine density and presence or absence, among other applications. Drawing from WD4C's collaborative work monitoring noxious weeds (and moving steadily towards eradication), noninvasively mapping out the whereabouts of endangered species, assessing presence of contaminants in aquatic ecosystems, this presentation will highlight how the use of conservation detection dogs greatly facilitates the application of quality science to real world conservation problems. Areas where dogs could be more incorporated in other complimentary, multi-disciplinary areas such as in the illegal botanical trade and monitoring livestock carcasses for disease and presence of veterinary agents harmful to scavenging wildlife will also be covered. The presentation will conclude with a brief, interactive discussion regarding what attendees consider limitations to using detection dogs in their own work, and how their incorporation could be facilitated.

11:40 am - 12:00 pm
DETECTING NEW POPULATIONS AND PATTERNS: BASIN-SCALE EDNA SAMPLING FOR BULL TROUT
Kevin S. McKelvey, National Genomics Center for Wildlife and Fish Conservation (NGC), United States Forest Service; Michael K. Young, National Genomics Center for Wildlife and Fish Conservation (NGC), United States Forest Service; Kellie J. Carim, National Genomics Center for Wildlife and Fish Conservation (NGC), United States Forest Service and the University of Montana; Caleb Dysthe, National Genomics Center for Wildlife and Fish Conservation (NGC), United States Forest Service and the University of Montana; Taylor M. Wilcox, National Genomics Center for Wildlife and Fish Conservation (NGC), United States Forest Service and the University of Montana; Michael K. Schwartz, National Genomics Center for Wildlife and Fish Conservation (NGC), United States Forest Service.

Environmental DNA (eDNA) sampling can provide extremely sensitive and rapid presence/absence assessments of rare species in lotic systems. Here we describe eDNA sampling for bull trout (*Salvelinus confluentus*) in multiple basins in western Montana and northern Idaho. The efficiency and reliability of eDNA sampling makes it feasible to inventory entire river basins at 1-km intervals, facilitating the discovery and delineation of small fragmented populations, the validation of novel results by targeted resampling, and the exploration of temporal patterns of use. Using eDNA sampling, we identified a new local population in Lolo Creek, Montana, and confirmed the presence of a small population in the Little

Blackfoot River, Montana, that had eluded detection by traditional methods for decades. In the St. Joe River basin, Idaho, we observed patterns that may be indicative of the use of tributaries as cold-water refuges during the summer. Overall, we predict that eDNA sampling will revolutionize our understanding of the distribution and ecology of rare lotic organisms.

Lunch Break 12:00 pm - 1:00 pm

Session 3: Conservation Genetics 1:00 pm - 2:00 pm

Location: James E. Todd Building, Room 210

1:00 pm – 1:20 pm
ISSUES IN CONSERVATION GENOMICS
Brittany A. Garner, University of Montana, Missoula; Brian K. Hand, University of Montana, Missoula; Brett Addis, University of Montana, Missoula; Stephen J. Amish, University of Montana, Missoula; Louis Bernatchez, Université Laval, Québec; Jeffrey T. Foster, University of New Hampshire; Kristina M. Miller, Pacific Biological Station; Phillip A. Morin, National Marine Fisheries Service; Shawn R. Narum, Hagerman Fish Culture Experiment Station; Stephen J. O'Brien, St. Petersburg State University; Gretchen Roffler, Alaska Department of Fish and Game; James Seeb, University of Washington, Seattle; Lisa Seeb, University of Washington, Seattle; William D. Templin, Alaska Department of Fish and Game; Paul Sunnucks, Monash University, Melbourne, Victoria, Australia; Jeffrey Strait, University of Montana, Missoula; Kenneth I. Warheit, University of Washington, Seattle; Todd R. Seamons, Conservation Genetics Laboratory; John Wenburg, Conservation Genetics Laboratory; Jeffrey Olsen, Conservation Genetics Laboratory; Gordon Luikart, University of Montana, Missoula.

This project is unique in that instead of being an original research article, it is a commentary response to a recent opinion piece in the journal Trends in Ecology and Evolution. This paper is currently in its second round of review and will most likely be accepted for publication shortly. The original opinion piece (Shafer et al. 2015) was written by more than 30 authors (almost all of which were European) and concluded that genomics is far from seeing regular application in conservation. In response to this, I gathered a group of conservation genomicists from around the world to write a commentary response to this recent Shafer paper that uses case studies of genomics in conservation to content the pessimistic view of those authors and point out a critical but overlooked component of conservation genomics- non-academic labs who lead the way but rarely publish (relative to academics). In addition, we provide novel definitions for the field of "genomics" in order to alleviate confusion and conflict between researchers in this field of study. This commentary is not only thinking outside of the box because of its topic matter (using a diverse tool like genomics to answer questions in conservation), but because it highlights diverse applications of this technology in a published format that will further the field of conservation as a whole.

1:20 pm – 1:40 pm
AN ECO-EVOLUTIONARY DEMOGENETIC METAPOPULATION MODEL FOR POPULATION VIABILITY ANALYSIS AND ASSISTED MIGRATION OF WHITEBARK PINE, US NORTHERN ROCKY MOUNTAINS
Erin Landguth, University of Montana, Missoula; Zachary A. Holden, United States Forest Service.

Whitebark Pine (*Pinus Albicaulus*) is considered a keystone species in high elevation western US forests. Recent population declines associated with the invasive pathogen blister rust, mountain pine beetle and fire exclusion has intensified interest in developing management strategies for maintaining and restoring the species. An important, but poorly studied aspect of Whitebark Pine management is understanding demographic and genetic ('demogenetic') connectivity, and the potential for introduction of blister rust resistant strains to maintain or promote resistance in the future. Here, we present CDmetaPOP, a

simulation model framework for assessing the connectivity of Whitebark Pine across the US Northern Rockies. Correlative Niche Models were used to map the potential for regeneration success of Whitebark Pine and the potential occurrence of blister rust, using Forest Inventory and Analysis plot data and high resolution, topographically resolved climatic water balance data as predictors. The model was then used to simulate the demogenetic connectivity of Whitebark Pine stands given its current distribution. Scenarios considering different selection pressures of blister rust were conducted and demographic and genetic vulnerability maps were plotted showing the influence of blister rust on stand distributions and local extirpation. Example outplanting scenarios of resistant genes were simulated showing the spatial and temporal decline in demogenetic vulnerability. Future Whitebark Pine landscape genetics studies are discussed, including additional resistant gene outplanting strategies to predict characteristics of the population across its range under current and potential future conditions. This framework may provide an important tool for advancing our understanding of Whitebark pine landscape genomics and for strategic conservation and restoration.

