

**The Montana Chapter of the Wildlife Society
61st Annual Conference**



**Plants and Pollinators: Conserving all
of the Interdependent Parts**

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THE MONTANA CHAPTER OF THE WILDLIFE SOCIETY
61ST ANNUAL CONFERENCE, 2023

“Plants and Pollinators: Conserving all of the Interdependent Parts”

February 14 - 17, 2023

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ABOUT THE WILDLIFE SOCIETY AND THE MONTANA CHAPTER

Founded in 1937, The Wildlife Society's mission is "To inspire, empower, and enable wildlife professionals to sustain wildlife populations and habitats through science-based management and conservation." The Society's membership of nearly 10,000 includes research scientists, educators, communications specialists, managers, conservation law enforcement officers, administrators and students in more than 60 countries.

The principal objectives of The Wildlife Society are:

1. To develop and promote sound stewardship of wildlife resources and of the environments upon which wildlife and humans depend;
2. To undertake a role in preventing human-induced environmental degradation;
3. To increase awareness and appreciation of wildlife values; and
4. To seek the highest standards in all activities of the wildlife profession.

The Montana Chapter of The Wildlife Society was chartered in 1962 and formally organized with the election of its first officers in 1963. Adoption of chapter bylaws occurred in 1964. The mission of the Montana Chapter of The Wildlife Society is to encourage and support effective wildlife management in Montana by fostering development of current and future wildlife professionals, providing science-based information for policy and education, and communicating and collaborating with conservation organizations and the public.

Core Values of the Montana Wildlife Society include:

1. Sound stewardship of wildlife and habitat including the North American Model of Wildlife Conservation;
2. Dedicated, passionate, and responsible wildlife professionals;
3. A diversity of perspectives, backgrounds, and individuals unified behind our core mission;
4. Integrity and ethical conduct; and
5. A land ethic influenced by informed public input.

Our chapter is only as strong as our members and participation. We have numerous committees that need active participation from members. We encourage member nominations to fill our elected positions, and presentations from researchers, managers, and students are always needed to continue communication among the various wildlife organizations in the state! Please see the Committees Page to find out more about the various committees in your chapter, as well as chairperson contacts.

The Montana Chapter of the Wildlife Society has been a primary sponsor of the Intermountain Journal of Sciences (ISSN 1081-3519) since its inception in 1995. This is the official publication for the printed proceedings of our annual meetings and submission of multidisciplinary scientific manuscripts for review and publication.

2022 - 2023 MONTANA TWS CHAPTER OFFICERS

President: Andrea Litt (Montana State University)

Past-President: Andrew Jakes (Smithsonian Conservation Biology Institute)

President-Elect: Chad Bishop (University of Montana)

Secretary: Brandi Skone (Montana Fish, Wildlife & Parks)

Treasurer: Heather Brower (NRCS)

Montana State University Student Chapter President: Morgan Monroe

University of Montana Student Chapter President: Adeline Wichman

2022 - 2023 MONTANA TWS COMMITTEE CHAIRS

Programs: Chad Bishop

Awards: Megan O'Reilly

Education/Information: Brent Lonner

Financial Management: Heather Brower

Membership: Heather Brower

Nominating and Elections: Andrea Litt

Conservation Affairs: Andrew Jakes, Lance McNew, Sonja Andersen

Scholarships: Dave Wiley – MSU

Chad Bishop – UM

Species of Concern Committee (Ad hoc): Dan Bachen

Effects of Recreation (Ad hoc): Bryce Maxell

Grants (Ad hoc): Claire Gower

Intermountain Journal of Sciences (Ad Hoc): Terry Lonner and Rick Douglass

THE MONTANA CHAPTER OF THE WILDLIFE SOCIETY

PROFESSIONAL CONDUCT DISCLAIMER

2023

Conference attendees are expected to conduct themselves in a safe, appropriate and professional manner. The Montana Chapter of The Wildlife Society (MTTWS) accepts no liability for harm done by individuals that fail to conduct themselves in a such a manner during formal conference activities. MTTWS is dedicated to providing a safe, professional and harassment-free conference experience for everyone. We do not tolerate harassment of conference participants in any form. Conference participants violating these rules may be sanctioned or expelled from the conference, without a refund, at the discretion of the conference organizers.

WELCOME TO THE 61ST ANNUAL CONFERENCE OF THE MONTANA CHAPTER OF THE WILDLIFE SOCIETY

“Plants and Pollinators: Conserving all of the Interdependent Parts”

Welcome back to our first in-person conference since COVID-19 upended “business as usual”! My recent conversations with folks indicate our Chapter is ready to rekindle relationships through face-to-face interactions and make up for lost time at this year’s conference in Helena. Our Executive Board has worked hard to facilitate a conference that will be meaningful and productive for you. Our conference will serve as an opportunity to learn from each other while highlighting the impressive work being done by Montana wildlife professionals across our amazing state and beyond. I was reminded recently how fortunate we are to live in a state where ecosystems are largely intact and where we have the *privilege* to debate how best to manage species such as grizzly bears. Whether you are an undergraduate college student, mid-career professional, or a wise retiree, I hope you walk away from the conference recharged and ready to do your part to conserve Montana’s wildlife! It has been a pleasure to serve you as president-elect over the past year and I look forward to becoming your president.

Plants and Pollinators: Conserving all of the Interdependent Parts

Our conference theme this year focuses on what we might consider a jurisdictional “gray area” in conservation. As wildlifers, we place a high priority on learning botany and plant identification. After all, community assemblages of plants provide the habitat our wildlife species depend upon. Our parent organization, The Wildlife Society, requires 9 credits of botany-related courses to become a certified wildlife biologist. In a similar vein, we encourage students to take entomology and place a priority on understanding the roles of insects in our ecosystems. I would guess that most of us believe native plant and insect biodiversity is of foundational importance to vertebrate conservation in Montana. With that said, it’s fuzzy at best as to who has the jurisdictional responsibility for conserving native plants and insects. State, tribal, and federal wildlife agencies across the nation are having conversations about jurisdictional roles for conserving plants and insects. Whose responsibility is it? What is the role of a “fish and wildlife” agency? Where does the funding come from? This topic is especially timely as Montana considers a revision of its State Wildlife Action Plan. Our plenary session will include seven panelists who will describe current work being done to understand and conserve plants and insects in Montana and discuss possibilities for more formally incorporating plant and insect conservation responsibilities within our existing conservation organizations.

Workshops, Papers, Posters, and Banquet

Beyond the plenary session, we have a strong conference lined up for you! There are four workshops taking place this year on Tuesday and Wednesday of the conference: 1) Structured Decision Making, 2) Navigating a Multi-generational Workplace, 3) Partnering with NRCS for Conservation, and 4) Legislative Policy. Additionally, we have 40 oral presentations and 15 posters included in the program. Thanks to all of you for stepping up to make this conference a success!

Finally, we are extremely excited to have Sam Lawry from Teller Wildlife Refuge as our keynote banquet speaker. Sam will no doubt entertain us while sharing stories of his years as an Arizona Game Ranger.

ACKNOWLEDGMENTS

The past few years have been challenging to say the least due to the COVID-19 pandemic. I'd like to start by acknowledging the tremendous efforts of current and past executive board members who had to suddenly pivot a few years ago and pull off virtual conferences. There was no guidebook or institutional memory for them to draw upon. Please thank them for their efforts when you see them in Helena, especially Andrew Jakes and Andrea Litt. Ironically, given the focus on virtual conferences, our current Executive Board lacked direct experience with planning an in-person conference, which brought forth its own set of challenges. It truly required a team effort to plan and implement this year's conference. I express my sincerest thanks to Andrew Jakes (Past President), Andrea Litt (President), Heather Brower (Treasurer), and Brandi Skone (Secretary). Whether it was keeping the website updated, handling payment transactions, or digging through our storage unit, I am grateful to each board member for the heavy lift and support over the past seven months. Our Executive Board is also appreciative of past board members who shared their experience with us at numerous points in the planning process. There are so many acknowledgements to make – please forgive me if I miss someone.

I thank all members of The Wildlife Society for being a part of such a great organization and helping “To inspire, empower, and enable wildlife professionals to sustain wildlife populations and habitats through science-based management and conservation.” I extend special thanks to CEO of The Wildlife Society, Ed Arnett, for attending and participating in our entire conference, from workshops and the plenary session to leading a special policy session with our membership.

I extend my sincere gratitude to the following individuals for their work on behalf of the chapter (in no particular order): Kristina Smucker (student paper/poster judging), Rebecca Mowry and Torrey Ritter (trivia night), Brandi Skone (arranging this year's conference fleece), Carly Segal (cover art on the program), Megan O'Reilly (awards), and Claire Gower (small grants).

Thanks to Sam Lawry for graciously agreeing to be our banquet keynote speaker. It's a tall ask, but Sam is more than up for the task. I am also grateful to Ed Arnett, Lauri Hanauska-Brown, Mike Ivie, Kari Kingery, Bryce Maxell, Hunter Van Donsel, and Wendy Velman for taking time from their busy schedules to share their knowledge with us as plenary speakers. Thanks to Ed Arnett, Heather Brower, Justin Gude, Adam Jespersen, Amy Seaman, Sarah Sells, and Hunter Van Donsel for leading workshops.

I thank Dan Bachen, Allison Begley, and Lisa Bate for their efforts in leading working groups. I am additionally grateful for Joshua Lisbon, Colin Ruggiero, Michael Forsberg, and Carrie Richer for sharing their talents and experience with us at movie night.

I owe big thanks to the paper and poster presenters, session moderators, judges, and many other volunteers – without you, there wouldn't be a conference. I'd especially like to thank the students and chapter advisors from higher ed institutions across Montana for contributing numerous hours in support of the conference. I love this Chapter in no small part because of the focus on students! Finally, I extend HUGE thanks to our sponsors, who make it possible to host a quality, affordable conference.

Chad Bishop



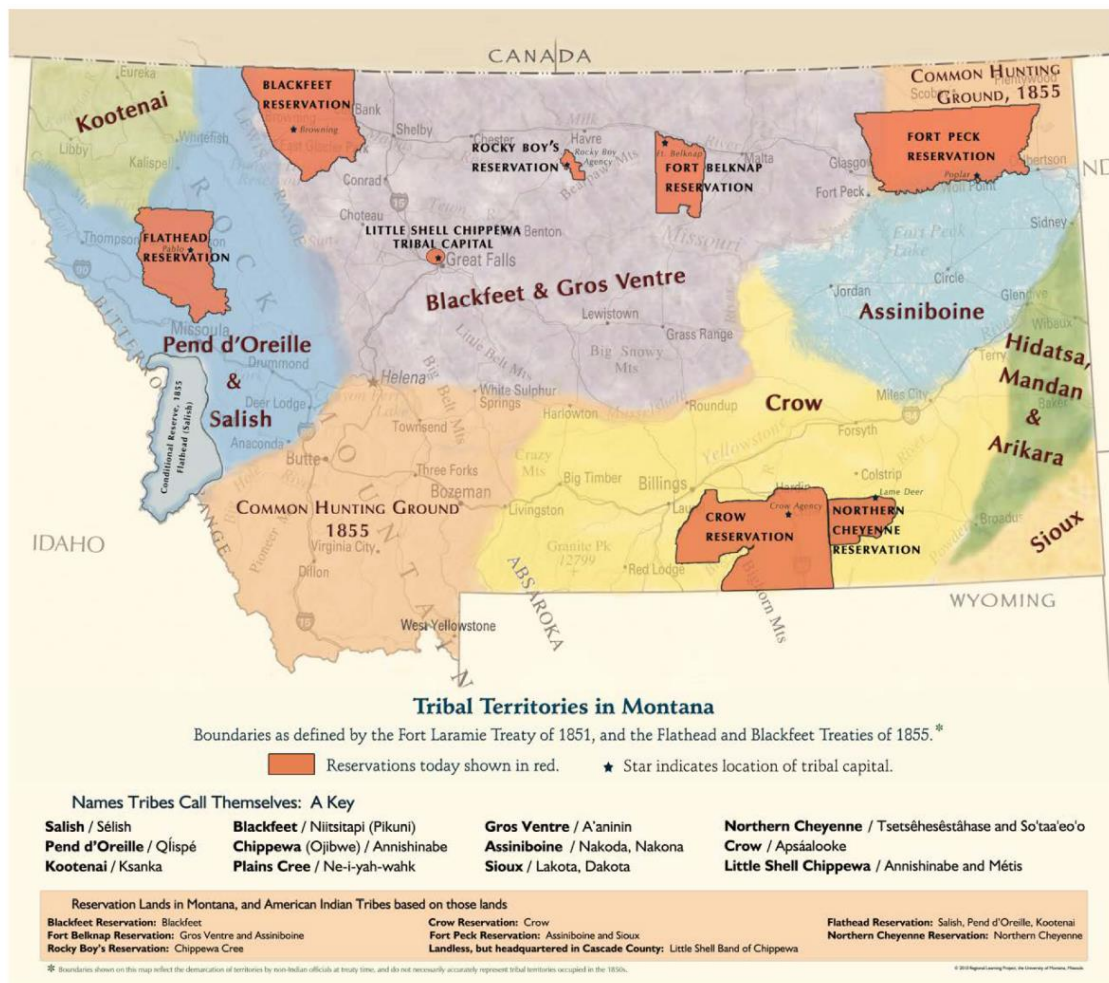
2022-2023 MTTWS President-Elect

LAND ACKNOWLEDGMENT

Most of us attending the Montana Chapter of TWS annual conference live and work across the land we now call Montana.

Montana is the traditional homeland and common hunting grounds of several tribes, including the Assiniboine, Blackfeet, Chippewa Cree, Crow, Gros Ventre, Kootenai, Little Shell, Northern Cheyenne, Pend d'Oreille, Plains Cree, Salish, Sioux, Hidatsa, Mandan, and Arikara.

Today this land is home to twelve sovereign tribes with tens of thousands of enrolled members. Those of us who are not Indigenous people acknowledge that we are settlers on this land and that we benefit from the colonization and oppression of Indigenous people in the past and present.



2023 NOMINEES FOR EXECUTIVE BOARD OFFICERS

PRESIDENT-ELECT CANDIDATES



Katie Benzel

Katie Benzel is a Wildlife Biologist for the Bureau of Land Management (BLM) Dillon Field Office. Growing up in Dillon, she spent her free time in the mountains where she cultivated respect and appreciation for the outdoors and wildlife. She attended Colorado State University for 2 ½ years before transferring to the University of Montana and graduating with a B.S. in Wildlife Biology in 2004. To diversify her knowledge of range management and wildlife habitat, she completed a M.S. in Range Science from Montana State University in 2008. Throughout undergrad and grad school she worked as a seasonal wildlife technician for the Forest Service and BLM. She has been in her current position since 2008.

Katie believes that public lands are essential, and she is grateful to work on the landscape that is deeply important to her. As a Wildlife Biologist for the BLM, she advocates for wildlife and habitat while navigating the complexities of managing multiple use public lands. Communication and willingness to hear all perspectives is required. Over the years she has worked with several agencies, groups, and private landowners covering a variety of species including amphibians, carnivores, big game, pygmy rabbits, raptors, sage grouse, migratory birds, and pollinators. Katie would enjoy the opportunity to be MT TWS President to work with new wildlife colleagues in the state and expand her experience and knowledge. She continues to spend her free time in the mountains hiking, skiing, running, hunting, and camping.





