Applying Conservation Science to Action

Annual Research Symposium of the Montana Chapter of the Society for Conservation Biology

October 9-10, 2008

University Center – University of Montana, Missoula, MT

SCHEDULE:

Thursday, October 9th

6:30-7:00 pm **Registration** - University Center Theater foyer

7:00-8:00 pm **Plenary 1** - University Center Theater

Joel Berger - John J. Craighead Chair of Wildlife Conservation - University of Montana, and Senior Scientist - Wildlife Conservation Society

ECOLOGICAL SYMBOLISM AND CONSERVATION: CAN AMERICA PROTECT MIGRATION CORRIDORS?
Animal migrations are biologically spectacular examples of evolution whether whale, tern, or butterfly. They stir the public imagination and, here in the Rocky Mountains, the needs of migratory species may be better appreciated than in many other parts of the world. Nevertheless, to maintain populations, corridors between seasonal ranges are in need of protection, a major challenge due to a complex mix of lands beyond the boundary of protected areas. This talk will outline where migrations occur and where they have been lost. And, it will detail the recent conservation of the longest migration corridor of a land mammal in the continuous USA as a demonstration of where science and subsequent public advocacy resulted in protection.

8:00-10:00 pm **Social and Poster Session** - University Center Theater foyer

FIRST-YEAR GROWTH AND SURVIVAL OF RIPARIAN TREE-PLANTING TRIALS TO RESTORE AVIAN HABITAT IN THE COLORADO RIVER DELTA.
Stephen Handler, University of Montana and the Sonoran Institute
Despite its reduced condition, the Colorado River Delta remains a vital conservation area for avian species. To restore riparian forest habitat in the Delta, we tested the effects of various treatments on the first-year growth and survival of mesquite seedlings and rooted cuttings of cottonwood and willow. Mean first-year growth of seedlings planted from 2.8-L pots was comparable between fall-planted honey mesquite (*Prosopis glandulosa*) and spring-planted honey mesquite. Fall-planted screwbean mesquite (*P. pubescens*) grew less than spring-planted screwbean mesquite, likely due to a widespread lepidopteron larval infection. Individuals planted in the spring from 2.8-L pots and 12-cm plugs had similar first-year growth for both species. Rooted cuttings of cottonwood (*Populus fremontii*) grew taller on average than cuttings of willow (*Salix goodingii*) in the first growing season, and both species had greater growth when planted from 2.8-L pots than 12-cm plugs. Survival was high throughout this first season for all species and treatments. These results expand upon conclusions of similar restoration projects undertaken in the United States, and demonstrate that areas within the Colorado River riparian corridor in Mexico are suitable for habitat improvement.

THE SCIENTIFIC BASIS OF CUMULATIVE IMPACTS ANALYSIS FOR WILDLIFE SPECIES: UNDERSTANDING LEGAL REQUIREMENTS, FOREST SERVICE PRACTICE, AND AREAS OF CONTENTION ON THE IDAHO PANHANDLE NATIONAL FOREST

Courtney Schultz, University of Montana

The National Environmental Policy Act (NEPA) requires agencies to conduct cumulative effects analysis (CEA) for affected resources. Between 1998-2007, the U.S. Forest Service lost the majority of legal cases brought against them with regard to this requirement. This research investigates the scientific standards established in this case law and how these have affected CEA implementation on the Idaho Panhandle National Forest (IPNF). A case law review, document review, and interviews with agency staff and other interested parties were conducted to understand the current use of science in CEA for wildlife species. The case law review finds that science-related requirements have been established regarding the quality of the data in CEAs, use of habitat modeling as a proxy for population monitoring, and appropriate scale of CEA for wildlife. NEPA documents from the IPNF were examined to understand how the agency currently uses science in CEAs. Results reveal that habitat modeling along with the use of habitat component guidelines, best management practices, and regional population viability analyses serve as the basis for CEAs. Interviews results highlight ongoing challenges and areas of contention, including the need for monitoring data, impact thresholds, peer-review of agency science, adaptive management, and modeling landscape fragmentation and connectivity.