1:40 pm – 2:00 pm
ECOREGIONS AND CONTEMPORARY LANDSCAPE FEATURES INFLUENCE GREATER SAGE-GROUSE HIERARCHICAL POPULATION GENETIC STRUCTURE
Todd Cross, University of Montana, Missoula; David Naugle, University of Montana, Missoula; John C. Carlson, Bureau of Land Management; and Michael K. Schwartz, University of Montana, Missoula.

Understanding how landscape features influence the population structure of this species is important for guiding ongoing conservation and restoration activities. The greater sage-grouse (*Centrocercus urophasianus*) is a species of concern in the western United States distributed across 1.2 million km2 of western North America. We genotyped 1,499 greater sage-grouse from 297 locations ranging across Montana, North Dakota and South Dakota using a 16 locus microsatellite panel, then used spatial principal components analysis and hierarchical Bayesian clustering to identify population substructure. We found nested structure wherein populations aligned first with ecologically distinctive landscapes formed by historical biogeographic processes and secondarily with modern anthropogenic landscape changes. This suggests that contemporary genetic population structure is shaped both by the landscape's underlying physiography and modern landscape alterations. We propose five management units based on the genetic subpopulation substructure we identified. These management units encompass existing conservation units recognized by the states within the study area, and can be used to inform targeted management of this highly-mobile and wide-ranging species within and among these priority areas for conservation.

Session 4: Climate Change 2:00 pm - 2:40 pm

Location: James E. Todd Building, Room 210

2:00 pm – 2:20 pm
CONNECTIVITY PLANNING FOR A CHANGING LANDSCAPE: EXPERT OPINION-BASED APPROACH TO CONSIDERING CLIMATE CHANGE EFFECTS ON GRIZZLY BEAR CONNECTIVITY IN SOUTHWEST MONTANA
Molly Cross, Wildlife Conservation Society.

Enhancing connectivity is one of the most commonly recommended strategies for helping species adapt to climate change, yet there are relatively few examples of connectivity conservation efforts that have explicitly considered how climate change might affect species' connectivity needs. Here we demonstrate an expert opinion-based approach to incorporating the effects of climate change into connectivity planning. We used this approach to inform grizzly bear connectivity conservation in southwestern

Montana, by addressing the fundamental question: How might we adjust our connectivity conservation priorities (i.e., what to do where) for grizzly bears in southwestern Montana to account for the effects of climate change? To tackle this question, we first consulted with grizzly bear and climate change experts to generate a list of potential pathways through which a change in climate might affect the location or quality of grizzly bear linkages in the region. We then gathered expert opinions to determine which climate change-related factors are perceived as having the greatest effect on grizzly bear connectivity needs. Ultimately, the experts concluded that although there are ways that grizzly bear connectivity needs could be affected by changes in climate, we cannot spatially predict those impacts with certainty. The experts also felt that for the foreseeable future, climate-related factors are not likely to be as important an influence on grizzly bear movements in this region as are non-climate-related concerns such as human land use and behaviors. We will discuss the relevance of these findings for grizzly bear connectivity conservation, monitoring and research in southwest Montana.

2:20 pm – 2:40 pm
LIFE HISTORY TRAITS AS MEDIATORS OF SOLITARY BEE RESPONSES TO CLIMATE-WARMING: PHENOLOGICAL SHIFTS, BODY SIZE, AND LIFE SPAN
Anthony Slominski, Montana State University, Bozeman.

Climate-warming is uncoupling plant-pollinator interactions by causing shifts in seasonal flowering periods and pollinator activity (i.e. phenologies) that are species-specific in magnitude and direction. Additionally, warming affects pollinator body size and life span, with implications for plant-pollinator interactions and reproductive success. Species-specific responses to climate-warming indicate that certain plant and pollinator species may be more vulnerable to the negative effects of climate-warming than others. However, the mechanisms mediating species-specific responses to warming are poorly understood in pollinators, preventing conservation professionals from identifying species of concern and limiting our ability to investigate the effects of climate-warming on plant-pollinator interactions and reproductive success. The goal of this study was to experimentally evaluate whether different overwintering life stage strategies (i.e. adult vs prepupae) in solitary bees influenced their phenological and physiological responses to climate-warming. Results suggest that different metabolic and developmental constraints associated with overwintering in the prepupae life stage compared to an adult life stage may influence how solitary bees respond to increased temperature and altered duration of winter in predictable ways. This work contributes to a better understanding of the effects of climate change on pollinator species, with implications for preserving pollination services in Montana, as well as informing future studies investigating the effects of climate-warming on plant-pollinator interactions and reproductive success.

Session 5: Conservation Success on Tribal Lands 3:00 pm - 5:00 pm

Location: James E. Todd Building, Room 210

3:00 pm – 3:20 pm
A NATURAL HISTORY OF SMUDGING: RESEARCHING BLACKFEET PLANT USE AND ENVIRONMENTAL KNOWLEDGE
Rosalyn LaPier, University of Montana, Missoula.

Rosalyn is interested in how does (Native American) land loss impacts environmental knowledge? What was the relationship people and plants, and religious belief systems and the natural world? Her current research explores the concept of purity in Blackfeet society and the role of plants or natural elements to achieve purity. What plants were used to achieve purity before land loss?

3:20 pm – 3:40 pm
BUILDING A LONG-TERM CONSERVATION STRATEGY FOR SWIFT FOX POPULATIONS IN MONTANA
Donelle Schwalm, Oregon State University; Kristy Bly, World Wildlife Fund.

Swift foxes (*Vulpes velox*) remain largely absent from central Montana despite the presence of considerable suitable habitat. This absence – which stems from a history of human persecution, conversion of native grassland to cropland, and predation and competitive exclusion by coyotes (*Canis latrans*) and red foxes (*Vulpes vulpes*) – has created a gap between existing swift fox populations in northern Montana/southern Canada and the core of the species range in the central Great Plains. Swift fox survey efforts have been limited in Montana, thus the extent of their distribution is unknown. It is clear, however, that the species is rare and the lack of information regarding their distribution has limited the ability of managers to develop effective conservation strategies in this region. Partnering with three state agencies, five tribal entities, one university and three nonprofit organizations, in August 2015, we began a broad scale camera trap survey for swift foxes on tribal, public, and private lands in Montana. Here, we provide results from the 300+ survey points we have completed to date. Furthermore, we outline the modelling framework in which this data will be used to develop a systematic, comprehensive reintroduction strategy for swift fox. The strategy will prioritize potential release sites based on population viability and contribution to overall connectivity between existing populations and other potential release sites. We will investigate the importance a series of variables concerning site and population specific traits. This strategy will be used to guide swift fox recovery efforts across partnering properties in Montana.