Dr. Andy Boyce

Andy Boyce is a research ecologist with the Smithsonian's National Zoo and Conservation Biology Institute, under both the Great Plains Science Program and the Smithsonian Migratory Bird Center. He received his BA in Ecology and Evolutionary Biology from the University of Colorado and his PhD in Wildlife Biology from the University of Montana. His work focuses on two major topics; 1) understanding how keystone species and grazing systems impact biodiversity and imperiled species in grassland ecosystems and 2) using animal tracking to identify factors regulating populations of imperiled birds and inform conservation efforts. This work, in partnership with NGOs, state and federal agencies, tribes, and academic institutions, is focused on the Northern Great Plains and anywhere in the world where it's breeding birds spend time. Andy is a faculty affiliate with the Wildlife Biology Program at the University of Montana and resides in Missoula.

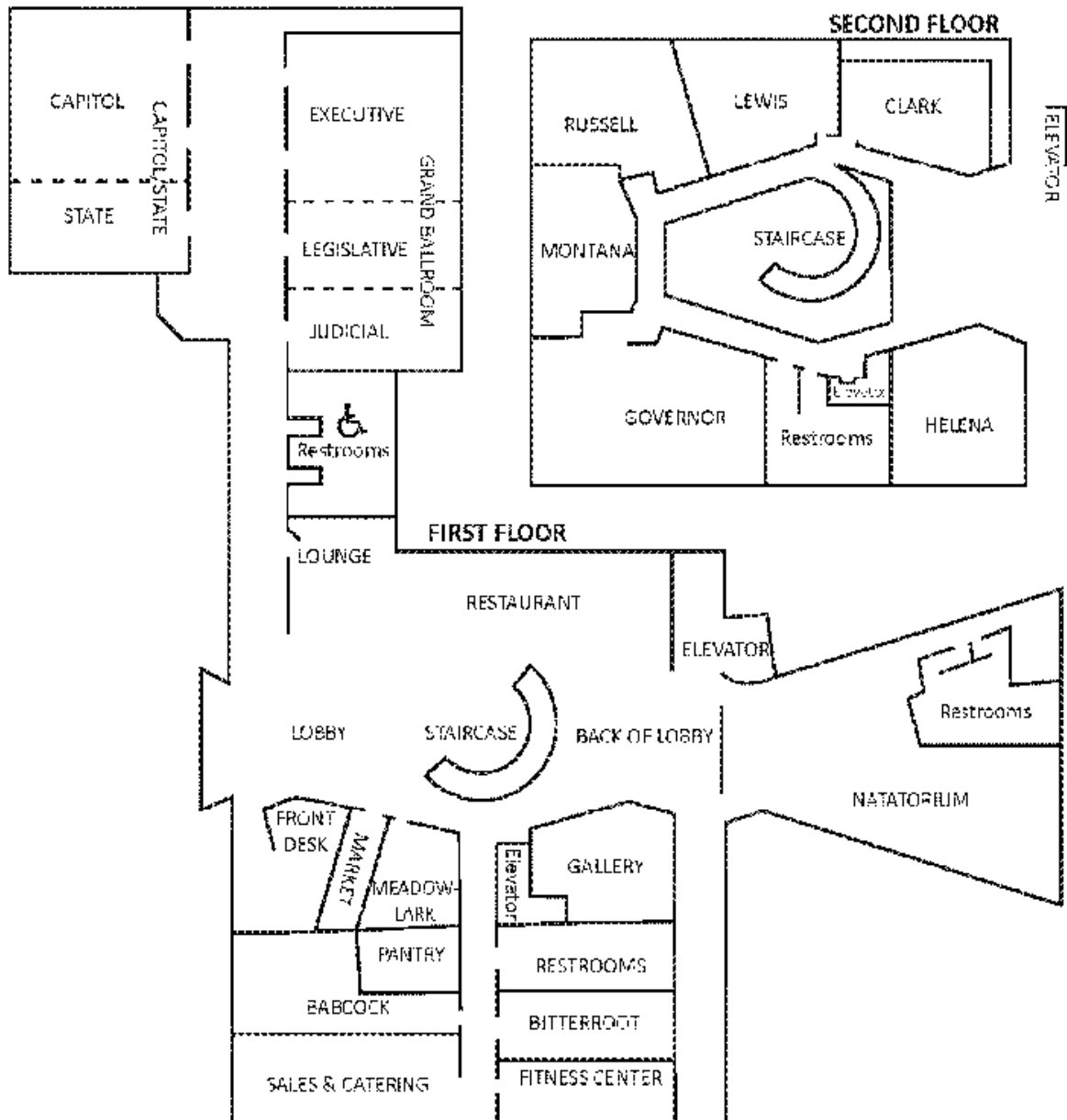


Smithsonian
National Zoological Park
Conservation Biology Institute

HOTEL MAP

Delta Hotels by Marriott Helena Colonial

2301 Colonial Dr. | Helena, MT 59601 406-443-2100



GENERAL CONFERENCE SCHEDULE

All Times MST	Monday, Feb 13	Tuesday, Feb 14			Wednesday, Feb 15		Thursday, Feb 16		Friday, Feb 17	
7:30							MTTWS Business Meeting 1: <i>Policy & Advocacy Discussion with TWS Leadership</i> <i>Executive Room</i>		MTTWS Business Meeting 2: <i>Chapter Business</i> <i>Executive Room</i>	
8:00										
8:30										
9:00			Workshop: Partnering with NRCS for Conservation		Workshop: Legislative Policy <i>Clark Room</i> <i>Instructors: Amy Seaman and Ed Arnett</i>		Concurrent Session A	Concurrent Session B	Joint Oral Paper Session <i>Capitol/State Room</i>	
9:30							<i>Capitol Room</i>	<i>State Room</i>		
10:00				<i>Clark Room</i>			Harlequin Duck Working Group <i>Governor Room</i>	Coffee Break		Coffee Break
10:30			<i>Instructors: Hunter VanDonsel and Heather Brower</i>	Concurrent Session A <i>Capitol Room</i>	Concurrent Session B <i>State Room</i>	Joint Oral Paper Session <i>Capitol/State Room</i>				
11:00										
11:30										
12:00						Lunch <i>Ballroom</i>		Conference Adjourned - Safe Travels!!		
12:30										
13:00	Conference Preparations Volunteers are welcome to help prepare for the conference. Contact a board member for details.	Workshop: Structured Decision Making <i>State Room</i> <i>Instructors: Sarah Sells and Justin Gude</i>		Montana Bat Working Group <i>Governor Room</i>	Plenary Session: "Plants and Pollinators: Conserving all of the Interdependent Parts" <i>Capitol/State Room</i>		Concurrent Session A <i>Capitol Room</i>		Concurrent Session B <i>State Room</i>	
13:30										
14:00			Workshop: Navigating a Multi- generational Workplace <i>Clark Room</i> <i>Instructor: Adam Jespersen</i>	MT Bird Conservation Partnership Working Group <i>Governor Room</i>			Break			
14:30									Concurrent Session A <i>Capitol Room</i>	Concurrent Session B <i>State Room</i>
15:00										
15:30										
16:00										
16:30										
17:00						MAFWB Meeting <i>Montana Room</i>	Poster Session <i>PreFunction / Hallway</i>			
17:30										
18:00		MTTWS Welcome Reception <i>Ballroom</i>			Student-Professional Mixer Trivia Night! <i>Ballroom</i>		Awards Banquet and Silent Auction <i>Ballroom</i>			
18:30										
19:00										
19:30										
20:00		Movie Night - Natatorium								
20:30										
21:00										
21:30										
22:00										
22:30										

2023 CONFERENCE DAILY SCHEDULE

Tuesday, February 14

- **Workshops**
 - **Partnering with NRCS for Conservation:** 8:00am–12:30pm (Clark Room)
 - **Structured Decision Making:** 1:00–5:00pm (State Room)
 - **Navigating a Multi-generational Workplace:** 2:00–4:00pm (Clark Room)
- **Working Group Meetings**
 - **Harlequin Duck Working Group:** 10:00am–12:00pm (Governor Room)
 - **MT Bat Working Group:** 1:00–3:00pm (Governor Room)
 - **MT Bird Conservation Partnership Working Group:** 3:00–5:00pm (Governor Room)
- **Montana TWS Welcome Reception:** 6:00pm–9:00 pm (Ballroom)
- **Movie Night!:** 9:00–10:30pm (Natatorium)
 - **Two Short Films by Michael Forsberg**
 - *The Great Plains – America’s Lingerin Wild*
 - *A Trout with Feathers*
 - **Tracking Notes by Colin Ruggiero**
 - Featuring research led by Joshua Lisbon, MPG Ranch
 - *Will include a Q&A with Colin and Joshua after the film*

Wednesday, February 15

- **Workshop**
 - **Legislative Policy:** 8:00am–12:00pm (Clark Room)
- **Plenary Session:** 1:00–5:00pm (Capitol/State Rooms)
 - **Welcome & State of the Chapter Address** (MT Chapter President Andrea Litt)
 - **Plenary Session & Panel Discussion: “*Plants and Pollinators: Conserving all of the Interdependent Parts*”** (Introduction by MT Chapter Pres-Elect Chad Bishop)
 - **Panelists:**
 - Ed Arnett – The Wildlife Society (Chief Executive Officer)
 - Bryce Maxell – Montana Natural Heritage Program (Program Coordinator)
 - Mike Ivie – Montana State University (Professor)
 - Lauri Hanauska-Brown – Montana Fish, Wildlife and Parks (Wildlife Division Special Projects/Bureaus Coordinator)
 - Kari Kingery – Confederated Salish & Kootenai Tribes Wildlife Management Program (Program Manager)

- Hunter VanDonsel – Pheasants Forever (Montana and Wyoming State Coordinator)
- Wendy Velman – Bureau of Land Management (Botany Program Lead and Invasive Species Lead for Montana/Dakotas State Office)

○ **Montana Association of Fish & Wildlife Biologists Meeting**

5:00–6:00pm (Montana Room)

○ **Student-Professional Mixer/Trivia Night:** 6:00–9:00pm (Ballroom)

Thursday, February 16

○ **Business Meeting 1: Policy & Advocacy Discussion with TWS Leadership**

7:30-9:00am (Executive Room) – All are encouraged to attend

○ **Concurrent Session A:** 9:00am–12:00pm and 1:30–4:40pm (Capitol Room)

○ **Concurrent Session B:** 9:00am–12:00pm and 1:30–4:40pm (State Room)

○ **Lunch provided by MT TWS:** 12:00-1:30pm (Hallway / Ballroom)

○ **Poster Session:** 5:00–6:00pm (Hallway b/t Capitol Room and Ballroom)

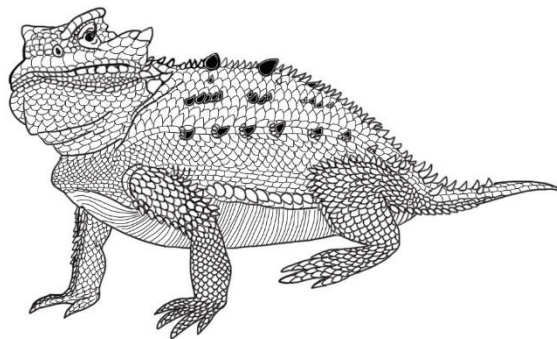
○ **Awards Banquet & Silent Auction:** 6:00–9:00pm (Ballroom)

Friday, February 17

○ **Business Meeting 2: Annual Chapter Business Meeting**

7:30-9:00am (Executive Room) – All are encouraged to attend

○ **Joint Oral Paper Session:** 9:00am–12:00pm (Capitol/State Rooms)



CONFERENCE LOGO ARTIST

AND WINNER OF THE 2023 STUDENT ARTWORK CONTEST



Carly Segal



Carly Segal has worked in Yellowstone National Park for a number of biological and ecological studies, although the majority of that time has been spent as a technician for the Yellowstone Bison Ecology and Management Office. She is now a masters student at Montana State University in the Ecology Department working on a study of arthropod diversity in relation to vegetation characteristics and bison grazing. Prior to living in Montana, she spent a number of years working in mostly states that border Canada, though with a few bordering Mexico thrown in as well. She is an avid trail runner, backcountry tripper (paddling or backpacking), and gardener. Though she loves the mountains, ocean, and desert, Montana feels like home at the moment. Carly finds it important to incorporate art into her life because it helps her stop and really take note of what's going on around her, she rarely heads into the backcountry without a sketch book and enjoys oil painting in her front country life. She aspires to become a biologist and hopes to be able to continue to incorporate backcountry work into her future studies.

About the cover

This year's theme, "plants and pollinators, conserving all of the interdependent parts" sent me in a number of directions before I settled on a design, I wanted to show all of the native wildflowers. Ultimately, I decided that a better representation of many native plants and pollinators that exist in Montana was pared down depiction of only a few of them; as emphasis that each of those interdependent parts plays an important role. - Carly

PROFESSIONAL DEVELOPMENT WORKSHOPS

We have four workshops available this year. One workshop takes an in-depth look at how to get involved with NRCS conservation programs. Our second workshop explains the Structured Decision Making Process (SDM) popular in the wildlife management field. Our third workshop looks at generational differences in work styles and approaches and aims to help participants navigate those differences. Finally, our fourth workshop explains the legislative process in Montana and offers a broader perspective on policy at the national level.

Partnering with Natural Resources Conservation Services (NRCS) for Conservation

Instructors: Hunter VanDonsel (Pheasants Forever), Heather Brower (NRCS)

Date and Location: Tuesday, February 14, 8:00am – 12:30pm (Clark Room)

Cost and participant limits: \$35 for professional, \$15 for student; 35 participants

Learn about the EQIP Targeted Implementation Plans and how to partner with NRCS. You'll also learn how partners have helped with NRCS's Montana Focused Conservation and how we can build better habitat together in the future.

Structured Decision Making

Instructors: Sarah Sells (USGS Montana Cooperative Wildlife Research Unit and University of Montana, Justin Gude (Montana Fish, Wildlife & Parks)

Date and Location: Tuesday, February 14, 1:00 – 5:00pm (State Room)

Cost and participant limits: \$25 for professional, \$15 for student; 35 participants

Sarah Sells, Assistant Unit Leader, USGS Montana Cooperative Wildlife Research Unit and University of Montana and *Justin Gude*, Research and Technical Services Bureau Chief, Montana Fish, Wildlife & Parks. This workshop will introduce participants to the field of Structured Decision Making (SDM). SDM is a formal process for making decisions and is used widely in the field of wildlife management. Participants will learn the basic steps of the SDM process and hear about several case studies of its application in Montana.

Navigating a Multi-generational Workplace

Instructors: Adam Jespersen (Montana Nonprofit Association)

Date and Location: Tuesday, February 14, 2:00 – 4:00pm (Clark Room)

Cost and participant limits: \$25 for professional, \$15 for student; 40 participants

Participants will learn about current and future demographic trends in the workplace, generational differences in work styles and approaches, and organizational strategies to build strong intergenerational teams.

Legislative Policy

Instructors: Amy Seaman (Montana Audubon) and Ed Arnett (The Wildlife Society)

Date and Location: Wednesday, February 15, 8:00am – 12:00pm (Clark Room)

Cost and participant limits: \$25 for professional, \$15 for student; 35 participants

The Montana State Legislature will be in session in 2023. With this workshop participants will learn the basics of the legislative process (i.e., how a bill becomes a law, etc.) and what bills are currently being proposed that may impact wildlife conservation in MT. Ed Arnett will add a broader perspective on legislative policy and current issues handled by The National Wildlife Society.