CHANGES IN EMBRYONIC ROTATION OF POND SNAIL EMBRYOS IN RESPONSE TO DIFFERENT ENVIRONMENTAL CONDITIONS

Ryan B. Shartau and Jeffrey I. Goldberg, University of Calgary

Cilia driven embryonic rotation in the pond snail embryo has been shown to increase in response to laboratory imposed hypoxia. This behavior offers embryos a short term coping mechanism to increase the amount of oxygen at their disposal. However; it is unclear how embryos use this behavior to cope with PO_2 changes in natural water bodies. We examine the rate of embryonic rotation, which stirs fluid surrounding the embryo within the egg capsule to reduce oxygen gradients. Embryos of *Helisoma trivolvis* and *Lymnaea stagnalis* were examined from ponds covering a geographical range from the southern Alberta prairie to the Rocky Mountains and exhibiting a range of trophic conditions. Additionally, abiotic factors including temperature, pH, salinity and water PO_2 were measured to gain an understanding how environmental conditions and embryonic rotation interact. Results from an oligotrophic prairie pond, where PO_2 remained relatively high, showed that embryonic rotation rates followed changes in temperature which likely represents a metabolic response as PO_2 did not reach critically low levels. These experiments are now being repeated on eutrophic ponds that experience more severe fluctuations in PO_2. Disturbances in wetlands leading to a loss of aquatic oxygen could lead to increased use of this putative survival mechanism.

MEASURING WILDLIFE ACTIVITY ON OPEN AND REMOVED ROADS IN IDAHO USING REMOTE CAMERAS

T. Adam Switalski. Wildlands CPR

Thousands of miles of forest roads are being removed across the U.S. northern Rockies to help restore threatened wildlife, yet little is know about the effectiveness of this restoration practice. Forest roads allow access into remote forestlands increasing poaching, fragmentation, and negative edge effects. The Clearwater National Forest (ID) has removed more than 600 miles of forest roads in an effort to restore fish and wildlife habitat. Using remote cameras, we captured more than 500 photos of animals on open and removed roads over the course of two summers. Black bear (*Ursus americanus*) selected for removed roads over open roads ($p=0.03$). Their also appeared to be spatial and temporal partitioning by bear and moose (*Alces alces*) in response to hunting pressure. While they were occasionally detected on open roads, they were never found on open roads during the hunting seasons. Additionally, bears and moose were rarely detected on open roads during daytime hours. Similarly, we never detected coyote (*Canis latrans*), mountain lion (*Felis concolor*), and bobcats (*Lynx rufus*) on open roads during the daytime. Traveling on open roads only in the cover of darkness and staying on removed roads during the hunting seasons may decrease vulnerability to human exploitation.

STELLER SEA LION REPRODUCTIVE RATE ESTIMATION

Rebecca Taylor, Montana State University

The western US Steller sea lion population is listed under ESA, and the reasons for the decline remain unresolved. Recent efforts to estimate Steller sea lion reproduction have been based on two types of data: dissections of Steller sea lions collected in the Gulf of Alaska in the 1970's and 1980's, and time series of pup and non-pup counts to which models are fit. I estimated Steller sea lion reproductive rates using mark resight analyses of 62 branded adult females whose sighting history also reported any association with a pup during the period 2002 through 2004. I conducted analyses under two different assumptions about pupping site fidelity of mature females, and my analyses accounted for survival and sightability of cows, sightability of pups, and seasonality of parturition. Under the assumption of incomplete site fidelity, mean reproductive rate was estimated at 69% (45%, 91%) in 2002, 71% (53%, 87%) in 2003 and 70% (54%, 86%) in 2004. Under complete site fidelity, the respective estimates were 53% (34%, 70%), 62% (46%, 76%) and 63% (49%, 77%). Resight effort has improved over the years, accounting for the decreasing variation in the estimates over time.

Friday, October 10th

7:30-8:00 am **Registration** - University Center Rooms 330/331 foyer

8:00-9:00 am **Plenary 2** - University Center Rooms 330/331

Martin Nie - Associate Professor of Natural Resource Policy - University of Montana

NATIONAL FORESTS POLICY ASSESSMENT: REPORT TO SENATOR JON TESTER

In January 2008, Montana Senator Jon Tester requested that the University of Montana's College of Forestry and Conservation initiate an outside and independent assessment of selected issues facing the U.S. Forest Service. In June 2008, Nie and Associate Dean Jim Burchfield presented the Senator with a requested analysis and set of policy recommendations. Nie will first sketch the contemporary political-legal context of federal land management and then briefly review why National Forests will become increasingly important in the future. Seven policy recommendations are then explained, with an emphasis on why they should be embraced by conservation biologists. Several issues will be discussed, including: federal lands funding, roadless rulemaking, forest planning, private land development, forest restoration, legal standards, place-based legislation, and the need for a comprehensive review of forest law and policy.