3:40 pm – 4:00 pm
INTER-TRIBAL AND INTER-AGENCY COLLABORATIONS FOR CONTROL OF FLOWERING RUSH
Virgil Dupuis, Salish Kootenai College; Peter Rice, University of Montana

Flowering rush (*Butomus umbellatus*), an aquatic invasive macrophyte, was first identified in Flathead Lake in 1964, and has spread into Idaho, Washington, and Oregon along the Columbia River. Salish Kootenai College and The University of Montana initiated research in 2005 to characterize the scale of the infestation in Flathead Lake and Lower Flathead River. Since then, research into chemical controls, the development of a predictive spatial model, and communications along the Columbia Basin has resulted in a multi-institutional and multi-jurisdictional effort to contain flowering rush from expanding down the system, implementing efforts to quantify and reduce the environmental impacts of flowering rush, and initiate the development biological controls.

4:00 pm – 4:20 pm
WETLAND RESTORATION ON THE FLATHEAD INDIAN RESERVATION
Barry Hansen, Confederated Salish and Kootenai Tribes.

The Confederated Salish and Kootenai Tribes have restored many wetland sites on the Flathead Indian Reservation over the last 20 years. The need for this work arose from extensive impacts caused by a wide range of activities that include irrigation diversions, grazing, wetland filling, and stream channelization. The Tribes have addressed these degraded sites with both active and passive techniques, and achieved a wide range of objectives ranging from restoration of historical conditions to creation of remedial wetlands on historically dry sites. Examples of each of these restoration approaches will be described.

4:20 pm – 4:40 pm
NEZ PERCE TRIBE CONSERVATION EFFORTS FOR ESA LISTED FISH IN THE SOUTH FORK OF THE SALMON RIVER
Wesley Keller, McCall Watershed Project Leader- Nez Perce Tribe

The Nez Perce Tribe has been actively restoring aquatic ecosystems in their historic ceded territory. This restoration work has its roots in exercising Tribal sovereignty and protecting rights reserved under the Nez Perce Treaty of 1855 with the United States Federal Government. Using a holistic approach encompassing entire watersheds the Nez Perce have had success in conservation and enhancement of Chinook salmon, steelhead, bull trout and lamprey. My talk will focus on work performed by the Nez Perce Tribe in the South Fork of the Salmon River Subbasin to highlight how habitat restoration, fisheries research and hatchery supplementation programs play hand in hand to conserve aquatic species.

4:40 pm – 5:00 pm
TRUMPETER SWAM REINTRODUCTION ON THE FLATHEAD INDIAN RESERVATION
Dale Becker, Tribal Wildlife Program Manager - Confederated Salish and Kootenai Tribes

In an effort to restore extirpated native wildlife species and wildlife habitat on the Flathead Indian Reservation, the Confederated Salish and Kootenai Tribes' Wildlife Management Program commenced reintroduction of Trumpeter Swans in 1996. The project was a cooperative effort with Montana Fish, Wildlife and Parks, the U. S. Fish and Wildlife Service and other non-governmental organizations and local citizens. Initially, wild Trumpeter Swan cygnets from Canada were used in the project, but captive-raised swans were released on the Reservation annually since 2002. To date 258 Trumpeter Swans have been released on the Reservation. The first nesting by reintroduced swans occurred in 2004. Since that time, the birds have dispersed to other areas in northwestern Montana to nest, and at least 105 nesting attempts have produced a minimum of 294 cygnets. The population continues to grow each year, as pairs colonize new wetlands both on and off of the Reservation. The primary cause of mortality is collision with overhead power lines. Ongoing cooperation in marking selected lines with the local utility, Mission Valley Power, seems to be lessening this mortality. Active releases of swans are nearly completed, and productivity in the region is continuing to increase.

Poster Session and Beer/Wine Reception 5:00 pm - 6:30 pm

Location: James E. Todd Building, Room 203

POSTERS

DOES WHITEBARK PINE HAVE A REFUGE FROM MOUNTAIN PINE BEETLE AT TREELINE?
Colin Maher, University of Montana, Missoula; Claudine Tobalske**,** Montana Natural Heritage Program.

Whitebark pine (*Pinus albicaulis*) is a major component of subalpine forests in western North America, and its seeds are an important food for wildlife. It is often the dominant tree species at alpine treeline, where it readily forms krummholz, a stunted, shrub-like growth form. Climate change-related increases in mountain pine beetle (*Dendroctonus ponderosae*) activity at high elevation are causing substantial declines in whitebark pine in the US Northern Rocky Mountains. While these changes are alarming, we have little understanding of whitebark pine responses to bark beetle impacts beyond our limited historical perspective. Refuge habitats are one way in which populations may persist through these impacts. Anecdotal accounts suggest that whitebark krummholz at alpine treeline may be resistant to beetles. We are currently investigating the potential for treeline habitats to serve as a refuge from mountain pine

beetle attack. We have sampled recent beetle-caused whitebark pine mortality across treeline ecotones at 7 of 10 planned sites in the US Northern Rocky Mountains. I compared treeline mortality gradients with other forest edges (e.g., cliffs, talus slopes, meadows, lakes, etc.) to determine if mortality patterns are unique to treeline edges. Preliminary results from this investigation indicate that treeline habitats do evade mountain pine beetle attack during recent outbreaks, and that this pattern is not found at other forest edges. If treeline individuals are long-lived or can reproduce, treeline habitats may be viable refugia for whitebark pine populations.

INFLUENCE OF CULVERTS ON TOPEKA SHINER (*NOTROPIS TOPEKA*) HABITAT

Marcy Mead, Salish Kootenai College

The Topeka Shiner (*Notropis topeka*) is Minnesota's first project was a habitat assessment of stream reaches at three culvert sites and three control sites in southwest Minnesota to find out what kinds of impacts culverts have on this species. Methods followed the Quantitative Physical Habitat Assessment Protocol of the Minnesota Pollution Control Agency and the Minnesota Stream Habitat Assessment with a few changes. None of the areas studied had riparian fences to keep cattle from the stream. This led to degraded stream banks and freed sediments that were washed downstream. The build-up of silt in the streams around the control areas is substantial. Heavy siltation impacts the *N. topeka* nesting sites. Riprap near culverts was helpful in preventing barriers for the fish when the water levels recede. Some of the riprap at stream pools helped reduce the erosion. The riprap also provided cover for the fish to seek shelter from current and from predators. A correlation was observed that more *N. topeka* were caught in deeper excavated pools near culverts. Siltation issues might be remedied by fencing the streams. Another solution would be to design ways to remove sediment in the floor of the culvert barrel or by finding a way of redesigning the culvert floor to prevent silt build up inside. The importance of engineering ways to keep the silt from building up in the culvert floors will be a big help to giving the *N. topeka* better chances to increase their populations.