BANQUET SPEAKER



Sam Lawry

Sam Lawry grew up in Northern California where he earned a BS in Wildlife Management from Humboldt State in 1981. After several temporary positions with the USFWS he began a career with Arizona Game and Fish Department (AZGFD) where he held several positions over a 23-year period. During his career with Arizona, he maintained a Law Enforcement Certification enforcing State Fish and Wildlife laws. Sam served as Chairman of the staff for the North American Wetlands Conservation Council and Staff for the Pacific Flyway Council as well as numerous committees for the Association of Fish and Wildlife Agencies. Following his career with AZGFD he served as the Coordinator for the Intermountain West Joint Venture, promoting bird conservation in 11 western states. He then joined Teller Wildlife Refuge in 2006 as the Director of Conservation and Education before taking on a new role in 2010 as the Western Director for Pheasants Forever and Quail Forever. After 7 years the call to return to Teller fell upon him and in December of 2017 he returned as the Executive Director. Sam recently published a book highlighting his wildlife law enforcement career which led to Meat Eaters Steve Rinella highlighting one of his stories in a podcast an audio book. Sam has lectured classes about careers in wildlife as well as delivering several keynote addresses to wildlife professionals. Sam and his wife Gwen reside in Hamilton where they have raised a family of four daughters all of which have a passion for conservation.

PLENARY SESSION ABSTRACT

“Plants and Pollinators: Conserving all of the Interdependent Parts”

Wildlife conservationists are increasingly focused on strategies to curb biodiversity loss amidst continued habitat loss and climate change. The biodiversity crisis spans plants, invertebrates and vertebrates. In fact, the vast majority of species are not vertebrates. One prevailing challenge to curbing species loss is the lack of dedicated funding to support conservation of non-hunted species. In the United States, conservation leaders have put forth considerable effort to secure passage of Recovering America's Wildlife Act (RAWA), which would generate \$1.3 billion annually for state fish and wildlife agencies and \$100 million annually for tribal agencies to conserve species. In essence, RAWA would allow wildlife biologists to implement meaningful conservation actions for declining, threatened, and endangered species. It appeared that Congress was finally going to move RAWA forward in December, but sadly (actually it was devastating), they failed to include it in the omnibus funding bill. We can and must continue to work hard to secure passage of RAWA or a comparable bill in the future.

If meaningful funding were to become available, wildlife biologists have species conservation plans in place to guide allocation of the funds. These plans are referred to as State Wildlife Action Plans (SWAPs). Montana's SWAP, similar to others in the nation, identifies community types of greatest conservation need, focal areas for implementing conservation actions, species of greatest conservation need, and species that need to be inventoried to better understand their status. With that said, Montana's SWAP does not include an explicit focus on conservation of native plants and insects. Montana is not alone in this regard, especially as it relates to plants. Presently, only 18 states in the U.S. include plants within their SWAPs. Insects are more commonly included, especially given increasing concerns over pollinator conservation, which is perhaps best highlighted by monarch butterfly conservation efforts.

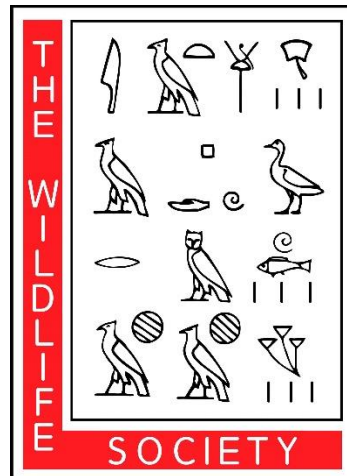
States across the nation are making decisions about whether, or to what extent, to incorporate plants, pollinators, and other insects in their SWAPs as part of plan revisions. Based on the set of SWAPs in 2015 (the most recent plan revision), there were approximately 13,500 species of greatest conservation need identified nationally, but only 3,231 of these species were amphibians, reptiles, fish, birds, or mammals (https://www1.usgs.gov/csas/swap/national_list.html). Clearly, there are significant implications for states electing to broadly incorporate plants and insects in their SWAPs. Biologists presently cannot begin to adequately address the conservation needs of vertebrate species, so does it make sense to attempt to conserve the much larger set of plant and invertebrate species? Can plant and invertebrate conservation efforts best be achieved through conservation of key community types, without necessarily focusing on individual species? Is Montana's SWAP the right mechanism for formalizing conservation of plants, pollinators, and other insects in Montana? If not, what is the appropriate vehicle and who is responsible for their conservation?

Our plenary speakers will address conservation status of native plants and pollinators in Montana and describe efforts underway to conserve these species. They will address some of the more critical conservation needs and ideas for addressing them. We hope you walk away from the plenary with a better understanding of what is and isn't being done in Montana to conserve native plants and pollinators. This information, in turn, should help our conservation community make decisions regarding future strategies to conserve plants, pollinators, and other insects in the state of Montana.

PLENARY SESSION SPEAKERS



Dr. Ed Arnett



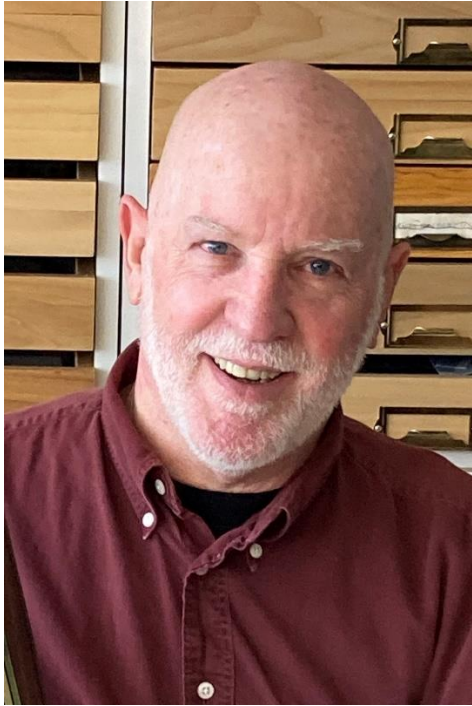
Ed Arnett joined The Wildlife Society staff as the Chief Executive Officer in November 2021. He also is an Adjunct Professor in the Department of Fish, Wildlife and Conservation Biology at Colorado State University and host of the public television conservation series [This American Land](#). He holds an Associate in Applied Science degree in natural resources management from Colorado Mountain College, a B.S. in fish and wildlife management from Montana State University, an M.S. in zoology and physiology from the University of Wyoming, and a Ph.D. in forest science from Oregon State University. Prior to joining TWS, Ed served as chief scientist for the Theodore Roosevelt Conservation Partnership for nearly a decade, where he worked to integrate science into federal and state policy on greater sage grouse conservation, ungulate migration and wildlife crossings, energy development, climate change, and other key conservation issues. He also worked for the US Forest Service, US Fish and Wildlife Service, Weyerhaeuser Company, and Bat Conservation International as a field and research biologist earlier in his career. He has worked with numerous species of wildlife and studied bats for more than 20 years, including research on these unique mammals for his doctorate degree. He was an Associate Editor of The Wildlife Society Bulletin for 10 years and is a past-President of the Oregon Chapter of The Wildlife Society, serving on that chapter's Board for 9 years. Ed also is a professional member of the Boone and Crockett Club and a member of the IUCN Sustainable Use and Livelihoods Specialist Group. An avid outdoor recreationist, hunter, angler, and dog trainer, Ed lives in Loveland, Colorado with his wife Glenda and their three dogs.



Dr. Bryce Maxell



Bryce Maxell grew up surrounded by a variety of farm animals and spent many hours dogsledding in the mountains of Utah. He completed a B.S. in Biology and a B.A. in Economics at the University of Puget Sound in 1994 where he studied the demography of kelp species in the Puget Sound and was an NAIA All-American swimmer. After his undergraduate degree, he received a Thomas J. Watson Fellowship for a yearlong independent study of the natural history of Australia and New Zealand in 1994 and 1995. Bryce completed his Ph.D. in Fish and Wildlife Biology in the Wildlife Biology Program at the University of Montana in 2009 where he completed a state-wide status assessment of, and constructed predicted habitat suitability models for, Montana's amphibian and reptile species and examined the population demographics of the Columbia Spotted Frog. Between 1996 and 2015, Bryce conducted field inventories for a variety of animal species in Montana and since 2015 he has been the Program Coordinator at the Montana Natural Heritage Program. During his time in Montana he has authored or coauthored three books, fifteen peer reviewed publications, and over 50 professional reports on amphibians, reptiles, bats, small terrestrial mammals, birds, terrestrial mollusks, and fish. Bryce is passionate about making biological information available to resource managers and the general public so that Montana's plants, animals, and terrestrial and aquatic communities can be appreciated by current and future generations and is excited to lead staff at the Montana Natural Heritage Program in this endeavor.



Dr. Michael Ivie



Michael Ivie is a biodiversity specialist and insect systematist, on the faculty of Montana State University for over 35 years. He holds a BS in Entomology from the University of California, Davis, and MS and PhDs in Entomology from The Ohio State University. He is the Curator of Montana's largest natural history museum, the Montana Entomology Collection, with holding in excess of 3 million specimens and thousands of Montana species. Mike has collected and studied insects in 69 countries, with specialties in Greater Montana and the West Indies. Fiercely proud of Montana and her wildlife, he has collected insects in every county of the state, visiting the remote and obscure places seldom mentioned by outsiders. He directs the Wild Bees of Montana and Montana Wood-Boring Beetles Projects, and advocates for the documentation of Montana's underrepresented invertebrate fauna. He is the author of over 150 journal papers and book chapters and has described dozens of new species and genera. He has served as President of the Entomological Society of America and the Coleopterists Society, and is an Honorary Member of both organizations. Forty-five new species and four genera have been named in his honor. Mike lives in Bozeman, Montana with his wife of 49 years, Donna, and two dogs.



Lauri Hanauska-Brown



Lauri Hanauska-Brown is a wildlife biologist with over two decades of experience conserving wildlife and wild places for future generations. She started her professional career in 2001 as an Idaho Department of Fish and Game biologist in southeast Idaho focused on conservation of trumpeter swans, peregrine falcons, bats and grizzly bears. She moved to Helena in 2008 to re-energize the nongame wildlife management program for Montana Fish, Wildlife & Parks. After more than ten years of building that program Lauri transitioned to her current role as Wildlife Division Bureaus Coordinator, aka, Chief Cat Herder. Her time with Fish, Wildlife & Parks has put her in front of unhappy constituents, concerned conservation organizations, rambunctious school kids, frustrated biologists and thrilled wildlife enthusiasts. She believes listening, empathy, and patience are key ingredients in successful relationships that result in conservation. She enjoys closing deals that benefit wildlife or habitat, hiking, horse riding and sleeping under the stars with her fishing outfitter husband and amazing teenage daughter.



Kari Kingery



A People of Vision

Kari Kingery is a Wildlife Biologist and program manager for the Confederated Salish & Kootenai Tribes Wildlife Management Program. She is a member of the Confederated Salish and Kootenai Tribes and started her career with CSKT as a Biologist Trainee in 2008 while studying terrestrial Wildlife Biology at the University of Montana. Kari earned both her Bachelor of Science Degree (2013) and Master's of Science Degree (2020) from the University of Montana – Missoula.

Having been awarded the Alfred P. Sloan's Research Fellowship in 2017, she conducted a master's project on grizzly bear habitat selection and studied the effects of small livestock (chickens, goats, pigs, llamas) on the selection of habitat by grizzly bears in the Mission Valley on the Flathead Indian Reservation. Upon graduation, Kari continued to work with landowners and partnering agencies in reducing carnivore conflicts on the Flathead Reservation.

Kari is an active member of The Wildlife Society, on both a national and state level. Throughout her career, she has developed Barn Owl nesting survey and dietary analysis protocol for the Mission Valley, conducted annual breeding bird; waterfowl and raptor surveys, and monitored local long-billed curlew populations. With an emphasis in Climate Change impacts on wildlife species, Kari works on the baseline monitoring of climate sensitive species and suitable habitats on the Flathead Reservation.



Hunter VanDonsel



Hunter VanDonsel is the State Coordinator for Montana and Wyoming for Pheasants Forever. Hunter grew up hunting and fishing in Montana which sparked a passion for wildlife conservation. He received his B.S. in Wildlife Biology from the University of Montana. After internship opportunities with MT FWP and MT DNRC, Hunter started his career in conservation as a Farm Bill Biologist for Pheasants Forever in Chinook, MT. During his time in that capacity Hunter led efforts to secure a \$6.4 million-dollar RCPP award for big game habitat improvement work in Central Montana, he received Ducks Unlimited Montana's Partner of the Year award in 2019, and he received Pheasants Forever's Acre Maker award for his conservation impacts in Montana. In Hunter's current role as State Coordinator, he is responsible for coordinating and leading new and existing landscape level habitat initiatives and partnerships that advance upland conservation in Montana and Wyoming.



Wendy Velman



Wendy Velman graduated with a B.S. in Botany from Idaho State University. The Summer of 1999, she started her career in federal service as a Biological Technician (Plants) for the Bureau of Land Management. In 2011, Wendy moved to MT/DKs State Office as the Botany Program Lead, which included pollinator habitat management. In 2017, Wendy and a team of BLM biologists started a pollinator inventory and monitoring partnership with USGS, that partnership is leading the BLM efforts to understand distribution and habitat needs. In 2019, a partnership working to include tribal communities in bringing science and culture together to heal the public lands and surrounding areas. In 2019 Wendy also became the Invasive Species Lead for BLM. She has been working to increase knowledge about native plants and pollinator when planning invasive species management, restoration efforts, and overall BLM management. Wendy lives on the Plains of Montana with her husband, three kids, one dog, nine chickens, and a large population of cats.