9:00-9:10 am **Break** - University Center Rooms 330/331 foyer

Session 1: Conservation Planning, Practice, and Education - University Center Rooms 330/331
Moderator: Gary Tabor

9:10-9:30

PUTTING CLIMATE CHANGE THEORY INTO PRACTICE FOR WILDLIFE AND WILDLAND CONSERVATION

Gary M. Tabor, Center for Large Landscape Conservation, NCEAS; Molly S. Cross. Wildlife Conservation Society, NCEAS

A major challenge facing biodiversity conservation is how to develop strategies that enable species and ecosystems to cope with the inevitable impacts of climate change. While a growing body of research has identified a number of adaptation options for addressing climate change, these recommendations are often too general to translate into actual management and conservation actions on the ground. The ability to implement these general recommendations is also hampered by insufficient communication between climate change scientists and conservation practitioners. Our project addresses these issues by bringing together scientists and conservation practitioners to test several general recommendations and apply them to site-based conservation decision-making at a particular location – the Greater Yellowstone Ecosystem (GYE). We developed a framework that uses multi-stakeholder workshops to: 1) assess the impacts of climate change on critical GYE species and ecological processes; and 2) translate generic adaptation recommendations into a portfolio of site-specific adaptation strategies that address those likely climate impacts. We found that this "bottom-up" approach is necessary for integrating climate change models into on the ground conservation decision making, and is an improvement over "top-down" approaches that generate generic recommendations that are difficult to implement.

9:30-9:50
MAPPING, SCORING AND PROTECTING UNROADED NATIONAL FOREST LANDS IN WESTERN MONTANA
Len Broberg, University of Montana
Protecting wildlife, fish and watershed values requires the application of a landscape level perspective. The National Forest lands of western Montana offer large blocks of landscape including inventoried roadless areas of 5000 acres or larger, but these blocks require connections. Unroaded lands 1000 acres or larger have potential to serve as connecting pieces to low elevation riparian areas and to major river basin bottomlands. Such unroaded areas were identified in the Bitterroot, Lolo, Flathead and Kootenai National Forests from USFS travel maps and using Geographic Information Systems. Suitability as wildlife habitat was further determined using aerial photos available from the Montana Natural Resources Information System, GIS, Montana Fish Wildlife and Parks elk range maps, vegetation maps, and on-site surveys by volunteers. Priority areas were identified and protected through meetings with USFS staff, comments in NEPA and forest planning processes and in some cases litigation. A science based approach supported rational allocation of effort and proved useful in the various actions to protect the values of these areas. Use of the information in three contexts-forest planning, project NEPA and litigation will be reviewed.

9:50-10:10
A SEMI-QUANTITATIVE RAPID ASSESSMENT METHOD FOR PRIORITIZING CONSERVATION PROJECT AREAS
April E. Johnston and Sarah F. Olimb, American Wildlands
Maintaining the ecological connections, or wildlife linkage areas, between major wildlife habitats is one of the most pressing conservation challenges in the Northern Rockies. National parks, refuges, wilderness and roadless areas that are not connected can potentially isolate populations of wide ranging species such as grizzly bear (*Ursos arctos horribilis)* and wolverine (*Gulo gulo*). Conservation and resource management agencies must prioritize where to focus their efforts due to scarce fiscal and personnel resources. A broad, multi- scale assessment of the ecological connections within the Northern Rockies landscape was needed to update and inform the efforts of conservation groups. In 2007, we conducted a rapid semi-quantitative assessment using quantitative habitat use data for eight species. The assessment focused on ecological quality, ecological "threats" and "opportunity for conservation" derived from expert-opinion interviews. This data was analyzed using a Bayesian averaging algorithm to adjust for unequal distribution of data across the landscape. The results were categorically grouped using a Jenks natural breaks method. The results were identification of over 100 wildlife linkages across the Northern Rockies of Montana and Idaho. This rapid assessment method has proven useful for applied conservation work where identification and prioritization is needed, and extensive research may be lacking.