A SPATIAL-TEMPORAL DATASET OF MESIC RESOURCES IN THE MOUNTAIN WEST SAGE-STEPPEMM

Daniel Perret, University of Montana, Missoula; Patrick Donnelly, University of Montana, Missoula/ US Fish and Wildlife Service; Victoria Dreitz, University of Montana, Missoula; Christine Wiggins, University of Montana, Missoula; Brendan Hoover, University of Montana, Missoula; Michael Johnson, University of Montana, Missoula.

Nest density is an important component of productivity among bird populations that is rarely measured. A census of every nest within a given area is often unfeasible and the rate of detecting nests is seldom known. Distance sampling methods are widely used when nest density is directly measured (Marques 2007), but this requires intensive and methodical surveying. Recently, an analytical approach was developed to estimate nest density using data collected to assess nest fate (Péron et al 2014). I will evaluate the NDE by comparing its nest density estimates to distance sampling estimates on a sagebrush obligate songbird, the Brewer's sparrow (*Spizella breweri*). Testing the validity of this nest density estimator (NDE) on an avian species with a starkly different life history strategy than the model species, the Blue Winged Teal (*Anas discors*), will assist in judging the usefulness of this estimator for avian species in general.

TESTING THE EFFECTIVENESS OF A NOVEL APPROACH TO ESTIMATE NEST DENSITY OF BREWER'S SPARROW (*SPIZELLA BREWERI*)

Kaitlyn Reintsma, University of Montana, Missoula; Alan Harrington, University of Montana, Missoula; Victoria Dreitz, University of Montana, Missoula; Jessie Golding, University of Montana, Missoula.

Nest density is an important component of productivity among bird populations that is rarely measured. A census of every nest within a given area is often unfeasible and the rate of detecting nests is seldom known. Distance sampling methods are widely used when nest density is directly measured (Marques 2007), but this requires intensive and methodical surveying. Recently, an analytical approach was developed to estimate nest density using data collected to assess nest fate (Péron et al 2014). I will evaluate the NDE by comparing its nest density estimates to distance sampling estimates on a sagebrush obligate songbird, the Brewer's sparrow (*Spizella breweri*). Testing the validity of this nest density estimator (NDE) on an avian species with a starkly different life history strategy than the model species, the Blue Winged Teal (*Anas discors*), will assist in judging the usefulness of this estimator for avian species in general.

HABITAT PREFERENCES OF THE HOARY MARMOT: IMPORTANCE OF WATER IN ALPINE ENVIRONMENTS

Adam Starecheski, Montana State University, Bozeman; Ben Turnock, Montana State University, Bozeman; Andrea R. Litt, Montana State University, Bozeman.

Warmer temperatures predicted for the American West will lead to decreases in snowpack and earlier spring snowmelt, with concomitant changes in the regional hydrology. Populations of small alpine obligates, such as the hoary marmot (*Marmota caligata*), will likely be negatively affected by these changes due to their behavioral and physiological traits. We sought to assess how proximity and type of water affects occurrence of the hoary marmot in western Montana and hypothesized that hoary marmots would be more likely to occur in areas near water. We surveyed for marmots in five different mountain ranges in western Montana during 2014 and 2015. We quantified the relationship between occurrence of marmots and the distance to the closest water source, as well as assessed evidence of a preference for moving or standing water. We detected marmots in 25 of 147 surveys completed (17%). We found a weak negative relationship between marmot occupancy and distance to closest water source. The odds of marmots occurring within a site where the closest water type is moving are approximately equal with the odds of marmots occurring at a site with standing water as the closest water type (0.98 to 1, 95% CI of 0.84 to 1.17). Understanding habitat features important to the hoary marmot will have significant implications for the persistence of this species. As the amount of stored water in the snowpack decreases, water sources will shrink and disappear, which will affect every species that relies on these sources of water, including the hoary marmot.

RELATIONSHIPS BETWEEN BLACK-NECKED STILTS (*HIMANTOPUS MEXICANUS*), MACROINVERTEBRATES, AND WETLAND HABITATS

Brett Stevenson, Salish Kootenai College; Antony Berthelote, Salish Kootenai College; Janene Lichtengerg, Salish Kootenai College.

This study investigated how differences in Black-necked Stilt (*Himantopus mexicanus*) numbers among wetlands might be correlated with their macroinvertebrate food supply. Black-Necked Stilts and other migratory waterbirds were monitored weekly on natural and restored wetlands within The Flathead Indian Reservation between 16 April and 25 June. Differences between two created wetland sites were observed, with higher numbers present at Ring-neck Ranch (MTWF-RR), and fewer individuals at Has Peregrine Falcons (KHN5). The Black-necked Stilt's diet is dominated by macroinvertebrates, and

stomach content research has shown a preference for "True bugs" of the Order Hemiptera. Macroinvertebrate samples were taken on dates in June and July 2015 from sites where Black-necked Stilts were documented, and two natural wetland sites for control values. This study found a correlation between Black-necked Stilt and macroinvertebrate abundance at specific restored wetlands

ACCOUNTING FOR ADAPTIVE CAPACITY AND UNCERTAINTY IN A CLIMATE CHANGE VULNERABILITY ASSESSMENT OF COLUMBIA RIVER SALMONIDS

Alisa A. Wade, University of Montana, Missoula; Brian K. Hand, University of Montana, Missoula; Clint C. Muhlfeld, USGS Northern Rocky Mountain Science Center, Glacier National Park; Ryan P. Kovach, University of Montana, Missoula; Diane C. Whited, University of Montana, Missoula; Gordon Luikart, University of Montana, Missoula.

Climate change vulnerability assessments (CCVAs) are a valuable tool for projecting the potential impacts of climate change on species, yet many CCVAs consider a limited suite of data sources and fail to explore uncertainty associated with results. We assessed climate vulnerability of two threatened salmonids with different life histories – steelhead trout (*Oncorhynchus mykiss*) and bull trout (*Salvelinus confluentus*) – throughout the Columbia River Basin, USA. We expand on traditional CCVAs that comprise measures of climatic exposure and habitat quality by including demographic and genetic metrics representing a species' climatic sensitivity and adaptive capacity. We identified general patterns of high vulnerability in low-elevation habitats and those in the southernmost portion of the Columbia River Basin. However, vulnerability rankings varied widely depending on the factors included in the CCVA (climate, habitat, demographic, or genetic). Further, among the locations where steelhead and bull trout were sympatric, many populations identified as having high vulnerability for one species were identified as having low vulnerability in the other. By including measures of demographics and genetics, our results provide managers with a more thorough understanding of the interplay amongst potential climate exposure, sensitivity, and adaptive capacity underlying salmonid vulnerability throughout the CRB and how spatial differences in those factors will complicate multi-species conservation. Importantly, our findings illustrate how CCVA results reflect data choices and how those choices can lead to markedly varied conclusions. Our results suggest CCVAS should be considered within a framework for refining hypotheses, guiding future research, and comparison of plausible scenarios as opposed to a prioritization panacea.