PRESENTATIONS AT A GLANCE

Thursday Morning, February 16th		
	CONCURRENT SESSION A: Capitol Moderator: Brent Lonner	CONCURRENT SESSION B: State Moderator: Dan Bachen
9:00	J. DEVOE - Evaluating and Mapping Pronghorn Responses to Fences	M. KUHLMAN - Long Term Bee Monitoring Reveals Little Change in Bee Species Richness in Response to Restoration of Intermountain Grassland Sites
9:20	**S. BRENKUS - Bighorn Sheep Respiratory Disease Surveillance via Community Science	E. GUSTILO – The Importance of Supporting Bumble Bees in the Early Spring
9:40	E. FLESCH - Landscape Features Outperform Habitat to Explain Genetic Connectivity of Bighorn Sheep in Waterton-Glacier International Peace Park	**J.S. Durney – Population Dynamics of <i>Parnassius clodius</i> Butterflies Under a Changing Climate
10:00	BREAK Moderator: Kirstie Yeager	BREAK Moderator: Shannon Hilty
10:20	M. SALVO - To Treat or Not to Treat: Do Wildlife Habitat Treatments Improve Elk Forage Conditions?	**A. EMMEL - Behavioral Plasticity in Snowshoe Hare Predator Escape Decisions
10:40	**N. BEALER - Importance of Individual and Environmental Factors Driving Body Condition in Female Elk	** C. PIPER - Preliminary Assessment of Bat Species Richness and Forage Activity in Anthropogenic and Naturally Occurring Water Sources
11:00	**E. PAINTER - A Story of Survival: Births, Deaths, and Predation in White-tailed Deer in North Idaho	D. BACHEN - Leveraging Community Science to Increase Knowledge of Understudied Species in Montana
11:20	J. SIKA - Helena Urban Deer Management, 2008-2023	A. MCEWAN - Roadside Surveys for Calling Amphibians in Montana
11:40	N. DECESARE - Leveraging Hunters as Citizen Scientists for Monitoring Statewide Moose Populations	** L. RYTER - Snapping Turtle Nesting Near Prairie Streams in Montana
12:00PM	LUNCH	LUNCH

** Student Presenter

Thursday Afternoon, February 16th		
	CONCURRENT SESSION A: Capitol Moderator: Ben Jimenez	CONCURRENT SESSION B: State Moderator: Catherine Wightman
1:30	S. SELLS – Predicted Habitat and Movement Corridors for Grizzly Bears in Western Montana	L. BATE - When Every Bird Counts: Maximizing Survey Efforts for the Elusive Black Swift
1:50	**E. PETERSON – Modeling Prey & Predator – Using Army Cutworm Moth Occurrence to Inform Grizzly Bear Foraging Suitability at Talus Slopes in Glacier National Park	K. STONE – Common Poorwills in Western Montana
2:10	L. ROBERTS - Using Radio Collar Activity Data to Detect Date of Parturition in Grizzly Bears	**V. KOVALENKO: Whitebark Pine and Clark's Nutcracker Abundance in Glacier National Park
2:30	C. COSTELLO - Energetic Trade-offs Explain Birth Timing in Grizzly Bears	A. BOYCE - Using Animal Movement Data to Uncover Hidden Links Between Long-billed Curlews and Black-tailed Prairie-dogs
2:50	BREAK Moderator: Heather Harris	BREAK Moderator: Nicole Hussey
3:20	**E. LEIPOLD – Recommendations for Unbiased Population Monitoring of Dusky Grouse in Montana	**R. DINES – Beaver Reintroduction and Willow Changes in the Southern Absaroka Beartooth Wilderness
3:40	** J. HANLON – Drones and Machine Learning Promise Advancements in Lek-based Population Surveys of Prairie Grouse	K. SZCODRONSKI - Identifying Climate Change Refugia for Riparian Zones in Montana
4:00	H. SPECHT - Conservation easements and leases mitigate potential losses of grassland birds in Montana	W. JANOUSEK - The Role of Climate in Declines of a Once Common Pollinator and Methods and Tools for Projecting Future Change
4:20	M. RESTANI - Eagle Protection and Offset Program	R. RAUSCHER – Range Condition and Vegetative Response to 42 Years of Grazing Management on the Blackleaf Wildlife Management Area
4:40	ADJOURN	ADJOURN

**** Student Presenter**

	Friday Morning, February 17th
	JOINT SESSION: Capitol/State Rooms Moderator: Trenton Heisel
9:00	B. MAXELL - Predicted Habitat Suitability for Biodiversity to Support Landscape Planning Processes
9:20	K. PLOURDE, H. BROWER - A Crash Course in Planning Conservation Plantings for Wildlife and Pollinators
9:40	R. ANDERSON - Natural Resources Conservation and Wildlife Hazard Assessment on Malmstrom Air Force Base
10:00	BREAK Moderator: Ken Plourde
10:20	B. WAKELING – Policy, Predators, and the Public Trust
10:40	M. MCTEE - Firing Hunting Bullets into Water Reveals Extreme Dissimilarities in Terminal Ballistics
11:00	T. MARTIN - Montana Wildlife and Transportation Partnership Project Program
11:20	M. EIDUM, E. FAIRBANK, B. KLAPSTEIN - Montana Wildlife and Transportation Planning Tool
11:40	D. ANDERSON - Yellowstone Safe Passages – A Community Approach to Addressing Wildlife-Vehicle Conflicts in Montana’s Upper Yellowstone Watershed
12:00PM	ADJOURN

CONCURRENT SESSION AND POSTER ABSTRACTS

Alphabetical by Presenter's Name

*Indicates Presenter

**Indicates Student Presentation

NATURAL RESOURCES CONSERVATION AND WILDLIFE HAZARD ASSESSEMENT ON MALMSTROM AIR FORCE BASE

Roberta Anderson*, Malmstrom Air Force Base, United States Air Force, Great Falls, MT

Malmstrom AFB is committed to a proactive management strategy focused on an ecosystem-based approach to natural resources management, including the protection and conservation of wildlife, habitat, and the surrounding watershed. Key natural resource management issues at Malmstrom AFB include improving the ecological integrity of the prairie grassland habitat; updating and maintaining awareness of wildlife species on base and throughout the deployment area; protecting the Missouri River watershed; controlling the distribution of invasive plant and animal species; minimizing bird/wildlife aircraft strike hazards; sustaining opportunities for outdoor recreation, and fostering cooperative management with state and federal wildlife and natural resources agencies, NGO, and university stakeholders. A year-long wildlife hazard assessment is currently underway, which includes avian, mammal, and insect surveys using numerous methodologies in adherence with accepted wildlife and industry standards for WHAs, including identification of BASH hazards, natural resources management, and mission safety operations. Data and insights from the first 6 months of the WHA will be presented, including bat monitoring data, nocturnal survey data, avian trends and analyses, along with game camera surveys documenting bird and mammal species presence and abundance. Findings will be used to make recommendations to leadership, and to determine future projects and management goals for Malmstrom, incorporating updated wildlife data, climate change impacts, and mission goals.

YELLOWSTONE SAFE PASSAGES - A COMMUNITY APPROACH TO ADDRESSING WILDLIFE-VEHICLE CONFLICTS IN MONTANA'S UPPER YELLOWSTONE WATERSHED

Daniel Anderson*, Yellowstone Safe Passages, Emigrant, MT

Several decades of credible research in North America have demonstrated the efficacy of wildlife crossing structures (wildlife overpasses, underpasses, and large culverts paired with diversion fences). Bringing these solutions to the ground in rural communities, however, is often easier said than done; Road ecologists, agencies, non-governmental organizations, and stakeholders seeking to advance wildlife-vehicle conflict (WVC) reduction strategies are bound to face complex social and political dynamics at the local level, particularly where private landholdings exist adjacent to roadways. The work invariably requires a thoughtful, community-oriented approach. The following presentation is a reflection from Yellowstone Safe Passages (YSP) - a group of citizens, organizations, agencies, elected officials, and philanthropists on a mission to address and resolve WVCs on US89 between Livingston and Gardiner, Montana.

Throughout the presentation I elevate the importance of collaboration. It begins by bringing information into the community, inviting community members into the problem-solving circle, and raising awareness about solutions. I encourage subtle culture shifts, where transparency of knowledge and data becomes an unspoken mantra; where deeper awareness of landownership and private property rights invites novel partnerships; and where framing WVCs as an impact on livelihoods enables leaders to consider that human safety is not a measure of life and death, but rather of an individual's ability to thrive. The purpose of this presentation is to articulate how YSP's experiences might apply to other communities across the State of Montana.

**** EFFECTIVENESS OF AUDIOMOTH ACOUSTIC RECORDING DEVICES IN DETECTING BLACK-BILLED CUCKOO CALLS OVER VARYING DISTANCES (POSTER)**

Jenna Asnault*, Charismatic Minifauna Lab, Wildlife Biology Program, University of Montana, Missoula, MT

Dr. Erim Gomez, Charismatic Minifauna Lab, Wildlife Biology Program, University of Montana, Missoula, MT

Black-billed cuckoos (*Coccyzus erythrophthalmus*) are classified as a species of concern in Montana and have seen declines due to habitat loss and fragmentation. However, we lack data on the current population of Black-billed cuckoos in Montana. They are a cryptic species and do not often call in the presence of people. Thus, they are difficult to detect, making research and management of them difficult. Autonomous acoustic survey methods offer the potential to be more effective and efficient than traditional avian survey methods. Autonomous recording units (ARUs) are small, programmable, relatively inexpensive acoustic detectors, and have been used in several other studies. Cuckoos, however, nest and perch in dense riparian vegetation, potentially limiting the detection capabilities of ARUs. We investigated the detection distance of ARUs and the change in effectiveness within varying levels of vegetation cover. We set up thirteen 200 meter transects in locations in Western Montana. Each site had varying levels of vegetation cover, from open landscape to dense vegetation. We mounted an ARU to a 6-foot PVC pipe at one end of the transect, then played Black-billed cuckoo calls from a speaker at intervals of 50 meters. We then analyzed how well the ARU detected the calls at each distance interval and how that changed with increased vegetation cover. Detection capability decreased as distance increased, then decreased further as vegetation increased. We also found that increased levels of ambient noise further decreased detection distance both with and without dense vegetation. Our work will help researchers to maximize detection probability by modifying the number of ARUs, and the distance between each ARU.

LEVERAGING COMMUNITY SCIENCE TO INCREASE KNOWLEDGE OF UNDERSTUDIED SPECIES IN MONTANA

Daniel Bachen*, Montana Natural Heritage Program, Helena, MT

Understanding species range and habitat associations is imperative for assessing the conservation status of the species and identifying Species of Concern. Global status assessments used by the IUCN and NatureServe and state status assessments by the Montana

Natural Heritage Program (MTNHP) to identify rare or threatened species are based on measures of rarity, of which geographic range extent is a core metric. Delineating range and assessing the area occupied by a species is often difficult for species that lack sufficient observation data. Although structured surveys performed by natural resource professionals can provide these data, resources to perform these surveys are often limited. Use of tools that allow the public to report observations of organisms have increased significantly in use over the past decade and have the potential to provide a significant number of observation records of both common and rare species. MTNHP has begun to vet and import species observation data from eBird and iNaturalist, two well used community science applications. We have imported 1,782,651 records from these sources representing 1,075 species. We have used these data to review range for all vertebrate species and to increase geographic coverage of observations use in predicted habitat suitability modeling. Currently MTNHP is tracking approximately 7,600 invertebrate species of which 8.7% have range polygons and 0.6% have predicted habitat models. Community science applications provide a rich source of data to begin to address these deficiencies as well as engaging members of the public in actionable science without incurring significant costs to agencies.

WHEN EVERY BIRD COUNTS - MAXIMIZING SURVEY EFFORTS FOR THE ELUSIVE BLACK SWIFT

Lisa Bate*, Science and Resource Management, Glacier National Park, West Glacier, MT

Amy Seaman, Montana Audubon, Helena, MT

Chris Hammond, Montana Fish, Wildlife & Parks, Kalispell, MT

Black Swifts (*Cypseloides niger*) are an unusual Neotropical migrant bird that initiates nesting in Montana when most other birds are completing their breeding seasons (late June/early July). They are considered at high risk of extirpation, due to climate change, as they rely on perennial streams to create the waterfalls they nest behind or near. Biologists in Canada listed Black Swifts (BLSW) as endangered in 2015 due to significant population declines. In Montana, BLSW are a species of greatest conservation need (S1B) and a species of greatest inventory need. Prior to 2011, biologists surveyed for colonies mid-day or late evening, and only three known BLSW nesting colonies had been identified in Montana. Since 2012, we have collaborated with multiple agencies and organizations to identify as many colonies as possible using systematic late evening surveys. Then in 2019, we began to conduct both evening and morning surveys at each site and recorded the high count of BLSW observed at any point during the survey. We conducted 37 paired tests to compare whether there was a difference in evening and morning surveys. We counted significantly more birds in morning surveys. We will use the high-count morning numbers to monitor trends in occupancy and abundance over time. We discuss strategies for monitoring BLSW abundance and population trends and share current maps of BLSW occupancy at Montana waterfalls.

**** IMPORTANCE OF INDIVIDUAL AND ENVIRONMENTAL FACTORS DRIVING BODY CONDITION IN FEMALE ELK**

Nicole Bealer*, University of Montana, Missoula, MT

Mark Hebblewhite, Wildlife Biology Program, University of Montana, Missoula, MT

Although ungulate body condition is often considered to be a product of the nutritional quality of forage on the landscape, body condition integrates both energetic costs and benefits and is influenced by more than forage resources. Individual factors such as reproductive effort represent significant energetic costs, and female body condition may be impacted by neonate survival. Our research evaluates how individual and environmental factors influence ingesta-free body fat (IFBF) in female elk (*Cervus canadensis*) to improve understanding and interpretation of body condition data. Seven years (2015-2021) of IFBF data were collected from monitored and recaptured female elk ($n = 139$) in the Ya Ha Tinda (YHT) population in Alberta, Canada. We are determining the best fitting linear mixed-effects model to explain IFBF as a function of both individual (age, previous reproductive outcome, pregnancy status) and environmental factors (migratory strategy, forage quality, predation risk, movement quantity, winter severity). Preliminary results indicate that age and prior reproductive success influence female body condition, with >3% estimated difference in IFBF between females whose calves survived for 90 days or more the previous summer (mean IFBF = 9.2%) and those whose calves did not (mean IFBF = 12.6%). Conclusions from this research will help scientists and managers interpret variation in ungulate body condition data and understand the important effects of juvenile survival on adult female body condition in the context of changing predator systems across North America.

USING ANIMAL MOVEMENT DATA TO UNCOVER HIDDEN LINKS BETWEEN LONG-BILLED CURLEWS AND BLACK-TAILED PRAIRIE DOGS.

Andy Boyce*, Great Plains Science Program, Smithsonian's National Zoo and Conservation Biology Institute, Missoula, MT

Andrew Dreelin, Biological Sciences & Smithsonian's National Zoo and Conservation Biology Institute, Northern Illinois University, DeKalb, IL

Paula Cimprich, Department of Biology, University of Oklahoma, Norman, OK

Black-tailed prairie-dogs (PDs) are keystone species and ecosystem engineers in grassland systems of western North America. However, they have been eradicated from greater than 90% of their range through grassland conversion, persecution by humans, and introduced sylvatic plague. Because of how quickly and thoroughly prairie-dogs were lost from our grassland ecosystems, their role as a keystone species remains poorly understood. Based on field observations of large aggregations of breeding long-billed curlews (LBCU) in the vicinity of PD colonies, we hypothesized that curlews were using prairie-dog colonies for breeding and foraging disproportionately compared with their availability on the landscape. To test this, we tagged 32 LBCU over 4 years with GPS satellite tags and modeled resource selection on the breeding grounds in a study area containing several large PD colonies. Using continuous-time resource selection functions we found curlews do, in fact, select for active PD colonies. Confirmation of this pattern sets up several hypotheses for the mechanism underpinning this association, which our research group is currently testing. Finally, this PD-LBCU link is an

example of a potentially important keystone function of PDs in grassland systems, one that we stand to lose in the absence of large-scale PD conservation efforts.

CONSERVATION SERVED WITH A TWIST (POSTER)

Krisitna Boyd*, Pink Bench Distilling, Troy, MT

Shawna Kelsey, Pink Bench Distilling, Troy, MT

Montanan's value wildlife both as useful resources and as part of their community's extended social network. They also believe wildlife management should be controlled locally, and economies should not suffer from environmental protections (Manfredo 2018). These values knit with Kootenai valley resident's views regarding Cabinet-Yaak grizzly bear recovery (Canepa 2008) and define common threads of conflict between residents and recovery managers. Home attractants are a main recurring conflict. During Fall in areas like the Kootenai valley, the probability of a male bear being located on a property with fruit trees is >80% (Merkle 2013), and the removal of backyard fruit is the single most effective conflict mitigation tool available to residents (Annis, pers. comm. 2022, Crevier 2021). Pink Bench Distilling will create a market solution that unites local values with the conservation needs of grizzly bears by creating a fruit gleaning program to incentivize and facilitate fruit harvest, crafting fruit brandies for commercial distribution and giving back to the community and conservation through multiple profit-sharing mechanisms. In addition to bears, the Cabinet-Yaak also hosts over 35 plants that can be used in gin and liqueur production, many of which are already harvested commercially without conservation coordination. In further pursuit of uniting local values with conservation needs, we have created a botanical harvest program with the Forest Service that defines parameters for sustainable harvest of our wild-sourced ingredients; the first of its kind in Montana. We seek peer feedback on further best practices for our fruit gleaning and wild harvest programs.