10:10-10:30
APPLYING CONSERVATION BIOLOGY TO CONSERVATION ACTION IN THE CABINET PURCELL MOUNTAIN CORRIDOR AND THE CROWN OF THE CONTINENT: TWO CASE STUDIES FROM THE YELLOWSTONE TO YUKON REGION
Katherine Deuel, Yellowstone to Yukon Conservation Initiative
By combining science and stewardship, Yellowstone to Yukon Conservation Initiative (Y2Y) seeks to ensure that the world-renowned wilderness, wildlife, native plants and natural processes of the region continue to function as an interconnected web of life, capable of supporting all of its natural and human communities, for now and for future generations. To achieve this mission, Y2Y uses scientific studies and ongoing, adaptive social and ecological research to develop conservation strategies (grizzly bear, avian and aquatic) that define priority landscapes for conservation action in the Y2Y region. Work in two transboundary priority areas identified in the grizzly bear strategy, (Cabinet Purcell Mountain Corridor and Crown of the Continent Ecosystem) illustrates the challenges and possibilities for developing successful, customized collaborative approaches to conservation that consider ecological threats and needs, local conservation capacity, and social and political realities; that engage partner organizations with shared vision and leadership; and by promoting the Y2Y region as the earth's premier mountain ecosystem to a broad public audience. Based on sound, adaptive science, using genuine collaboration that builds from a core constituency and shared vision, and connecting to both local and broad audiences, Y2Y and its collaborative partners have generated considerable, tangible and connected conservation successes.

10:30-10:40 **Break** - University Center Rooms 330/331 foyer

10:40-11:00
BRIDGING SCIENCE AND PRACTICE TO CONSERVE GRIZZLY BEARS (URSUS ARCTOS) THROUGH A COMMUNITY-BASED APPROACH
Seth M. Wilson, Blackfoot Challenge
Conservation of grizzly bears (*Ursus arctos*) largely depends on reducing human-caused mortality. In Montana, expansion of grizzly bear activity on private, low elevation land has resulted in conflicts between people and bears. This applied research and conservation effort seeks to reduce human-grizzly bear conflicts by using a systematic approach that emphasizes understanding the social and ecological context and involves local people in research, planning, and conservation. We used an integrative, multi-method approach relying on GIS field-based mapping and analysis, one-on-one meetings, workshops, field tours, and group meetings to actively engage the local community in data collection and participatory projects. Preliminary results from the Blackfoot Valley, MT where this framework was used, suggest that human-grizzly bear conflicts have been reduced by 93% from 2003-2007 and that there is a downward trend in grizzly bear mortality for this same period. Important lessons learned from this effort are the following: 1) develop community-supported goals; 2) focus on changing practices and behaviors not values; 3) create inclusive decision-making forums that emphasis common not special interests; 4) recognize livelihood interests; 5) provide economic incentives; 6) work across jurisdictional boundaries at the correct biological scale; and 7) cultivate the trust and support of key project partners.

11:00-11:20
WHAT THE CROWN OF THE CONTINENT RESEARCH LEARNING CENTER OFFERS FOR APPLYING CONSERVATION SCIENCE TO ACTION
Sallie Hejl, Glacier National Park, Crown of the Continent Research Learning Center
The Crown of the Continent Research Learning Center (CCRLC) is located in the Division of Science and Resources Management at Glacier National Park. The Research Learning Center's goals are: (1) facilitating use of parks for scientific inquiry, (2) supporting science-informed decision-making, (3) communicating the relevance of and providing access to research knowledge, and (4) promoting resource stewardship through partnerships. Some of the specific ways we have supported science-informed decision-making includes facilitating sabbaticals for university professors, coordinating brown bag seminars for park staff when researchers are conducting studies in the park, and coordinating workshops on hot topics. We are also in the beginning stages of working with research scientists to create one-page summaries of the status and trends of important park resources for park managers and resource managers to use when making management decisions. We would like to work with others to create more ideas for how we can improve our work in this arena.