FRIDAY, NOVEMBER 20TH
James E. Todd Building Room 203/210:

Breakfast 7:45 am - 8:15 am

Location: James E. Todd Building, Room 203

Session 6: Population Monitoring 8:20 am - 10:00 am

Location: James E. Todd Building, Room 210

8:20 am - 8:40 am
SNOW LEOPARD CONSERVATION IN SANJIANGYUAN AREA, CHINA
Lingyun Xiao, Peking University; Juan Li, University of California, Berkeley; Xiang Zhao, Shanshui Conservation Center; Yanlin Liu, Shanshui Conservation Center; Zhi Lu1, Peking University and Shanshui Conservation Center.

Conservation program specifically targeting snow leopards started very recently in China. In March 2008, an international conference was organized in Beijing, China to bring together representative from all snow leopard range countries for the first time. The next year Shanshui Conservation Center launched the long-term snow leopard program in Sanjiangyuan Region of the Tibetan Plateau, which is the largest nature reserve in China containing continuous snow leopard habitat. We started from almost no data available except few previous scattered studies (Janecka et al. 2008, McCarthy et al. 2008). We surveyed 70 15x15 km grids for snow leopard tracks and produced a distribution map across the whole area (Li et al. 2014). Conflict and poaching data were also collected to assess the threats (Li et al. 2013, 2014). From the year 2012, we started to focus on prey population status, which is always important for large carnivore conservation. We found overwhelming impact of livestock husbandry on snow leopard prey density. At the meantime, Tibetan Buddhism plays a significant role in safeguarding wildlife (Li et al. 2014). Studies are still going on to study the impact of sacred mountains on snow leopard conservation. Community-based monitoring on both snow leopards and their wild prey is going on to involve local herders into snow leopard conservation.

8:40 am - 9:00 am
PRELIMINARY PATTERNS OBSERVED IN ROCKY MOUNTAIN PIKAS AND ECOSYSTEMS, CONTEXTUALIZED WITH DYNAMICS OBSERVED RANGE-WIDE
Erik A. Beever, U.S. Geological Survey, Northern Rocky Mountain Science Center; Aaron N. Johnston, U.S. Geological Survey, Northern Rocky Mountain Science Center.

Montane ecosystems provide fresh water for ~2/3 of the world's people, provide aesthetic and recreational values, and constitute >90% of the nation's and world's strictest-conservation land portfolio. Additionally, given their sharp gradients in biotic and abiotic conditions, they have high diversity and constitute natural corridors for species' spatial re-shuffling amidst contemporary climate change. Unfortunately, these ecosystems and their constituent species are typically under-studied, due to their ruggedness and isolation. We present data on patterns of pika distribution and occupancy, behavioral flexibility, adaptive capacity, and rates of extirpation, contrasting findings from across Montana and the north-central Rocky Mountains with findings from other parts of western North America.

In particular, we find that rates of persistence of *Ochotona princeps* in and around Montana since historical records are nearly 100%, whereas extirpations of the species from >44% of sites with historical records or from entire management units have occurred elsewhere. Generally, pikas occupy all but the lowest elevations of many management units in and around Montana, except for highest elevations as one

moves to northern Montana (Glacier NP) and poleward. Whereas abundance of *O. princeps* generally increases linearly with elevation further south in the range, we have often observed a unimodal pattern of pika density when plotted against elevation. Pika individuals in the north-central Rocky Mountains exhibit a great deal of phenotypic (especially behavioral) plasticity that allows them to take advantage of non-traditional microrefugia and food sources; comparable behavior has not been observed, further south in the species' range.

9:00 am - 9:20 am
A CRITICAL ROLE FOR DISEASE PERSISTENCE IN POPULATION VIABILITY ASSESSMENTS OF BIGHORN SHEEP
Kezia Manlove, Penn State; Frances Cassirer, Idaho Department of Fish and Game; Paul Cross, USGS Northern Rocky Mountain Science Center; Raina Plowright, Montana State University, Bozeman; Peter Hudson, Penn State.

Disease-induced die-offs of bighorn sheep are a widely recognized management challenge for the American Rockies. Impacts of the poor recruitment that often follows these all-age disease events are less understood. Here we study the long-term effects of lamb disease on bighorn population growth rates. We find that population dynamics are very sensitive to the frequency of pathogen introduction – a strong argument for continuing policies aimed to segregate bighorn and domestic sheep – but we also show that long-term population viability depends critically on the duration over which disease persists in lambs. Our models suggest that long-term pathogen persistence may precipitate a phase-transition in bighorn population dynamics, from a period of rapid growth prior to disease onset, to a period of stagnant-to-declining population trajectories. Taken together, our results underscore the importance of understanding pathogen, and disease persistence, in order to optimally manage bighorn sheep throughout the mountain west.

9:20 am - 9:40 am
UNDERSTANDING AN OVERLOOKED NATIVE SALMONID: SPAWNING AND EARLY-LIFE DISTRIBUTION OF MOUNTAIN WHITEFISH IN THE MADISON RIVER, MONTANA
Jan Boyer, Montana Cooperative Fishery Research Unit; Christopher S. Guy, Montana Cooperative Fishery Research Unit; Molly A. H. Web, United States Fish and Wildlife Service; Travis B. Horton, Montana Fish, Wildlife, and Parks.

Mountain whitefish were historically common throughout much of the Intermountain West, and are the most abundant native salmonid in many of the region's rivers. However, within the last decade mountain whitefish have declined in some rivers. In the Madison River, Montana, anecdotal evidence indicates abundance has declined and the population is skewed toward larger individuals, which is typically symptomatic of recruitment problems. Describing spawning behavior and juvenile distribution will form a foundation for investigating mechanisms influencing recruitment. We relocated mature radio-tagged mountain whitefish in autumn 2012 - 2014. Timing of spawning was determined from spawning status of captured females and eggs collected on egg mats. In spring 2014, we seined backwater and channel sites to describe age-0 distribution. In 2013 and 2014, spawning occurred between the third week of October and first week of November. During spawning, 28% of tagged fish were observed in an area accounting for 5% of study site length. The reach downstream of this area yielded the highest C/f of age-0 mountain whitefish, and within this reach age-0 Mountain Whitefish were associated with silt-laden habitats. Future investigations on mechanisms influencing recruitment should be focused in these areas.