**** BIGHORN SHEEP RESPIRATORY DISEASE SURVEILLANCE VIA COMMUNITY SCIENCE**

Sidney Brenkus*, Department of Biological Sciences, University of Memphis, Memphis, TN

Dr. James S. Adelman, University of Memphis, Memphis, TN

Dr. Cassandra MV Nunez, University of Memphis, Memphis, TN

Dr. Robert W. Klaver, U.S. Geological Survey Iowa Cooperative Fish and Wildlife Research Unit, Ames, IA

Introduction: Because Bighorn Sheep Respiratory Disease (BHSRD) leads to reduced lamb recruitment, decreased population growth and stability, and local extinctions in bighorn sheep (*Ovis canadensis*) populations, monitoring this disease is essential to wildlife management. However, physiological surveillance is logistically and economically challenging, hampering our ability to detect BHSRD incidence and spread. Statement of Objectives: Our work aims to circumvent some of the challenges by developing a surveillance program using clinical signs and behavioral sampling to predict infection in bighorn herds. Methods: We observed bighorns in four different sites with differing disease prevalence in Montana in the summers of 2021 and 2022. We performed 20-minute focal behavioral sampling, focusing on one animal at a time

and noting the time of active and inactive behaviors as well as any other signs of compromised health. Results: Data we collected show that lambs from the high disease prevalence population spent more time inactive than did lambs in the other populations (Kruskall Wallis, $p = 0.043$, $\chi^2_{(df=3)} = 8.59$), demonstrating that behavioral metrics correlate with disease prevalence in these populations. BHRSD monitoring therefore seems a prime candidate for low-cost, community science-driven programs. Conclusion: Few studies have focused on whether behavioral metrics are indicators at the population level. The results from our study 1) identify behaviors and clinical signs in bighorn sheep that indicate BHRSD presence at the population level and 2) provide community science tools that managers, parks, and landowners can use to proactively monitor bighorn sheep populations for outbreaks of BHRSD.

ENERGETIC TRADE-OFFS EXPLAIN BIRTH TIMING IN GRIZZLY BEARS

Cecily Costello*, Montana Fish, Wildlife and Parks, Bozeman, MT

Lori Roberts, Montana Fish, Wildlife and Parks, Kalispell, MT

Milan Vinks, Montana Fish, Wildlife and Parks, Kalispell, MT

In grizzly bears (*Ursus arctos*) and other temperate-zone ursids, the seasonality of births during winter hibernation is best explained by ancestral traits of delayed implantation, altricial young, and obligate maternal denning. But drivers determining parturition timing within the 3- to 6-month hibernation period are unknown. Capitalizing on latitudinal and den timing variation among four grizzly bear populations, we tested two alternative hypotheses. The first was that birth timing is temporally associated with den entry because of proximate cues linking implantation and hibernation physiologies. The second was that birth timing is associated with den emergence to balance the energetic trade-off between minimizing lactation time (to protect the mother's lifetime fitness) and maximizing developmental time (to increase offspring survival) during the winter fast. Based on activity sensor data, we estimated 91 parturition dates using anomaly detection methods and associated first and last dates of dormancy using change point analyses. Observed birth dates ranged from 31 Dec to 27 Feb and day of year increased with latitude. Days between first day of dormancy and birth were positively correlated with latitude, but days between birth and last day of dormancy were not. Implantation dates (birth date - 56 days) ranged from 41 days before to 83 days after the first day of dormancy. Evidence supported the energetic trade-off hypothesis. Although the high variation observed may have been partially explained by individual age- or body condition-related adjustments to the trade-off, it also signaled that optimality may rarely be achieved given the stochastic nature of annual green-up.

LEVERAGING HUNTERS AS CITIZEN SCIENTISTS FOR MONITORING STATEWIDE MOOSE POPULATIONS

Nick DeCesare*, Montana Fish, Wildlife & Parks, Missoula, MT

Kevin Podruzny, Montana Fish, Wildlife & Parks, Helena, MT

Justin Gude, Montana Fish, Wildlife & Parks, Helena, MT

Hunter populations can provide a tremendous workforce of citizen scientists afield when queried for data. Soliciting incidental observations of non-target species from hunters may be a relatively important but untapped population monitoring resource in systems where hunter effort is common and widespread. During 2012-2016, we queried hunters of deer and elk for observations of a non-target species, moose, across their statewide distribution in Montana. We analyzed data in an abundance-detection framework with n-mixture models and evaluated the effects of covariates such as hunter effort, survey response totals, weekly session, and forest cover on detection probability before using models to predict moose abundance. We collected an average of 3,409 moose observations per year and our best n-mixture model included effects of week, year (number of responses), site (proportionate forest cover), and site-year (hunter effort) on detection probability, as well as an effect of site (area of forest and shrub habitat) on abundance. Density estimates averaged 0.099 (range 0.002-0.439) moose/km² across sites or 0.200 (range 0.017-0.799) moose/km² when limited to density within shrub and forest cover specifically. Statewide abundance totals across the five-year study period averaged 10,755 (range 9,925-11,620). Goodness-of-fit tests showed that models were identifiable and overdispersion of the data was low, yet some caution is still warranted when extrapolating these data to abundance estimates. Synthesis and applications. Querying a sample of deer-elk hunters for observations of a non-target species yielded thousands of spatially georeferenced detections per year and analysis in a temporally structured framework yielded estimates of both detection probability and abundance. Abundance estimates at this scale are unprecedented for moose in Montana and are encouraging for long-term monitoring over space and time.

EVALUATING AND MAPPING PRONGHORN RESPONSES TO FENCES

Jesse DeVoe*, Montana Fish, Wildlife & Parks, Bozeman, MT

Kelly Proffitt, Montana Fish, Wildlife & Parks, Bozeman, MT

Joshua Millsbaugh, University of Montana, Missoula, MT

Understanding pronghorn movement responses to fences is essential for improving landscape permeability of pronghorn. Our study used hourly collar locations from adult female pronghorn in 8 Montana herds and identified encounters with fences to: 1) evaluate movement responses as a function of fence and landscape attributes, and 2) map fence permeabilities. We mapped 37,878 km of fences, of which we collected structural attributes for 979 km, and identified fence encounters from movements of 702 collared pronghorn. We evaluated the correlation of pronghorn responses to fence encounters with fence types and landscape variables. We calculated fence permeabilities based on the ratio of altered to total encounters weighted by how many unique individuals encountered each fence. We found that woven wire fences substantially reduced crossings and increased crossing times, while both low (average lowest wire height <41 cm) and high (average lowest wire height ≥41 cm) strand fences were relatively

permeable. Crossing probabilities increased through time modestly for strand fences but only negligibly for woven wire fences. Pronghorn knowledge of and fidelity to permeable locations along fences likely allow some woven wire fences and most strand fences, regardless of the average lowest wire height, to be permeable. Improving landscape permeability for pronghorn should primarily focus on removing or replacing woven wire fences and incorporating variation in lowest wire heights. We made available to conservation practitioners interactive HTML maps of fence permeabilities for each herd as a tool for identifying potential movement barriers and prioritizing remediation efforts.

**** BEAVER REINTRODUCTION AND WILLOW CHANGES IN THE SOUTHERN ABSAROKA BEARTOOTH WILDERNESS**

Rachael Dines*, Department of Animal & Range Sciences, Montana State University, Bozeman, MT

Dr. Dan Tyers, U.S. Forest Service, Bozeman, MT

Dr. Bok Sowell, Department of Animal & Range Sciences, Montana State University, Bozeman, MT

Dr. Doug Smith, Yellowstone National Park, Bozeman, MT

Dr. Lauren Walker, Eastern Ecological Science Center, U.S. Geological Survey, Laurel, MD

Willow is a critical component of the southern Absaroka Beartooth Wilderness (ABW) ecosystem because it provides critical forage and habitat to local wildlife populations. Riparian meadows in the southern ABW were once occupied by beaver, but by the mid-1900's they were extirpated through trapping, disease, and willow stand degradation from moose browsing. After several decades of absence, 50 beaver were reintroduced by the Forest Service and Montana Fish, Wildlife, and Parks starting in 1986. While factors such as reduced moose browsing may have supported a recovery of willow height, we hypothesized that reintroduced beaver contributed to an increase in willow canopy cover. Therefore, our objective was to analyze the long-term success of beaver colonies in the southern ABW and quantify changes in willow canopy cover. We used annual stream-side surveys across four drainages in the southern ABW to record the number and location of beaver colonies from 1986 to 2021, and aerial imagery to describe changes in willow canopy cover in 13 meadows occupied by beaver. Using binomial regression, we evaluated the relationship between willow canopy cover and beaver colony density and longevity. We found that beaver have remained at carrying capacity over the last two decades, and average willow canopy cover increased from 16% in 1981 to 37% in 2019. The probability of willow occurrence increased the longer beaver occupied an area and with colony density. This study shows that beaver in the southern ABW persisted for decades after reintroduction and enhanced willow habitat.

**** POPULATION DYNAMICS OF PARNASSIUS CLODIUS BUTTERFLIES UNDER A CHANGING CLIMATE**

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Dr. Diane Debinski, Department of Ecology, Montana State University, Bozeman, MT

Dr. Stephen Matter, Department of Biological Sciences, University of Cincinnati, Cincinnati, OH

The Greater Yellowstone Ecosystem (GYE) is a relatively intact temperate ecosystem, home to over 120 species of butterflies. One species of interest is *Parnassius clodius*, a non-migratory butterfly specialized to montane meadows and dependent on a few flowering plant species in high-elevation and high-latitude environments. *Parnassius clodius* are an important climatic indicator because a) their lifecycle is dependent on environmental cues and changes in seasonality, b) they are well studied, c) they are widespread across the GYE, and d) they live in small populations with limited fecundity, making their populations susceptible to change. A *Parnassius clodius* population in Grand Teton National Park (GTNP) has been monitored since 2009 using mark-recapture methods to evaluate population change over time in response to their environment. The number of marked individuals has varied from 199 to 867 from 2009-2021. Rates of change in population size have fluctuated around zero, where zero signifies a stable population. In 2009, the rate of change was -0.4 indicating the largest population decline, while in 2011 the rate of change was 0.2 indicating the greatest population growth. We examined a suite of environmental variables associated with snow and temperature, as well as density-dependence, to test for correlations with interannual population changes. Extreme maximum air temperature during *P. clodius*' larva-pupa stage had the greatest effect on population change, where extreme maximum air temperatures led to declines in the next generation. *Parnassius clodius* butterflies in GTNP appear to be relatively stable, however, continued monitoring is needed to determine long-term trends.

MONTANA WILDLIFE AND TRANSPORTATION PLANNING TOOL

Mike Eidum*, Montana Department of Transportation, Helena, MT

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The Montana Wildlife & Transportation Planning Tool (MWTPT) combines wildlife and transportation information to identify areas of greatest need for wildlife/transportation accommodations along Montana highways. Development of this tool was a key objective of the Wildlife Transportation Summit in 2018. The Wildlife and Transportation Steering Committee, which formed after the summit, assigned this task to the Data and Information Working Group (DIWG). The DIWG is a collaboration of staff from the Montana Department of Transportation,

Montana Fish Wildlife and Parks, and representatives from the Montanans For Safe Wildlife Passage coalition. Data layers were collected to evaluate wildlife-vehicle conflict and important areas for wildlife movement and conservation along Montana Department of Transportation maintained roads. Data layers considered for the analyses were at the continental, national, regional (i.e., Northern Great Plains, Pacific Northwest, etc.) and, statewide scale, along with ecological systems within Montana. Those data were then compiled, categorized, weighted, and ranked to identify large areas (i.e., not specific locations) of greatest need for wildlife and transportation accommodations. This information has now been visualized as an ArcGIS StoryMap consisting of a series of interactive maps and includes a summary report as well as a comprehensive user guide. This presentation will introduce this exciting new product to the audience and provide information on the data and analysis features available, as well as how to use the tool to support work to reduce wildlife-vehicle conflict across the state.

**** BEHAVIORAL PLASTICITY IN SNOWSHOE HARE PREDATOR ESCAPE DECISIONS**

Amanda Emmel*, Wildlife Biology, University of Montana, Missoula, MT

Nate A. Bickford, Natural Resources Department, Oregon Institute of Technology, Klamath Falls, OR

L. Scott Mills, Wildlife Biology Program and Office of the Vice President of Research, University of Montana, Missoula, MT

Under climate change, wildlife species are facing new selective pressures that will force them to adapt through range shifts, phenotypic plasticity, or adaptive evolution. Previous research on behavioral plasticity in snowshoe hares (*Lepus americanus*) has shown limited evidence that hares can modify their behavior to decrease predation risk in response to camouflage mismatch brought on by decreased snow duration during the winter white molt period. However, snowshoe hares have shown innate capacity for plasticity in predator avoidance, for example reducing risk by shifting foraging behavior relative to cover availability and moonlight. We ask whether snowshoe hares exhibit behavioral plasticity in escape behavior in response to aerial versus ground predators. Because aerial predators use different attack tactics compared to terrestrial predators, we predict that hares will likewise respond with different escape behaviors. We simulate predation encounters using trained falconry hawks and hunting dogs to pursue radio-collared snowshoe hares to quantify hare decision-making under different types of predatory threat. We compare use of subterranean refugia, vegetative cover, and flight behavior after raptor chases, dog chases, and human approach. Preliminary findings suggest increased use of subterranean and subnivean refugia in response to avian predatory threat compared to human approach. Understanding the capacity for behavioral plasticity in snowshoe hare predation avoidance behavior allows us to better anticipate the species' ability to adapt in the face of increased predation risk under reduced snow conditions due to climate change.

LANDSCAPE FEATURES OUTPERFORM HABITAT TO EXPLAIN GENETIC CONNECTIVITY OF BIGHORN SHEEP IN WATERTON-GLACIER INTERNATIONAL PEACE PARK

Elizabeth Flesch*, Ecology Department, Montana State University, Bozeman, MT

Tabitha A. Graves, U.S. Geological Survey, Northern Rocky Mountain Science Center, West Glacier, MT

Mark J. Biel, National Park Service, Glacier National Park Science Center, West Glacier, MT

We evaluated bighorn sheep (*Ovis canadensis*) telemetry data and genetic samples collected in Glacier National Park, Waterton Lakes National Park, and the Blackfeet Reservation to estimate the influence of landscape features on bighorn sheep genetic connectivity. Over 168,400 GPS locations were collected between 2002 and 2011 for 97 bighorn sheep, and we generated genomic data for 95 individuals using the High-Density Ovine array. Using a machine-learning optimization approach, we conducted a landscape genetic analysis of genomic kinship between all pairs of individuals with GPS locations during the rut (November through December). We evaluated a local resource selection model to represent habitat and a suite of possible landscape characteristics predicted to influence genetic connectivity, including water bodies, tree cover, shrub cover, and other surface characteristics, such as slope and distance to steep terrain. We found that water bodies and tree cover were the most important predictors of resistance to genetic connectivity in the study area. We applied this information to predict how genetic connectivity of bighorn sheep may be influenced by current and future changes to the landscape, such as tree cover reduction due to wildfire. Our results provide insights regarding the spatial scale and landscape influences of gene flow in a native bighorn sheep population with no history of translocations. This information can be used to determine if certain habitat characteristics can be managed to facilitate or impede long-term connectivity among bighorn sheep populations and determine if genetic connectivity of bighorn sheep may be affected by climate change.