11:20-11:40
SHOULD AN "UMBRELLA CORRIDOR" CONCEPT BE USED FOR LANDSCAPE PLANNING?: EMPIRICAL RESULTS FROM ROCKY MOUNTAIN CARNIVORES
Michael K. Schwartz, Samuel A. Cushman, and Kevin S. McKelvey, RMRS, USDA Forest Service.

11:40-1:00 **Lunch** - University Center 2nd floor Cafeteria

Afternoon Concurrent Sessions

Session 2a: Wildfire and Conservation - University Center Room 330
Moderator: Richard Hutto

1:00-1:20
THE ECOLOGICAL NECESSITY OF SEVERE FIRE: A CONSERVATION MESSAGE STILL NOT HEARD
Richard L. Hutto, University of Montana
Insight into the importance of fire in any ecosystem can be gained through careful consideration of the ecology of plant and animal species that are most restricted in their habitat distribution to the particular postfire conditions associated with fire. Immediately following the fires of 1988, I visited burned forests in more than 40 different locations throughout western Montana and discovered that there is one bird species (Black-backed Woodpecker) that is so specialized on exploiting the abundance of beetle larvae in severely burned forests that it is nearly restricted in its habitat distribution to such conditions. Subsequent field work conducted across another 20 different fires and more than 3,000 additional locations in the northern Rockies during the past 20 years confirms that this bird species is relatively restricted to burned forest conditions. This restricted distribution pattern has profound implications because it brings into question the hypothesis that the severe fires we see burning in many, if not most, western forests are "unnatural" or "unhealthy" and suggests instead that severely burned forest conditions across a broad range of forest types throughout the Intermountain West must have occurred naturally for millennia. For obvious (and maybe some not-so-obvious) reasons, this story has yet to reach politicians, public land managers, and the public-at-large, most of whom continue to view severe fires as catastrophic events.

1:20-1:40
SEED PREDATION BY DEER MICE SLOWS DOWN THE REGENERATION OF BURNED MONTANE FOREST
Rafał Zwolak, University of Montana; Dean E. Pearson, RMRS, USDA Forest Service; Yvette K. Ortega, RMRS, USDA Forest Service; Elizabeth E. Crone, University of Montana
We investigated seed predation by deer mice (*Peromyscus maniculatus*) and its effects on the emergence and establishment of ponderosa pine (*Pinus ponderosa*) and Douglas-fir (*Pseudotsuga menziensii*) seedlings in unburned and recently burned forest in west-central Montana. Deer mice were almost twice more abundant in burned than in unburned sites. In seed offering experiments, overnight seed removal was more intense in burned than in unburned areas. Ponderosa pine seeds were removed at higher rates than Douglas-fir seeds. In seed addition experiments, emergence of seedlings in cages with openings that allowed access by deer mice was extremely rare (0.0% in burned forest and 0.9% in unburned forest) and did not differ between tree species. In closed cages (deer mice excluded), seedling emergence was low in unburned forest (2.3% for ponderosa pine and 11.7% for Douglas-fir), but considerably higher in burned forest (21.1% for ponderosa pine and 56.0% for Douglas-fir). Seedling survival to establishment was also significantly higher in burned than in unburned areas (52.3% vs. 21.6%). Wildfire creates favorable abiotic conditions for seedling recruitment but seed predation by deer mice obliterates this advantage.

1:40-2:00
MODELING THE RESPONSE OF WILDLIFE COMMUNITIES TO DISTURBANCE: QUANTIFYING THE EFFECT OF PRESCRIBED FIRE TREATMENTS ON AVIAN COMMUNITIES IN A CONIFEROUS FOREST IN WASHINGTON
Robin E. Russell, RMRS, USDA Forest Service; J. Andrew Royle, USGS Patuxent Wildlife Research Center; Victoria A. Saab, RMRS, USDA Forest Service; William M. Block, RMRS, USDA Forest Service; John F. Lehmkuhl, PNRS, USDA Forest Service; John R. Sauer, USGS Patuxent Wildlife Research Center
Identifying the impacts of prescribed fire on bird communities in ponderosa pine (*Pinus ponderosa*) forests is necessary for providing land management agencies with information regarding the effects of fuel reduction on avian communities. Recent developments in occupancy modeling have established a framework for quantifying the impacts of management practices on wildlife community dynamics. We describe a Bayesian hierarchical model of multi-species site occupancy accounting for detection probability (implemented in WinBUGS), and demonstrate the use of the model for identifying effects of habitat disturbances on wildlife communities. Our modeling of the impacts of prescribed fire on avian communities in a ponderosa pine forest in Washington indicate that prescribed fire treatments result in increased occupancy rates for several bark-insectivore, cavity-nesting species including the management species of interest, Black-backed Woodpeckers (*Picoides arcticus*). Three aerial insectivore species, and the ground insectivore, American Robin (*Turdus migratorius*), also responded positively to prescribed fire,