9:40 am - 10:00 am
OUR DACE ARE NUMBERED: CONSERVATION OF MONTANA PRAIRIE CYPRINIDS
Allison Stringer, Montana Cooperative Fishery Research Unit; Robert G. Bramblett, Montana Cooperative Fishery Research Unit; Alexander V. Zale, Montana Cooperative Fishery Research Unit.

Pearl Dace (*Margariscus margarita*) and Northern Redbelly × Finescale Dace hybrids (*Chrosomus eos* × *C. neogaeus*; hereafter Hybrid Dace) are Montana species of special concern. Both taxa appear to have undergone substantial range contractions and are at risk of extirpation from Montana. A lack of information regarding their present distributions and status hinders their conservation and management. We are identifying and ranking conservation areas for both taxa by (1) conducting targeted surveys to establish their current distributions relative to historic distributions, (2) determining the locations and proportion of Northern Redbelly Dace populations that contain Hybrid Dace, and (3) evaluating the threat from non-native Northern Pike (*Esox lucius*), which we hypothesize cause range contractions of dace in Montana prairie streams. We visited 37 sites on 29 streams across the Missouri River drainage in 2015, 7 of which had historic occurrence records of Pearl Dace. Northern Redbelly Dace were present at 15 sites, Hybrid Dace were probably present (pending laboratory verification) at 7 sites, Pearl Dace were present at 1 site, and Northern Pike were present at 9 sites. Pearl Dace occurred historically in 6 of the streams with Northern Pike, but we found Pearl Dace in only one of them. Presence of three year classes of Northern Pike in one stream infers successful reproduction in some prairie streams. A case study of two adjacent streams indicated that Northern Redbelly Dace were present in the stream without Northern Pike and absent in the stream without Northern Pike.

Coffee Break 10:00 am - 10:20 am

Location: James E. Todd Building, Room 203

Session 7: Population Monitoring 10:20 am - 11:40 am

Location: James E. Todd Building, Room 210

10:20 am - 10:40 am
PEOPLE, PREDATORS, AND PREY: HUMAN SHIELDS IN THE CROWN OF THE CONTINENT
Wesley Sarmento, University of Montana, Missoula; Mark Biel, Natural Resources, Glacier National Park; Joel Berger, Colorado State University, Fort Collins.

Redistribution of wildlife resulting from human alteration of environments and ecological interactions is of growing management concern in North America. Habituation seems to be particularity prevalent in national park systems because millions of visitors interact with wildlife. For example, Glacier National Park in northwestern Montana, USA, receives approximately 2.2 million visitors over the months of June, July, and August each year—with the majority of their activity concentrated along the Going-to-Sun Road. The Going-to-Sun Road corridor is well-known for its habituated mountain goats (*Oreamnos americanus*). Habituation, however, was identified as a priority management concern in Glacier National Park. Successful management actions require a clear understanding of the causes and consequences of complex ecological issues such as habituation. Through experimental and observation effort this project has identified human-created predation refugia, or human shields, where mountain goats are escaping predation through interaction with people. Reductions in predation risk have resulted in mountain goat redistribution and changes in behavior. We found mountain goats using sites with human shields were less vigilant and were found in smaller groups. Furthermore, goats in areas with human-mediated predation refuge had reduced use cliff security terrain. Additionally, mountain goats that exploited people as shields from predators showed a weakened response to an experimentally presented predator model. Reductions in predator risk appear to be the primary driver of mountain goat redistribution, and the use of humans as buffers from predation has led to close contact between people and wildlife, resulting in

compromised safety and altered ecological interactions.

10:40 am - 11:00 am
AN ECO-EVOLUTIONARY METAPOPULATION SIMULATION MODEL FOR POPULATION VIABILITY ANALYSIS IN RIVERSCAPE GENETICS: CASE EXAMPLES IN THE SULLIVAN WATERSHED, WASHINGTON, USA
Erin Landguth, University of Montana, Missoula; Andrew Bearlin, Environmental Affairs Division, Seattle City Light; Casey Day, Purdue University.

Due to a new Federal License for the Boundary Dam in northeastern WA, there is a mandate to understand how to effectively monitor native fish population responses from impacts of nearby hydroelectric dam operations in the lower Pend Oreille River. The required relicensing mitigation actions that include extensive habitat improvements, dam removal, non-native species suppression, and reintroduction and supplementation of native species, coupled with intensive monitoring data, provide unique opportunities to study and model the dynamics of local fish populations. Using a new eco-evolutionary metapopulation program, system models have been created for target species (Bull Trout, Westslope Cutthroat Trout and Eastern Brook Trout) that are useful in the context of an overarching adaptive management approach for assessing the performance of the many mitigation projects. With these system models, applications are given for how to (1) apply harvesting scenarios for suppression management, (2) design optimal reintroduction strategies, and (3) develop relationships between specific genotypes and riverscape environments for helping to identify the ecological drivers of adaptive genetic variation and rates of hybridization.

11:00 am - 11:20 am
RECREATIONAL AVIATION AND WILDLIFE: THE PHYSIOLOGICAL STRESS RESPONSE IN UNGULATES AND ASSOCIATED USER PERCEPTIONS
Devin Landry, University of Montana, Missoula; Creagh W. Breuner, University of Montana, Missoula; Elizbeth C. Metcalf, University of Montana, Missoula.

Backcountry aviation is a popular form of recreation throughout the northern Rocky Mountains; however, it is unclear whether this seasonal disturbance adversely impacts wildlife. Using stress physiology techniques provides a mechanistic understanding of the effects of disturbance on free-living populations. The analysis of fecal glucocorticoid metabolites (FGM) is an effective tool in conservation biology because it provides a non-invasive measurement of circulating glucocorticoid stress hormones deposited into the feces. We quantified aircraft activity and human presence in concert with collecting white-tailed deer (*Odocoileus virginianus*) and mule deer (*O. hemionus*) fecal samples from six backcountry airfields and six control sites (n=12) throughout western Montana and north-central Idaho. By correlating FGM levels against aircraft activity, we can evaluate the impacts of backcountry aviation on deer stress physiology within the greater context of recreation on public lands. We also conducted a quantitative electronic survey of a recreational pilots group (n=6154). The primary purpose of the survey was to determine the acceptability of possible management actions aimed at mitigating wildlife stress levels and to evaluate the effect of variables such as wildlife attitudes or pilots' place attachment to backcountry airstrips on the acceptability of possible management actions. This research represents the first attempt to model the endocrine profile of wildlife populations exposed to recreational, backcountry aviation while also providing relevant social science data on associated users. This study is funded by the Aircraft Owners and Pilots Association, the Recreational Aviation Foundation, and the Montana Department of Transportation.