**** ENTRY LEVEL PAY IN THE WILDLIFE PROFESSION IN THE PACIFIC NORTHWEST AND MOUNTAIN WEST (POSTER)**

Isabelle Gibbs*, Wildlife Biology Department, Charismatic Minifauna Lab, Wildlife Biology Program, University of Montana, Missoula, MT

Dr. Erim Gomez, Charismatic Minifauna Lab, Wildlife Biology Program, University of Montana, Missoula, MT

In June 2021, the Wildlife Society (TWS) Council approved a Diversity, Equity, and Inclusion statement. TWS committed to identifying and removing barriers to recruiting and retaining a diverse workforce. Low entry-level salary is a barrier to hiring and retaining wildlife professionals. Our aim was to determine entry-level pay in the Pacific Northwest and Mountain West region of the United States. We collected data on the hourly pay of seasonal and termed wildlife positions. We collected data from January 31, 2022, to May 31, 2022. Our data source was the Texas A&M Natural Resource Job Board, the most well-known wildlife job board. We collected data for the following 5 states; Montana, Wyoming, Oregon, Idaho, and Washington. In addition to hourly pay, we collected the title of the position, location, whether the job was seasonal or an internship, start date, duration, type of organization of the employer, educational requirements, and whether housing was provided. Across the states sampled, the

average hourly wage was \$17.22 per hour for seasonal positions. In Montana, 16% of postings required a bachelor's degree. Only 46% of Oregon's, 41.5% of Idaho's, 41% of Montana's, 29% of Wyoming's, and, 16% of Washington's job postings provided housing. The average pay for a person with a bachelor's degree in Montana is \$22.59, while the pay for entry-level positions in wildlife is significantly lower. We encourage employers to offer competitive wages to help retain and recruit professionals from different socioeconomic backgrounds.

NON-LETHAL APPROACHES TO MONITORING BEES: PHOTOS AND EDNA (POSTER)

Tabitha Graves *, Northern Rocky Mountain Science Center, U.S. Geological Survey, West Glacier, MT

Annie Colgan, U.S. Geological Survey, Northern Rocky Mountain Science Center, West Glacier, MT

Rich Hatfield, Xerces Society for Invertebrate Conservation, Portland, OR

Amy Dolan, Independent Contractor, Boise, ID

Rebecca Newton, Bureau of Land Management, Billings, MT

Wendy Velman, Bureau of Land Management, Billings, MT

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Erica Gustilo, Northern Rocky Mountain Science Center, U.S. Geological Survey, West Glacier, MT

David Pilliod, Forest and Rangeland Ecosystem Science Center, U.S. Geological Survey, Boise, ID

Stephen Spear, Upper Midwest Environmental Sciences Center, U.S. Geological Survey, La Crosse, WI

With little knowledge of the ~4500 bees in North America and multiple bumble bee species in decline, we urgently need approaches to better sample pollinators. However, bumble bee and other pollinator identification requires specialized expertise and can be difficult in the field. Taking photographs of bumble bees in the field offers a non-lethal alternative that may be more cost-effective, appropriate for species of concern, or suitable for engaging community scientists. Using photographs of 1418 bees and paired specimens of >565 bumblebees collected between 2018 and 2021, we independently identified bees to assess the effectiveness of this approach. Experts identified 92.4% of bees from photographs and 98.2% of bees from specimens, with matched identifications for 95.1% of paired samples. Based on a second opinion for specimens without matching identifications, data suggested a similar misidentification rate (2.7% for photographs and 2.5% specimens). We suggest approaches to maximize accuracy including photographic and bee handling techniques, collection of a subset of specimens in some cases, and focused identification training for species of concern and species frequently confused in a study area. Sampling flowers for eDNA detection of pollinators offers a promising approach to non-lethal sampling of pollinators and can include approaches that target species of concern or metabarcoding approaches across a broader spectrum of species. We will provide an overview of recent data collection, lab and field experiments, and upcoming research seeking to develop eDNA techniques to inform broader understanding of the distributions and communities of pollinators as well as plant-pollinator networks.

SWITCHING SAGEBRUSH TYPES INFLUENCES SURVIVAL OF SAGE-GROUSE BROODS IN A GRAZED LANDSCAPE (POSTER)

Emma Grusing*, Department of Animal & Range Sciences, Montana State University, Bozeman, MT

Kyle Cutting, Red Rock Lakes National Wildlife Refuge, Lakeview, MT

Andrea Litt, Department of Ecology, Montana State University, Bozeman, MT

Bok Sowell, Department of Animal & Range Sciences, Montana State University, Bozeman, MT

Human activities, including livestock grazing, can alter heterogeneity in habitat structure and function, leading to animal displacement. However, we understand less about how these changes influence animal survival. The sagebrush-steppe contains high levels of heterogeneity, created by distinct patches of sagebrush species and understory plant communities. We quantified survival of sage-grouse broods based on telemetry data from females ($n = 99$) from 2014-2019 and explored how survival changed as a function of whether broods moved to different species of sagebrush, capitalizing on heterogeneous conditions. We were also interested in how survival changed with the influence of grazing, such as water tank presence and reductions in vegetation diversity. Using generalized linear models, we assessed the probability of sagebrush type switching after accounting for grazing, biotic, and abiotic variables. We found no evidence that broods preferred specific sagebrush types. Broods were most likely to switch sagebrush types when they were in areas with low forb and high shrub cover, and near water tanks and mesic areas. Survival rates to 32 days in broods that switched sagebrush types ($n = 26$) were higher (38.5%) than broods that did not (25.2%, $n = 73$). For sedentary broods, survival rose with increasing distance to mesic areas and accumulated precipitation. For broods that switched, survival was buffered against changes in these same variables. Survival was highest for broods at higher slope positions, regardless of switch status. Ultimately, survival increased when sage-grouse broods were mobile in a heterogeneous landscape and could avoid areas of high grazing impact.

THE IMPORTANCE OF SUPPORTING BUMBLE BEES IN THE EARLY SPRING

Erica Gustilo*, U.S. Geological Survey, Northern Rocky Mountain Science Center, West Glacier, MT

Bumble bees are critical to terrestrial ecosystem functioning and human food security because of the pollination services they provide. As a group, bumble bees are the most economically important native pollinators in North America and play a vital role in native angiosperm pollination. However, many species and populations of bumble bees have experienced dramatic declines in recent decades. The mechanisms driving these declines remain understudied, but likely involve factors such as changes in land use and increases in pesticide and disease prevalence. While most research and conservation efforts focus on supporting bumble bee colonies in the summer months, the needs of populations during the remaining three-quarters of the year remain relatively understudied and under addressed.

Here, I present a combination of fieldwork and lab experiments focused on the basic needs and biology of early spring bumble bee populations, which consist entirely of solitary queens. Early spring queens have higher mortality, lower fecundity, and higher exposure to environmental

stressors such as predation and extreme weather events relative to queens in late spring and summer that have workers in the nest. These results underline the importance of supporting bumble bee queens and the habitats on which they depend in the early spring, before many pollinators are visible on the landscape.

**** DRONES AND MACHINE LEARNING PROMISE ADVANCEMENTS IN LEK-BASED POPULATION SURVEYS OF PRAIRE GROUSE**

Jason Hanlon*, The Nature Conservancy and Montana State University, Dodson, MT
Lance McNew, Department of Animal & Range Sciences, Montana State University, Bozeman, MT

Ilya Buzytsky, Bias Intelligence Inc, Seattle, WA

Brian Martin, The Nature Conservancy, Red Lodge, MT

Unbiased counting of prairie and sage-grouse at leks is an annual challenge that requires substantial time and effort. Unmanned aerial vehicles (a.k.a. drones) and artificial intelligence are emerging tools that may 1) increase the efficiency of lek counts, 2) reduce sources of observer error, and 3) automate the creation of digital data that can be stored and used for further analysis. We compared traditional lek count methods and counts collected by a drone at 23 sage-grouse leks in 2021 and 2022. At each lek, grouse were counted with traditional methods, and a drone equipped with an infrared camera and programmed for autonomous flight. Integrating an autonomous flight plan allowed a single observer to observe grouse during flight operations, ensuring that breeding behavior was not disrupted. We employed two independent methods to identify and count sage grouse from each video. Birds were first counted manually by a trained observer and then by a machine learning-based automated tool. Comparisons of counts show promise for surveys using drones and automated processes. The average difference across all observations was less than one bird, while the average standard deviation across observations was less than four birds. Traditional lek counts were shortened to (7 ± 5 min) so more leks could be visited per day, while drone flights took (11 ± 7 min). However, each flight consists of four counts. With just one count per flight in the future, efficiency will improve. Future analyses will estimate detection probabilities for traditional and drone-based lek surveys.

HAVE YOU TRIED IPAS? USING IMPORTANT PLANT AREAS FOR CONSERVATION IN MONTANA (POSTER)

Teagan Hayes*, Montana Native Plant Society, Missoula, MT

Peter Lesica, Montana Native Plant Society, Missoula, MT

Kenda Herman, Montana Natural Heritage Program, Helena, MT

Plant biodiversity is under threat, but we need to know where it exists to conserve it. The Important Plant Area (IPA) program aims to identify and protect a network of sites with high biodiversity throughout the world using consistent criteria. An Important Plant Area supports an exceptional population of one or more globally rare plants or an exceptional assemblage of plants that are rare or threatened in Montana. IPAs have influenced public land management

and natural resource use by bringing attention to plant species and communities at risk. For a site in the Pryor Mountains Desert, IPA designation has been part of the course for conservation in the face of a proposed mining project. Committees for Montana's IPA designation have included members from land management agencies and organizations, including the Bureau of Land Management, Montana Fish Wildlife and Parks, Montana Natural Heritage Program, Montana Native Plant Society, the Nature Conservancy, and U.S. Forest Service. We show IPAs in Montana in the context of protected areas and areas of conservation concern, and we urge managers to work with other agencies and groups to use current IPAs and consider nominating other sites as a tool for conservation. Important Plant Areas can be a tool for management in multiple ways. 1) IPA designations offer a critical avenue toward formal conservation. 2) There is an opportunity and need to conserve IPAs that are adjacent to or overlapping other conservation areas, including Important Bird Areas. 3) IPAs represent areas where the environment is unique, and these unique areas likely support unusual insect populations or other wildlife species. 4) Managers can use IPAs in planning and prioritizing new conservation efforts to conserve biodiversity. 5) IPAs can be used in mapping and identifying linkages for diversity and interspersed of important conservation areas. 6) More research pertaining to IPAs will contribute to conservation of current and future areas of concern. Research will inform understanding and management of existing IPAs and help to identify other sites with rare species or communities.

MONTANA CITIZEN BOTANY PILOT STUDY (POSTER)

Kenda Herman*, Botany Program, Montana Natural Heritage Program, Helena, MT

Successful Citizen Science Programs across the nation have made important contributions to conservation. Studies on Citizen Science efforts agree that success is only achieved by programs that are well adapted to specific objectives and stakeholders. In Montana, meaningful conservation of rare plant species is often a challenge due to insufficient or outdated knowledge of simple plant population parameters. Aligned in mission, the Montana Natural Heritage Program and Montana Native Plant Society developed the concept of a Citizen Botany Program aimed at training volunteers to collect survey data from rare plant sites where population status has not been updated in more than 20 years. In 2022 a two-year pilot study was funded to test the framework and function of this concept in action. The Citizen Botany Pilot Study is an operating prototype demonstrating benefits for rare plant conservation and those who contribute. We will present the purpose, methods, and accomplishments of Year 1, share what we have in store during Year 2, and show you how to become a Citizen Botanist.

**** 3D DIGITIZATION OF YELLOWSTONE WOLF SKULLS (CANIS LUPUS) FOR RESEARCH, EDUCATION, AND OUTREACH (POSTER)**

Madeline Jackson*, W.A. Franke College of Forestry and Conservation, University of Montana, Missoula, MT

Jonathan Keller, Department of Biology, University of New Mexico, Albuquerque, NM

Douglas Smith, Yellowstone Center for Resources, Yellowstone National Park, Mammoth, WY

Recent innovations in imaging software and virtual platforms have made it possible for museums to make virtual 3D models of biological specimens available to a wider audience for research, education, and outreach. The Yellowstone National Park Heritage and Research Center (HRC) houses one of the best-studied collections of wolf skulls (*Canis lupus*; n>225) in the world. Long-term research conducted by the Yellowstone Wolf Project has produced an extensive volume of ecological metadata associated with each skull specimen. Here, we used photogrammetry to digitize the HRC wolf skull collection (crania and mandibles) and uploaded the virtual 3D models to MorphoSource, an online 3D data repository. We will use these 3D models and landmark-based geometric morphometric methods to answer questions about how skull shape varies as a function of age, sex, social status, disease, mortality type, and relative prey availability. We will also analyze Yellowstone wolf skull shape variation through time and quantify the occurrence of dental malocclusion in Yellowstone wolves as a result of hunting large prey. In addition to answering these questions, the 3D models will be made available for use as online educational tools and as tangible educational aids by 3D printing individual specimens. Individuals and organizations will be able to download these data and their derivatives for collaborative research to answer new questions about wolf cranial and mandibular morphology. With the absence of a physical gallery in the HRC, this new medium will increase accessibility and public engagement with the natural history of Yellowstone National Park.

NEON IN MONTANA DATA AND RESOURCES TO UNDERSTAND CHANGING ECOSYSTEMS (POSTER)

Jarrett Jamison*, National Ecological Observatory Network, Bozeman, MT

Marie Faust, National Ecological Observatory Network, Boulder, CO

The National Ecological Observatory Network (NEON) is a continental-scale facility that provides long-term, open access, ecological samples, and data to better understand how ecosystems are changing across the United States. NEON will provide 30 years of data from 81 terrestrial and aquatic field sites, including two sites in Yellowstone National Park. NEON data cover a range of subject areas within ecology, including organismal observations, biogeochemistry, aerial lidar, hyperspectral imagery, and micrometeorology. All samples and data collected by NEON are publicly available and can be accessed digitally through the NEON website. In addition to open data, NEON also provides many resources that support land managers, researchers, educators, and students, including sampling protocols, data skills tutorials, shared code, and classroom-ready lesson plans. By providing free and open standardized data - along with protocols and educational resources - NEON is engaged in the global effort to expand the scope of science and make scientific data access easier for all. This poster will provide an introduction to NEON as well as the resources available for accessing and working with NEON data for your research,

curriculum, or land management. It will also showcase published research studies that use NEON data and samples from the Yellowstone National Park field sites to demonstrate how NEON science can be an integral co-benefit of protecting and preserving Montana wildlife and natural communities.

THE ROLE OF CLIMATE IN DECLINES OF A ONCE COMMON POLLINATOR AND METHODS AND TOOLS FOR PROJECTING FUTURE CHANGE.