whereas three foliage insectivores and two seed specialists, Clark's Nutcracker (*Nucifraga columbiana*) and the Pine Siskin (*Carduelis pinus*) declined following treatments. Land management agencies interested in determining the effects of habitat manipulations on wildlife communities can use these statistical methods to provide guidance for future management activities.

2:00-2:20 *No talk due to cancellation.*

2:20-2:40
FIRE IN MY BACKYARD: UNDERSTANDING LANDOWNER PERSPECTIVES ON FIRE AND FUEL MANAGEMENT ON THE KOOTENAI NATIONAL FOREST
Michael A. Cacciapaglia; Laurie Yung, University of Montana
Place research has the potential to contribute to more democratic decision-making within land management agencies. However, research on relationship to place has rarely been explicitly connected to public preferences for proposed management actions. For research to enable true integration of place meanings into natural resource decision-making, it must investigate the place-based dimensions of management actions. I conducted in-depth, semi-structured interviews and a participatory mapping exercise with 38 landowners living in the wildland-urban interface on the Kootenai National Forest. I investigated the ways in which landowner relationship to place influenced perspectives on hazardous fuel reductions in the Cabinet Mountains. Results indicate that landowners' place relationships are connected to their views on fire and fuel issues. However, most landowners lacked specific management preferences for specific sites. Their preferences had only broad connections, both spatially and substantively, to the meanings they associated with those places. Landowners instead thought about fire and fuel management more intangibly or at a landscape level. Findings suggest that relationship to place may not be entirely geographically situated, as most place research assumes. Instead, place relationships may be situated at nested scales, beginning with a particular geographical locale and expanding out to a larger socio-cultural context.

2:40-3:00
INFLUENCES TO SCIENCE APPLICATION BY WILDLAND FIRE MANAGERS
Vita Wright, USDA Forest Service, RMRS, Aldo Leopold Wilderness Research Institute
Federal land managers are mandated to base decisions, such as those that affect fire, wildlife, and invasive plants, on the best available science. Although nearly all conservationists can describe practical barriers to applying science, there has been little formal effort to address fundamental barriers to the effective communication and application of science. My research, based in theory on interpersonal and organizational communication, organizational learning, and social psychology, offers insight into how and when science is integrated into federal land management. Examples from 55 in-depth interviews elucidate wildland fire specialists' and decision makers' experiences using research and working with scientists. Results of a quantitative survey compare the prevalence of these experiences among a broader population of fire staff specialists and decision makers in the western United States. I'll describe the model I'm testing to determine the relative strength of individual, organizational, and external influences to the use of science among different potential users of fire science. With a better understanding of influences to the innovation-decision process, scientists and other science communicators will be able to improve science delivery. More effective delivery will lead to faster integration of relevant science and, ultimately, better stewardship of fire-adapted ecosystems of the Northern Rocky Mountains.

Session 2b: Wildlife Conservation and Management - University Center Rooms 331
Moderator: Lisa Eby

1:00-1:20
MODELING EFFECTS OF CLIMATE CHANGE AND WILDFIRE ON WILDLIFE HABITAT SUITABILITY IN GLACIER NATIONAL PARK, MONTANA, USA
Rachel A. Loehman; Robert E. Keane, RMRS, Missoula Fire Sciences Laboratory
Fire-BGC, a mechanistic vegetation dynamics model, was used to examine ecological responses to climatic variability and fire regimes within forested landscapes at Glacier National Park. We used a full factorial experimental design including climate (historical, current, and predicted future scenarios) and fire (historical fire return and varying levels of fire suppression) as factors to simulate effects of disturbance on landscape structure, composition, and function. Spatial and temporal changes in grizzly bear (*Ursus arctos horribilis*), elk (*Cervus canadensis*), and Canada lynx (*Lynx canadensis*) habitat suitability were modeled in response to climate- and fire-mediated changes in vegetation species composition and forest successional stage. Results suggest that climate

changes stimulate vegetation species conversions and amplify fire dynamics; fire exclusion results in homogeneous landscapes and increasing risk of large fires; spatial characteristics of wildlife habitat are both climate- and fire-driven; and that wildlife habitat resiliency varies across species. The project and its results demonstrate the importance of climate and fire in structuring mountainous ecosystems, and provide a method for assessing and predicting disturbance effects on wildlife habitat.