11:20 am - 11:40 am
TNC CLEARWATER-BLACKFOOT PROJECT FOREST ROAD AND STREAM CROSSING INVENTORY AND RESTORATION
Adam Switalski, InRoads Consulting, LLC; Steven Kloetzel, The Nature Conservancy.

The Nature Conservancy in Montana (TNC) contracted InRoads Consulting LLC to survey roads and stream crossings on their newly acquired Clearwater-Blackfoot Project lands - 117,152 acres of former Plum Creek timberlands in western Montana. A total of 1,264 miles of roads were inventoried to identify issues with fish passage, erosion into streams, and weed invasion as well as identifying illegal motorized trespass.

We identified 50 road "hotspots" where there was a significant amount of erosion such as gullying or road-triggered landslides. A total of 461 culverts were surveyed with 51 identified as "hotspots" with more than 50% blockage. Some of these culverts are completely blocked, creating the potential for major road washouts during spring runoff. About 90% of inventoried culverts were perched or did not have enough water to allow fish passage.

Noxious weeds were ubiquitous across the landscape, and we found a total of 11 infestations of three new invader weeds: yellow hawkweed, orange hawkweed, and yellow toadflax. Most of the road system was gated or barriered, but illegal trespass around closed roads was common with 24 documented violations.

All the data collected was entered into a searchable geo-database. With this information TNC will be able query a list of more than 50 different variables related to roads and culverts and decide how to best prioritize maintenance and restoration funds. TNC has already begun to use this tool to implement restoration treatments, and has sprayed new invader weeds, blocked off illegal access, restored user-created routes, and cleared blocked culverts of debris.

SCHEDULE SUMMARY

	Event	Instructor/ Presenter	Title
Wednesday (Nov. 18th)			
12:00 pm - 1:00 pm	**Registration**		
1:00 pm - 2:40 pm	**Workshop**	Bebe Crouse	Communicating Science Workshop
2:40 pm - 3:00 pm	**Break**		
3:00 pm - 5:00 pm	**Workshop**	Bebe Crouse	Communicating Science Workshop
5:00 pm - 6:30 pm	**Dinner Break**		
6:30 pm - 7:30 pm	**Plenary Talk**	Keith Aune	Approaches to Conservation in a Modern World: Ramblings of an Aged Conservationist
7:30 pm - 9:00 pm	**Social**		
Thursday (Nov. 19th)			
7:30 am - 8:30am	**Registration/ Talk Upload**		
8:20 am - 8:40 am	**Grassland Conservation**	Jessie Golding	Assessing grazing as a conservation tool in sagebrush and grassland ecosystems
8:40 am - 9:00 am		Danielle Fagre	Investigating the effects of bison grazing on grassland songbirds
9:00 am - 9:20 am		Kevin Ellison	Rangeland conservation at scale: WWF's "plowprint," sustainable ranching initiative, and grassland birds
9:20 am - 9:40 am		Colleen Ferris	Adventure science on Montana's Great Plains
9:40 am - 10:00 am		Jody Hilty	Does it pay off to envision conservation at scale? Y2Y a 20-Year retrospective
10:00 am - 10:20 am		Meredith McClure	A connectivity data atlas for the Great Northern LCC: making sense of diverse data to inform strategic connectivity conservation
10:20 am - 10:40 am	**Break**		
10:40 am - 11:00 am	**Diverse Tools for Conservation**	Will Janousek	An assessment of current statewide avian monitoring programs in Montana
11:00 am - 11:20 am		Zachary Holden	Development of topographically resolved historical daily gridded air temperature data with distributed sensor networks for the US Northern Rocky Mountains