Will Janousek*, Northern Rocky Mountain Science Center, U.S. Geological Survey, Missoula, MT
Tabitha A. Graves, U.S. Geological Survey, Northern Rocky Mountain Science Center, West Glacier, MT

The acute decline of global biodiversity has become ubiquitous across ecosystems and taxa. The loss of insect pollinators is of particular concern because of the ecological and economic value these organisms provide. One species that has experienced recent declines is the western bumble bee (*Bombus occidentalis*), once common throughout western North America and is now under consideration for ESA listing by the U.S. Fish and Wildlife Service (USFWS). We used a full lifecycle framework and a Bayesian hierarchical occupancy model leveraging 14,457 surveys conducted over 23 years (1998-2020) to evaluate the effects of 17 climate related variables. We found strong support for a negative relationship between occupancy and two climate components: temperature during the warmest quarter and drought; and a predicted mean decline of 57% across the species range. In this talk we will also cover methods, tools, and best practices for developing scenarios for future projections of wildlife populations using climate and land cover change forecasts. We used the results of the contemporary trend model to project future *B. occidentalis* occupancy to the mid-century (2050-2059), including changes in climate, land cover, and overall trend momentum across three scenarios that bound the plausible range of future conditions. By the 2050's, our most optimistic scenario projects occupancy declines in almost half of ecoregions; more severe scenarios project declines in all ecoregions ranging from 51% to 97%.

**** WHITEBARK PINE AND CLARK'S NUTCRACKER ABUNDANCE IN GLACIER NATIONAL PARK**

Vladimir Kovalenko*, University of Montana, National Park Service, Missoula, MT
Lisa Bate, Glacier National Park, West Glacier, MT
Jeffrey Doser, Michigan State University, East Lansing, MI
Victoria Dreitz, Avian Science Center, University of Montana, Missoula, MT
Cara Nelson, Nelson Restoration Ecology Lab, University of Montana, Missoula, MT
Diana Six, Six Lab, Missoula, MT

Whitebark pine (*Pinus albicaulis*) is in decline in many places across its range, and most notably in the Northern Continental Divide Ecosystem which includes Glacier National Park (GNP). White pine blister rust, caused by non-native fungus *Cronartium ribicola*, is the prevailing cause of whitebark mortality in the ecosystem, with an estimated mortality rate of 69.3% in GNP. The local population of Clark's nutcracker (*Nucifraga columbiana*), whitebark pine mutualist and sole seed dispersal vector, is not well studied. Using in-person point count surveys and

automated acoustic recorders, we modelled nutcracker abundance at sites throughout GNP using Bayesian joint likelihood.

LONG TERM BEE MONITORING REVEALS LITTLE CHANGE IN BEE SPECIES RICHNESS IN RESPONSE TO RESTORATION OF INTERMOUNTAIN GRASSLAND SITES

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Chuck Casper, MPG Ranch, Missoula, MT

Skyler Burrows, Utah State University, Logan, UT

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Philip G. Hahn, Entomology & Nematology Department, University of Florida, Gainesville, FL

Restoration of reference plant communities is often a proximate goal of ecological restoration, and land managers may expect mobile organisms such as birds, mammals, and other vertebrates and invertebrates to respond to restoration efforts by recolonizing from nearby habitats. As diverse plant communities become established during the restoration process, there is evidence that native bee communities respond with increasing species richness over time. The objective of this study was to assess if efforts to restore grassland plant communities at former agricultural sites affected species richness of native bee communities. We analyzed a long-term dataset of bee captures from across a 6,000-ha intermountain grassland location in western Montana and found that rarified bee species richness was consistently lower in restoration sites compared to other habitats. Importantly, and contrary to expectations, bee richness did not increase in restoration sites across the 7-year sampling period. The reduced bee species richness at restoration sites was particularly pronounced in early season when surrounding reference habitats typically have high bee species richness and high flowering richness. Since many early-blooming native plant species common in intermountain grasslands are not commercially available or are difficult to establish, they are rarely included in restoration seed mixes, including at our restoration sites. This finding suggests that native seed selection likely plays a role in limiting bee community richness in restoration projects.

**** RECOMMENDATIONS FOR UNBIASED POPULATION MONITORING OF DUSKY GROUSE IN MONTANA**

Elizabeth Leipold*, Department of Animal & Range Sciences, Montana State University, Bozeman, MT

Katharine Banner, Department of Mathematical Sciences, Montana State University, Bozeman, MT

Claire Gower, Montana Fish, Wildlife & Parks, Bozeman, MT

Lance McNew, Department of Animal & Range Sciences, Montana State University, Bozeman, MT

No rigorous state-wide monitoring programs currently exist for dusky grouse. Difficult-to-reach habitat and low probability of detection makes monitoring dusky grouse difficult. Our objectives were to evaluate sampling and analytical methods for producing annual unbiased

estimates of average local abundance, as well as the effect of survey conditions and survey timing on the probability of detecting dusky grouse. We compared point counts vs transects, and route type (off-trail, trail, road). We evaluated and compared four analytical methods using simulations: time-to-detection model and N-mixture model for point counts, raw count (naïve) and hierarchical distance sampling model for point counts and transects. We found surveys located along roads/trails best balanced the trade-offs between sampling effort and survey design requirements, despite limiting inferences to dusky grouse populations located in prime habitat along roads/trails. Simulations indicated that N-mixture models where sites were visited four times resulted in unbiased estimates of local population size with the highest precision. Detection of dusky grouse was highest on clear days, with little wind and background noise, with surveys occurring 0-200 minutes post-sunrise during 5-20 May. Based on our preliminary results, we recommend conducting surveys along roads/trails at 240 sites under optimal conditions during May within 3.5 hours post-sunrise using electronic playback to increase detection. We recommend surveying each site four times and estimating population size using a N-mixture model. Our results provide baseline information necessary for the development of a state-wide monitoring program for Montana and illustrate a process applicable for developing dusky grouse monitoring elsewhere.

MONTANA WILDLIFE AND TRANSPORTATION PARTNERSHIP PROJECT PROGRAM

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Following the December 2018 Montana Wildlife and Transportation Summit, the Montana Department of Transportation (MDT), Montana Fish, Wildlife & Parks (FWP), and a coalition of conservation non-governmental organizations focused on wildlife and transportation issues formed the Montana Wildlife & Transportation Partnership. The Partnership Steering Committee is releasing the MWTP Project Program to establish an avenue for public-private partnerships to propose wildlife accommodation projects. The Program addresses the need for transportation projects specifically dedicated to accommodating wildlife with the collaborative engagement of stakeholders, including the leveraging of capacity and capital investment. These projects are expected to be proposed by interested parties outside of the agencies. An applicant can be a member of the public, non-profit and non-governmental organizations, public agencies, local governments, community groups, or Tribal governments. Projects that have a strong purpose and need and demonstrated collaboration and partnerships are more

likely to advance. Applicants can propose projects that are of various scales and stages of development. The Steering Committee will review project applications through a standardized process with selection criteria to determine whether the project will advance to the next step in development. The number, types, scale, scope, and locations of projects previously accepted into the Program, agency capacity, and available resources will play a role in determining the suite of projects selected in each cycle. Details regarding the MWTP Project Program, the project application guidance, and the project selection process will be shared with participants in preparation for the program launch.

PREDICTED HABITAT SUITABILITY FOR BIODIVERSITY TO SUPPORT LANDSCAPE PLANNING PROCESSES

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Daniel Bachen, Montana Natural Heritage Program, Montana State Library, Helena, MT

The Montana Natural Heritage Program has been modeling predicted habitat suitability for a variety of individual species for over 15 years. We now have models in place for nearly 1,100 species, including all vertebrates, all plant Species of Concern, and all non-native species that are invasive. Model write ups that describe the modeling process, evaluate model output, and provide links to download layer package files of model output for individual species are posted on our Predicted Suitable Habitat Models page at <https://mtnhp.org/models/>. Recently we have combined individual models for biodiversity groups to create 90 x 90 meter pixel maps of cumulative habitat suitability for native species and cumulative invasion risk for non-native species. Maps can be used by resource managers in landscape-scale planning processes to prioritize conservation efforts for native species and survey and control efforts for non-native species. A new Habitat Suitability for Biodiversity task in our Map Viewer web application <https://mtnhp.org/mapviewer/> allows anyone to access these maps and create summaries of species predicted to occur in various jurisdictions of interest as well as the cumulative biodiversity various land ownership categories are predicted to support within the jurisdiction. Models for individual species can be displayed as map overlays and land ownership breakdowns by predicted suitability class are provided for individual species predicted to occur in each jurisdiction of interest. Range-wide models for individual species, statewide cumulative predicted habitat suitability for biodiversity layers, and layers and maps with output rescaled to local areas of interest can be requested at <https://nris.mt.gov/regapp/userMain.asp>

ROADSIDE SURVEYS FOR CALLING AMPHIBIANS IN MONTANA

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Since the first global assessment of amphibian populations in 2004, nearly a third of species are considered threatened with 43% experiencing population declines. Habitat loss, disease, and climate change are the main factors believed responsible for these declines. To assess the population status of amphibian species in eastern Montana, we repeated nocturnal calling

surveys first performed in 2016. By comparing species detections across established routes, we sought to inform state conservation status ranks and identify Montana Species of Concern. In 2016, we surveyed 19 roadside transects for breeding amphibians and detected five species: Boreal Chorus Frog (*Pseudacris maculata*), Northern Leopard Frog (*Lithobates pipiens*), Great Plains Toad (*Anaxyrus cognatus*), Woodhouse's Toad (*A. woodhousii*), and Plains Spadefoot (*Spea bombifrons*). We repeated these transects in 2022 with the addition of five new routes and detected these same five species. The greatest number of detections were of Boreal Chorus Frogs (26%) followed by Woodhouse's Toad (6%), Plains Spadefoot (3%), and Great Plains Toad (2%). Comparing diversity between years, 2016 had up to three species detected per transect, while diversity in 2022 ranged from no detections up to five species on at least one transect. Of the 19 repeated surveys, 52.6% remained consistent in species composition and 26.3% had an increase in species diversity between the two years of survey effort. As species detections across transects changed little between 2016 and 2022, it is likely that populations of these species are stable within this area and current taxonomic statuses remain valid.

FIRING HUNTING BULLETS INTO WATER REVEALS EXTREME DISSIMILARITIES IN TERMINAL BALLISTICS

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Hunting bullets are often comprised of a lead core covered with a copper jacket. When the bullet collides with an animal, particles - sometimes thousands - can shed from the projectile and embed in animal tissues. Those lead fragments can end up in game meat and in the remaining carrion that many species scavenge. Hunters can reduce the availability of lead in food chains simply by shooting lead-free ammunition. With all bullets, it is vital to assess their accuracy and terminal ballistics to ensure they perform adequately and effectively. We fired 12 types of bullets into water to measure their weight retention and expansion at 100 and 260 yards. Bullet constructions included bonded, partition, cup-and-core lead, copper, and tin. Copper bullets retained >98% of their weight, whereas cup-and-core lead bullets retained 9-55%, depending on the brand. One brand of bonded lead bullet retained weight (~96%) almost as well as copper bullets, while another brand retained much less mass (~71%). Most copper bullets expanded similarly regardless of distances tested. Cup-and-core lead bullets often performed inconsistently, where the jacket separated from the lead core. Our data emphasize the importance of understanding a bullet's terminal ballistics as a prerequisite to hunting with that projectile.

ELK IN THE RUBY MOUNTAINS (POSTER)

Wyatt Nielsen*, Wildlife Biology, University of Montana, Missoula, MT

Human recreation and wildlife overlap is a growing concern. The amount of people who visit public land grow in numbers every year, and it is important to understand how large visitor numbers are affecting the local ecosystem. Elk are particularly affected, since they need space to raise calves, find food, and sleep as a herd. With the largest elk population in the United States, the state of Colorado is investigating how humans that hike and camp affect where elk spend their time and raise their calves. To this end, study sites have been set up with trail cameras in Colorado and Montana. We calculated an abundance estimate for one of the few study sites outside of Colorado, the Ruby Mountains of Montana. We used trail camera photos collected from July and August of 2020 to estimate total elk, cow, and bull abundance over the entire study period. We also estimated total calf abundance over four two-week periods. Our estimates for total number of elk, cows, and bulls were reasonable when compared to existing FWP regional estimates. Calf abundance dropped significantly over the course of the study, though misclassification made our estimates lower than we expected. We calculated our estimates with the Space to Event (STE) model (Moeller et al. 2018, Moeller and Lukacs 2021). Although areas that experience heavy recreational use are obvious candidates for surveys, areas whose recreation are diffuse such as the Ruby Mountains are just as important to gain a complete understanding of the subject.

**** A STORY OF SURVIVAL: BIRTHS, DEATHS, AND PREDATION IN WHITE-TAILED DEER IN NORTH IDAHO**

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Mark Hurley, Wildlife Research Section, Idaho Department of Fish and Game, Coeur d'Alene, ID

In North Idaho, ungulate and predator populations are fluctuating, and determining the population growth of white-tailed deer (*Odocoileus virginianus*) will allow us to assess their role in the complex predator-prey systems, where they have never been studied. We wanted to identify how white-tailed deer fawn and adult survival influence population growth rates, and how predation on different age groups contributes to changes in population growth rates. We used vital rates estimated from 360 female deer collared between 2019 and 2021 to build a stage-based matrix model. We then tested eight management scenarios of hypothetical reductions in cause-specific mortality proportional to each stage to determine their impacts on population growth. We estimated a current declining population growth rate. The scenarios that produced a population growth rate above 1, were a 50% reduction in mountain lion predation, and two scenarios of combined reductions in mortality due to mountain lions and bears, as well as a reduction in antler-less harvest. Our findings demonstrated that this population can withstand low fawn survival rates, and is more sensitive to changes in adult survival rates. Additionally, mountain lion predation impacts all stages and would require drastic changes to alter the trajectory of this population. We produced the first estimates of population parameters and vital rates in North Idaho of white-tailed deer, highlighting low recruitment rates and high mortality due to mountain lions. The management scenarios

illustrate the potential effects, or ineffectiveness, of predator removal to improve white-tailed deer population outlook.

**** MODELING PREY & PREDATOR - USING ARMY CUTWORM MOTH OCCURRENCE TO INFORM GRIZZLY BEAR FORAGING SUITABILITY AT TALUS SLOPES IN GLACIER NATIONAL PARK**

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Dr. John S. Waller, Glacier National Park, National Park Service, West Glacier, MT

Dr. Charles Robbins, School of Environment & School of Biological Sciences, Washington State University, Pullman, WA

Dr. Dan Thornton, School of the Environment, Washington State University, Pullman, WA

Army cutworm moths (ACM) migrate hundreds of kilometers from low elevation agriculturally dominated landscapes to aggregate in talus slopes of high elevation massifs along the Continental Divide from New Mexico into Canada. In certain mountain ranges of Montana, the moths' summer occurrence overlaps the domain of recovering grizzly bear populations. In Glacier National Park, the moths' nourishing ~70% fat and 25% protein summer body composition compels grizzly bears to ascend mountains to feast on moths by the thousands each day. Due to the difficulty in accessing and surveying this terrain, the habitat characteristics as well as the mountain locations where grizzly bears forage for ACMs in Glacier, is poorly understood. We implemented systematic ground and aerial surveys from 2019-2021 to 1) develop models describing the talus slope features for ACM occurrence in Glacier, and then 2) used a park-wide projection of the resultant ACM model as an input to better understand the relative suitability of grizzly bear foraging for ACMs across the park, using Maxent modelling. We show the habitat features predicting ACM occurrence drive grizzly bear foraging patterns. Further, while our models together indicate ACMs scantily occur at high elevations, our observations show a remarkable percentage of the park's grizzly bear population is attracted to these rugged locations across summer moths. Given the park's increasing annual visitation rates and their expanding demand for off-trail recreation, our findings will aid park land managers' ability to preserve these sensitive habitats for grizzly bears while maintaining appropriate human use.