1:20-1:40
DEMOGRAPHY OF YELLOWSTONE NATIONAL PARK TRUMPETER SWANS (CYGNUS BUCCINATORS) FROM 1968-2007
Kelly M. Proffitt, Montana State University; P. J. White, National Park Service; R. A. Garrott, Montana State University
Declining abundance of Yellowstone National Park (YNP) trumpeter swans raises concern about the persistence of resident swans in YNP. The purpose of this study was to quantify trends in abundance of YNP trumpeter swans from 1967-2007, and investigate potential effects of management practices, density dependence, and environmental conditions on annual variations in growth rates. The estimated abundance of YNP trumpeter swans ranged from a high of 59 individuals in 1968 to a low of 10 individuals in 2007. Using a log-linear modeling approach, we estimated annual growth rate from 1967-2007 at -0.036 (95% CI = [-0.042 -0.030]), and we found evidence that following changes in management of the Rocky Mountain trumpeter swan population in 1992, declines in the YNP segment of the population became more dramatic. We found little evidence of density dependent effects on growth rate, but we did find strong evidence that annual environmental conditions affected growth rate. Growth rates increased following cooler summers and milder winters. Declining trends in YNP trumpeter swan abundance contrast trends in the larger Tri-State subpopulation, suggesting that changes detrimental to trumpeter swans have occurred in YNP.

1:40-2:00
SURVIVAL OF THE COLUMBIA SPOTTED FROG (*RANA LUTEIVENTRIS*) IN RELATION TO SNOWPACK VARIATION
Rebecca McCaffery, University of Montana; Bryce A. Maxell. Montana Natural Heritage Program.
Long-term changes in snowpack levels could have profound impacts on pond-breeding amphibian populations in alpine ecosystems. We conducted a mark-recapture study on three Columbia spotted frog (*Rana luteiventris*) populations in western Montana from 2000-2007. Two populations were monitored for four years, and one population was monitored for eight years. Using robust design multi-state capture recapture models, we estimated growth and survival in juvenile and adult frogs and related those parameters to annual peak snowpack levels. The two populations monitored for four years generally showed weak positive correlations between juvenile and adult survival and peak snowpack levels. However, reduction in survival rates to reflect low snow years did not change long-term population growth rate predictions. In the system with eight years of data, variability in the relationship between snow and survival increased, and all life stages except subadults showed negative correlations between survival and peak snowpack levels. Systematic reductions in snowpack due to climate change in these systems may not currently be the most important driver of population dynamics, but the continued development of long-term datasets will help elucidate these relationships.

2:00-2:20
BIRTH-CONTROL, BISON, & BRUCELLOSIS: ALTERNATIVE MANAGEMENT STRATEGIES FOR YELLOWSTONE NATIONAL PARK BISON.
Mike Ebinger; Paul Cross, USGS NRMSC
Federal and Montana state agencies have long been entangled in controversy over bison leaving Yellowstone National Park. With a record number of bison (>1700) sent to slaughter this winter, this ongoing controversy is at an all time high. At the heart of the controversy is the risk of brucellosis transmission from infected bison to disease-free livestock. Transmission of brucellosis occurs via contact with aborted fetuses, placentas, and partrional fluids from infected individuals. Because of this unique mode of transmission, preventing pregnancy (via contraceptives) provides a means of eliminating transmission from infected individuals. In addition, contraception impacts population growth rates, thus reducing the frequency and intensity of the publicly sensitive lethal removals. We use a spatially implicit, stochastic, individual-based model, parameterized from YNP bison data, to investigate how contraception might be used as a management tool. Using this model we compare the results of contraception management to the current approach (removal) and that of vaccination (the proposed plan of the IBMP). A variety of more integrated strategies using different temporal strategies as well as combinations of all three approaches are

models. Changes in seroprevalence, population size, and management action (removals) over time are used to evaluate the different management strategies.