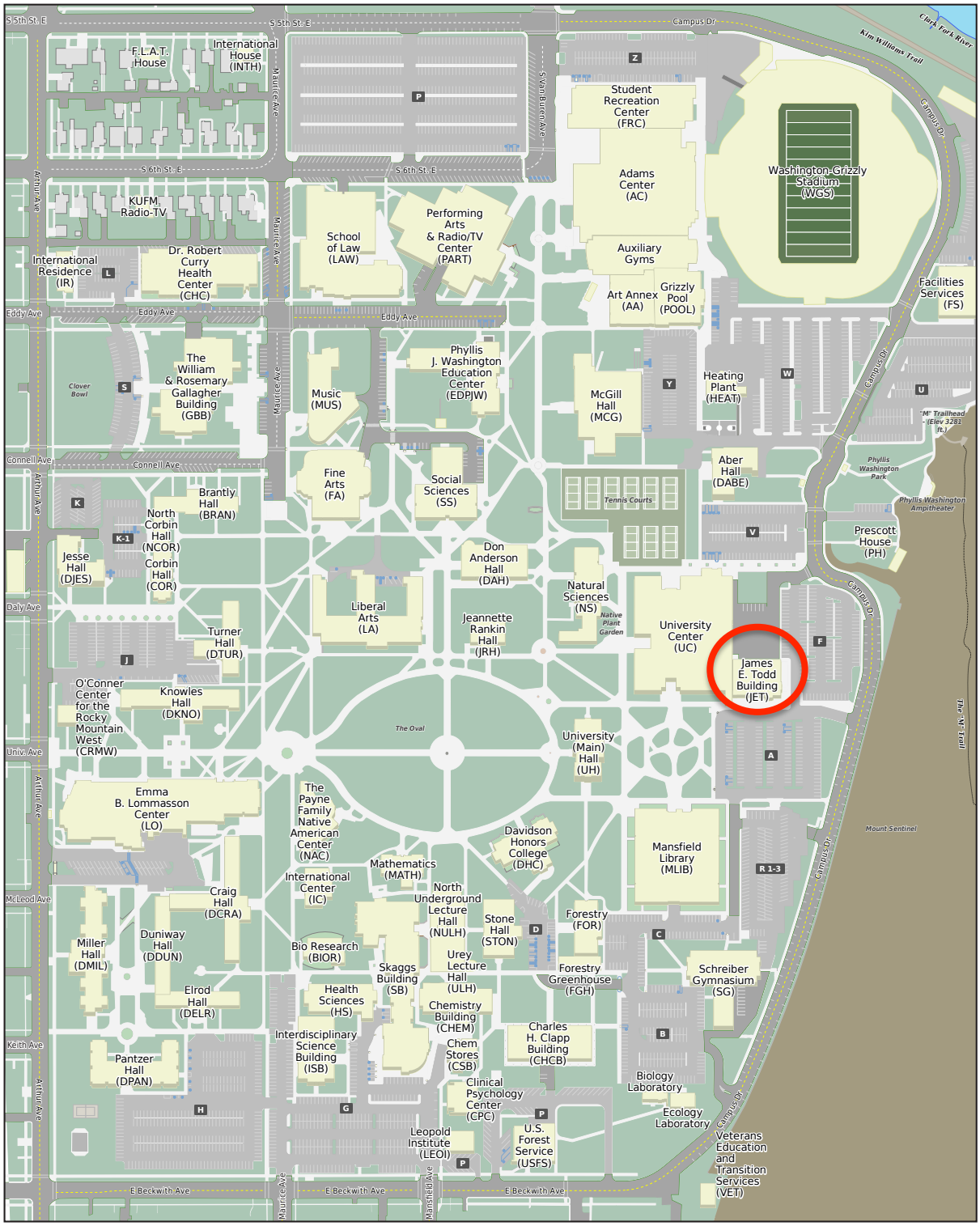
	Event	Instructor/ Presenter	Title
11:20 am - 11:40 am		Aimee Hurt	Greater integration of detection dogs in ongoing research and monitoring can benefit science, conservation and policy
11:40 am - 12:00 pm		Kevin McKelvey	Detecting new populations and patterns: basin-scale eDNA sampling for bull trout
12:00 pm - 1:00 pm	**Lunch Break / Talk Upload**		
1:00 pm - 1:20 pm	**Conservation Genetics**	Brittany Garner	Issues in conservation genomics
1:20 pm - 1:40 pm		Erin Landguth	An eco-evolutionary demogenetic metapopulation model for population viability analysis and assisted migration of Whitebark Pine, US Northern Rocky Mountains
1:40 pm - 2:00 pm		Todd Cross	Ecoregions and contemporary landscape features influence greater sage-grouse hierarchical population genetic structure
2:00 pm - 2:20 pm	**Climate Change**	Molly Cross	Connectivity planning for a changing landscape: Expert opinion-based approach to considering climate change effects on grizzly bear connectivity in southwest Montana
2:20 pm - 2:40 pm		Anthony Slominski	Life history traits as mediators of solitary bee responses to climate-warming: phenological shifts, body size, and life span
2:40 pm - 3:00 pm	**Break**		
3:00 pm- 3:20 pm	**Conservation Success on Tribal Lands**	Rosalyn LaPier	A natural history of smudging: researching Blackfeet plant use and environmental knowledge
3:20 pm- 3:40 pm		Donelle Schwalm	Building a long-term conservation strategy for swift fox populations in Montana
3:40 pm- 4:00 pm		Virgil Dupuis	Inter-tribal and inter-agency collaborations for control of flowering rush
4:00- pm- 4:20 pm		Barry Hansen	Wetland restoration on the Flathead Indian Reservation
4:20- pm- 4:40 pm		Wesley Keller	Nez Perce Tribe conservation efforts for ESA listed fish in the South Fork of the Salmon River

	Event	Instructor/ Presenter	Title
4:40- pm- 5:00 pm		Dale Becker	Trumpeter swan reintroduction on the Flathead Indian Reservation
5:00 pm - 6:30 pm	**Poster Session**		
Friday (Nov. 20th)			
7:45 am - 8:30am	**Talk Upload**		
8:20 am - 8:40 am	**Population Monitoring**	Lingyun Xiao	Snow leopard conservation in Sanjiangyuan Area, China
8:40 am - 9:00 am		Erik A Beever	Preliminary patterns observed in Rocky Mountain pikas and ecosystems, contextualized with dynamics observed range-wide
9:00 am - 9:20 am		Kezia Manlove	A critical role for disease persistence in population viability assessments of bighorn sheep
9:20 am - 9:40 am		Jan Boyer	Understanding an overlooked native salmonid: spawning and early-life distribution of mountain whitefish in the Madison River, Montana
9:40 am - 10:00 am		Allison Stringer	Our dace are numbered: Conservation of Montana prairie cyprinids
10:00 am - 10:20 am	**Break**		
10:20 am - 10:40 am	**Human/Wildlife Interactions**	Wesley Sarmento	People, predators, and prey: human shields in the Crown of the Continent
10:40 am - 11:00 am		Erin Landguth	An eco-evolutionary metapopulation simulation model for population viability analysis in riverscape genetics: case examples in the Sullivan watershed, Washington, USA
11:00 am - 11:20 am		Devin Landry	Recreational aviation and wildlife: the physiological stress response in ungulates and associated user perceptions
11:20 am - 11:40 am		Adam Switalski	TNC Clearwater-Blackfoot project forest road and stream crossing inventory and restoration

Key	
	No conference activities
	Conference activities
	Catered with light refreshments

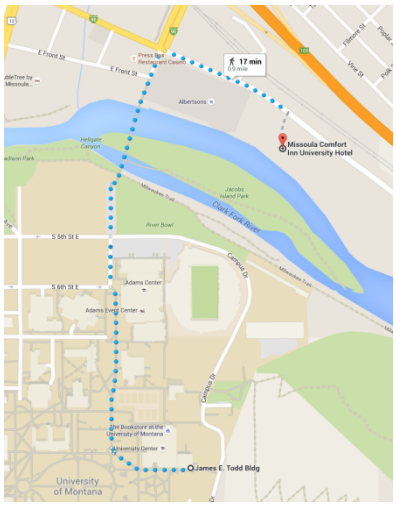
UNIVERSITY OF MONTANA

Campus Map



LODGING & PARKING INFORMATION

We have arranged for discounted group rates at the Missoula Comfort Inn University Hotel available on a first come first serve basis. The hotel is located at 1021 E. Broadway across from the University of Montana campus along the Clark Fork River, about 1 mile (15-20 minute walk) from the UM Lifelong Learning conference center (see map below). To get the discounted group rate ($95 single rate), mention the group name "MTSoCB Conference" when you reserve your room.



Missoula Comfort Inn University Hotel (406-549-7600)

http://missoulacomfort.com/

- $95 single room rate, plus tax
- Group room rates subject to availability (not available when hotel reaches 80% capacity)
- River and mountain views from every room
- Free airport shuttle from 6a.m. to midnight
- Free hotel parking
- Free internet
- Free hot breakfast
- Microwave and fridge
- Free cruiser bikes for guest use

We will have day passes available for parking at the registration desk. There is also pay as you go parking around the east side of campus. We encourage people to walk form their hotels if possible, because parking is always tight after 8am.