2:20-2:40
POPULATION GENETIC STRUCTURE OF WALLEYE (SANDER VITREUS) IN ALBERTA AND IMPLICATIONS FOR CONSERVATION AND MANAGEMENT
Lindsey A. Burke, University of Alberta; Richard M. Jobin, Alberta Fish and Wildlife Forensic Unit
Walleye (*Sander vitreus*) is an economically valuable freshwater fish throughout North America. In Alberta, a large number of anglers per lake and an active commercial fishery make effective management and protection of this species crucial to its sustainability. We collected genetic data for a range of valuable applications including monitoring and assessment of stocking programs, enforcement of harvest restrictions and determination of units for conservation. To do this we analysed variation at 16 short tandem repeat (STR) microsatellite markers was for over 1200 walleye sampled from various water bodies in Alberta. Differentiation between populations varied (F_{ST}=0.03 to 0.23) with patterns predicted by the current hydrographical landscape, except where stocking events have occurred. Genetic assessment of stocking events in Lac La Biche showed a higher success of one source over another. The markers detect sufficient genetic variation between most populations to successfully assign an individual fish to a population of origin for forensic applications. We anticipate the genetic data will help guide management decisions designed to conserve genetic diversity and protect genetically distinct populations of walleye as well as to detect and assist in convicting individuals who illegally take and/or traffic in walleye.

2:40-3:00
EVALUATING EFFECTS OF SMALL DAMS ON MIGRATORY BULL TROUT IN THE CLEARWATER RIVER DRAINAGE, MONTANA
Aubree Benson, University of Montana; Lisa Eby, University of Montana; Ladd Knotek, Montana Fish, Wildlife and Parks; John Thabes, Montana Fish, Wildlife and Parks
There are over 2,000 small dams in Montana with many near or beyond their engineered lifespan. Therefore, decisions regarding the fate of these dams are becoming increasingly common. In collaboration with Montana Fish, Wildlife and Parks and the U.S. Forest Service, we are using the Clearwater River Drainage in west-central Montana to evaluate effects of two small dams on a threatened bull trout (*Salvelinus confluentus*) population. In 2007, we monitored movements of 25 radio-tagged fish initially captured and passed over the dams or tagged in surrounding lakes. Movement data demonstrated that these small dams are upstream migration barriers separating spawning and foraging habitat. In 2007, 88% of the radio-tagged fish that we moved over the dams immediately swam into a tributary and presumably spawned. Summertime electrofishing surveys indicate bull trout recruitment in this basin is primarily due to migratory fish. Evidence from surveys of spawning sites, abundance of fish detected at dams, and initial population modeling indicate that the dams have large impacts on population sustainability. Our ongoing research will contribute to the decision-making process involving dam modifications or removal to balance the benefits of upstream passage for native fish with the risk of expansion by undesirable non-native fish.

3:00-3:15 **Break**

3:15-4:15 **Plenary 3** - University Center Rooms 330/331

KEEPING CONSERVATION BIOLOGY THRIVING FOR THE NEXT 22 YEARS
L. Scott Mills - Professor of Wildlife Population Ecology – University of Montana
Since its founding 22 years ago, the Society for Conservation Biology (SCB) has established itself as a legitimate scientific subdiscipline making valuable contributions to society. Early dominating themes of genetic drivers of extinction have broadened considerably, tracking the new developments and growing interactions among ecology, genetics, evolutionary biology, and quantitative biology. Thankfully, the early schism between "wildlife biology" and "conservation biology" can now be pronounced dead. The role of SCB in informing societal decisions in the face of climate change, habitat loss and invasive species should only increase. I will offer three guiding principles that I believe are necessary for conservation biology to continue to thrive as a science that is useful to society: 1) Don't use science as a bludgeon; 2) Learn enough across disciplines to know when you need collaborative help; 3) Don't be a cheap date, scientifically speaking. Examples will range from putting a human on the moon to the science involved in de-listing northern Rocky Mountains gray wolves.

5:00pm **Informal dinner and drinks** - Iron Horse Brew Pub (2nd floor, 510 N. Higgins Ave)