**** PRELIMINARY ASSESSMENT OF BAT SPECIES RICHNESS AND FORAGE ACTIVITY IN ANTHROPOGENIC AND NATURALLY OCCURRING WATER SOURCES**

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Black Hossack, University of Montana, US Geological Survey, Missoula, MT

Lisa Eby, Department of Wildlife Biology, University of Montana, Missoula, MT

Human impacts are decreasing critical wildlife resources. In the western U.S., over half of the surface water has shifted to human-made water bodies built for storage instead of naturally occurring streams, wetlands, and lakes, which are becoming more intermittent. Bats rely on surface waters for foraging and drinking, yet the use of different water resources by bats in arid regions is not well understood in North America nor globally. Determining how changes in water availability and water body type influence bat richness is needed to identify potential

conservation efforts to avoid population declines. To help address this question in the arid prairie ecosystems of eastern Montana, we conducted preliminary acoustic monitoring in July 2021 and 2022 in areas around Fort Peck and Zortman, MT. We detected an average of 4.0 species of bats at aquatic sites and 3.45 species at terrestrial sites. Most bat species were detected at both anthropogenic and naturally occurring waterbody types, but Townsend's big-eared bat (*Corynorhinus townsendii*) and the long-eared myotis (*Myotis evotis*) were only detected around reservoirs while the spotted bat (*Euderma maculatum*) was only detected around naturally occurring streams. We detected an average of 5.4 species near anthropogenic water sources (reservoirs and stock ponds), compared to 3.5 species near naturally occurring sites (streams). We plan to expand this acoustic monitoring and link it to trends in water availability and prey availability, which will help us understand how drought-driven changes in the amount and type of surface waters are likely to affect bat communities.

A CRASH COURSE IN PLANNING CONSERVATION PLANTINGS FOR WILDLIFE AND POLLINATORS

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Heather Brower*, USDA Natural Resources Conservation Service, Scobey, MT

Insects, especially pollinating species, are ecologically and economically important but many species are declining across the United States. The duty of fish and wildlife agencies to manage for insects can be unclear based on existing charters, which can make obtaining funding or capacity to directly address these declines difficult. By factoring these species into current habitat management practices, natural resource agency staff can leverage existing capacity to benefit these species. Conservation plantings of grasses and forbs are regularly conducted for reasons such as soil health, erosion control, livestock forage, upland game bird and waterfowl nesting, and grassland songbird habitat. Incorporating pollinator habitat needs is relatively easy when designing these projects. As an example of existing agency potential to benefit pollinator species, in just the last two years Montana Fish, Wildlife and Parks' Upland Game Bird Enhancement Program administered over 5,300 acres, and the USDA Natural Resources Conservation Service's Environmental Quality Incentives Program separately administered over 42,000 acres of conservation grass and forb plantings on private lands throughout Montana. Each agency also has multiple other programs under which this work occurs. This presentation will explore how to conduct conservation plantings to achieve multiple natural resource benefits including a basic planning process, resources for planning, specific considerations for benefiting pollinators when designing seed mixes, and a review of some existing cost-share programs available to implement these practices on public or private lands.

RANGE CONDITION AND VEGETATIVE RESPONSE TO 42 YEARS OF GRAZING MANAGEMENT ON THE BLACKLEAF WILDLIFE MANAGEMENT AREA

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Gary Olson, Retired Wildlife Biologist, Great Falls, MT

The Blackleaf Wildlife Management Area, originally purchased in 1979 and currently totals approximately 11,000 acres, is managed to provide the best possible winter range for mule deer and elk and quality habitat for other native wildlife species. Range condition and vegetative trend surveys were initiated shortly after purchase of the property to establish baselines and monitor trends. Fourteen permanently marked transects were established and species' cover values and frequencies were recorded every four years from 1979 - 2021. Rough fescue (*Festuca scabrella*), Hood's phlox (*Phlox hoodii*) horizontal juniper (*Juniperus horizontalis*) and shrubby cinquefoil (*Potentilla fruticosa*) were selected as indicator species that reflect overall plant community trend. After a period of rest from grazing, a non-traditional rotational grazing system was initiated in 1990. Pastures are grazed from early June to late August once every 4 years. Vegetative monitoring indicates total vegetative cover remains relatively static varying between 35% - 50% with the lowest values coinciding with severe drought. Comparison of grazed versus ungrazed transects for the period of 1979 to 2001 indicated slightly more total vegetative cover for ungrazed transects, similar increasing trends for grass cover, and similar decreasing trends for forb cover. Relative cover for total grasses shows an increasing trend with rough fescue contributing a significant amount of the increase. Relative cover for total forb cover remains moderately static. Horizontal juniper cover is increasing while shrubby cinquefoil cover is decreasing. Overall range condition has improved from fair to good-excellent condition.

**** MOOSE OVERWINTERING HABITAT USE ON MONUMENT RIDGE, WYOMING (POSTER)**

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Cody Lane, Wildlife Biology Program, University of Montana, Missoula, MT

It is important to investigate the effects of management on non-target species which may be detrimentally affected by management for other species. The Bridger-Teton National Forest is conducting thinning and prescribed burning of forest stands on Monument Ridge in western Wyoming to promote aspen regeneration for mule deer and elk fawning and calving habitat and to reduce the risk of wildfire near urban areas. As a significant remaining patch of mixed conifer forest after the 2018 Roosevelt Fire, which burned nearly 65,000 acres, Monument Ridge is thought to be an important location for wintering moose. However, the effects of this management on moose in the area are unknown. Conifer removal may be detrimental to overwintering moose since conifer cover reduces snow depth and decreases energetic costs of movement across a landscape. Increased cover may also create a warmer microclimate in one of the coldest places in the continental United States, and subalpine fir may be an important food source for moose populations which do not winter in riparian willow habitat. We used photos from 24 motion-triggered camera traps to assess moose utilization of thinned and wildfire burned sites relative to untreated areas over the 2021-2022 winter, from October 1 to

April 30. We hypothesize that moose occupancy will be positively related to conifer cover and negatively related to burned areas.

EAGLE PROTECTION AND OFFSET PROGRAM

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Andrea J. Buffington, NorthWestern Energy, Bozeman, MT

A recent study found that the main anthropogenic causes of golden eagle mortality in the western US were shooting, collision, electrocution, poisoning, and trapping. This “take” of golden eagles can either be intentional (e.g., shooting) or incidental from otherwise lawful activities (e.g., collisions with wind turbines, electrocutions from power lines). Incidental take of golden eagles violates the Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act. The US Fish and Wildlife Service can issue Eagle Incidental Take Permits to industry, such as wind energy developers, as long as compensatory mitigation to offset eagle mortality is implemented. Currently, the only mitigation accepted to offset any source of eagle incidental take is power pole retrofitting to reduce electrocutions. The US Fish and Wildlife Service has approved a mitigation bank for eagle incidental take developed by Burns & McDonnell, an engineering firm headquartered in Kansas City. NorthWestern Energy has partnered with Burns & McDonnell to provide the power pole retrofits needed to fulfill mitigation for eagle incidental take permittees. Power poles qualify for the Eagle Protection and Offset Program based on Relative Risk Index, presence of eagle habitat, history of eagle mortalities, location within Eagle Management Units, and cost. NorthWestern provided the first power pole credits for eagle incidental take in 2022.

USING RADIO COLLAR ACTIVITY DATA TO DETECT DATE OF PARTURITION IN GRIZZLY BEARS

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Cecily Costello, Montana Fish, Wildlife and Parks, Bozeman, MT

Milan Vinks, Montana Fish, Wildlife and Parks, Kalispell, MT

Documenting natality among radio-marked adult female grizzly bears (*Ursus arctos*) is an important component of many population monitoring programs. Because female grizzly bears give birth in their den during hibernation, direct observation of neonate litters is not possible until after den emergence. Litter detection can also be compromised by poor visibility in some habitats, potentially leading to biased natality estimates. Using radio-collar activity data from females within three Rocky Mountain and one Alaska population, we developed a method to detect parturition events by the presence of a mid-winter spike in movement likely associated with the prolonged post-parturition licking by mothers. We developed criteria from 22 known mothers and tested them against data from another 291 females. Based on results from 40 females later observed with cubs, the overall true positive rate was 93%. The true negative rate was 87%, based on 55 females later observed with older offspring. A birth event was predicted for 45% of females that were never observed (n=38), 22% of females later observed without any offspring (n= 108), and 8% of females considered too young to reproduce (n=12). All predicted births in the southernmost Greater Yellowstone occurred in January, whereas all

births in the northernmost Gates of the Arctic population occurred in February. Births in the intermediate populations, Selkirk Cabinet-Yaak Ecosystem and Northern Continental Divide Ecosystem, occurred within both months. Our anomaly detection method was highly successful in identifying parturition events and may provide an additional tool for population monitoring.

**** SNAPPING TURTLE NESTING NEAR PRAIRIE STREAMS IN MONTANA**

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Kayhan Ostovar, Environmental Science Department, Rocky Mountain College, Billings, MT

Snapping turtle nesting behavior has not been studied in Montana and little is known about their habitat use on prairie streams. From May to late-June timed visual surveys were conducted for reptile eggs. Eight “nesting aggregations,” with concentrated nesting activity were identified. Fresh snapping turtle nests were excavated to count and measure eggs and then rebury them with a HOBO temperature logger. Sites were resurveyed in the fall to document hatching success or predation. Nests were mainly found in mixed substrate on southern facing hills and bluffs with an average slope of 23.6 degrees, located no more than 50 meters from the water. Daubenmire nest/random site comparisons indicated that nest site ground cover consisted of over 75% bare ground, while random sites were more vegetated with only 16% bare ground. Suitable nesting habitat at this creek seems limited and thus it is important that we help landowners understand the value of these sites and how to limit disturbance.

ASSESSING HUNTING REGULATION COMPLEXITY IN THE UNITED STATES (POSTER)

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Jonathan Karlen, Wildlife Biology Program, University of Montana, Missoula, MT
Jon McRoberts, Wildlife Biology Program, University of Montana, Missoula, MT
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To counter the decades-long decline of hunters, state wildlife agencies and non-governmental organizations (NGOs) have made substantial investments in recruiting, retaining, and reactivating hunters, known as R3 programs. Central to R3 efforts is understanding and developing tools to mitigate barriers that different demographics face in hunting or learning to hunt. While complex hunting regulations have long been proposed as a potential barrier to R3 efforts, there is no synthesis regarding how the complexity of hunting regulations varies among states and impacts R3 efforts. We (1) summarized the peer-reviewed and gray literature about hunting regulation complexity, and (2) documented the complexity of the most recent (2021-22 or 2022-23) firearms deer, upland bird, and waterfowl hunting regulations across all 50 states and identified outliers which were regulations shared by five or fewer states. We reviewed 23 articles or reports which addressed regulation complexity and indicated complexity is a barrier to R3 objectives, but not the primary driver of the decline in hunting participation. We identified 225 unique regulation categories which potentially add to the real or perceived complexity of hunting regulations. Hunting regulation complexity likely interacts with other

factors to make hunting more intimidating or less appealing to new or lapsed hunters and more work is needed to determine how specific regulations may act as barriers to R3 objectives.

TO TREAT OR NOT TO TREAT: DO WILDLIFE HABITAT TREATMENTS IMPROVE ELK FORAGE CONDITIONS?

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Chad Bishop, Wildlife Biology Program, University of Montana, Missoula, MT

Joshua Millspaugh, Wildlife Biology Program, University of Montana, Missoula, MT

In collaboration with land management agencies, the Rocky Mountain Elk Foundation (RMEF) has completed over 10,000 habitat improvement projects. Many of these habitat treatments use prescribed fire, mechanical thinning, or a combination of treatments to meet objectives. Elsewhere, habitat treatments have been used increasingly to improve wildlife habitat and restore forest ecosystems yet little is known about the effects of these treatments on forage conditions for elk. We studied prescribed fire, mechanical thinning, and mechanical thinning followed by prescribed fire habitat treatments across Montana, Idaho, and northeastern Oregon using RMEF habitat treatment sites that ranged in age from 3 to 24 years post-treatment. Each summer during 2018-2019 we determined the quantity and nutritional quality of forage plant species compared to nearby undisturbed forests. In total, we sampled 207 vegetation transects at 26 paired treatment and control sites to measure biomass of forage species and digestible energy of common plants. Additionally, we opportunistically collected fresh elk fecal samples to determine diet composition and identify key forage species. Decreased canopy cover had the strongest positive effect on forage quantity, with mean biomass being 278% higher in sites with no canopy cover compared to sites with 100% cover. Forage quality increased 10% from 1-9 years post treatment before returning to similar levels as controls after 10 years. Habitat treatments which reduce canopy cover by at least 50%, with possible re-application after 10 years may be effective at increasing nutritional resources for elk during the summer.

PREDICTED HABITAT AND MOVEMENT CORRIDORS FOR GRIZZLY BEARS IN WESTERN MONTANA

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Lori Roberts, Montana Fish, Wildlife and Parks, Kalispell, MT

Milan Vinks, Montana Fish, Wildlife and Parks, Kalispell, MT

Once-contiguous grizzly bear (*Ursus arctos*) populations remain largely isolated in the western US. Research has been needed to understand habitat use and assess potential corridors that could promote genetic and demographic connectivity among recovery ecosystems. Accordingly, our objective was to model grizzly bear habitat use, movements, and population connectivity. We employed GPS data from male and female grizzly bears in Montana's Northern Continental Divide Ecosystem (NCDE) and an integrated step selection function approach to test hypotheses

of habitat selection and simulate movements. Results demonstrated highly individualistic behaviors, with some individuals avoiding and others preferring various features like forest edge, riparian areas, and secure habitat. Such individualism supported the need for an individual-based modeling approach to understand and predict grizzly bear behavior. Simulation of movements using each individual's model within and near the NCDE produced habitat maps with high predictive power. Simulated pathways from the NCDE to nearby recovery areas revealed corridors bears may use under varying levels of exploratory versus optimal movements. The predicted habitat and corridors identified by our study can be targeted for proactive conservation efforts such as conservation easements, conflict prevention, and road mitigations to help recover grizzly bears in western Montana and beyond.

HELENA URBAN DEER MANAGEMENT, 2008-2023

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Due to increasing human-deer conflicts, there are a growing number of municipalities in Montana that are managing urban deer, and the methods include public hunting as well as trapping and lethal removal. This presentation will provide an overview of the City of Helena's trap and removal program from 2008 to 2023. Due to the number of nuisance complaints, vehicle collisions, and negative encounters, the City established a task force, developed a management plan, and selected a social-tolerance threshold of <25 deer/mi². The City covered costs for staffing, surveys, and trapping/removal. A local food bank paid for meat processing. Montana Fish, Wildlife and Parks provided technical expertise and collected samples for CWD testing. Trapping success varied with winter conditions and over time. Trapping success was greater in years with more snow and winter weather, and deer appeared to become trap smart over time. CWD sampling began in winter 2021-2022, and to date, all samples were negative. A distance sampling survey was completed in years 2009-2018 and 2021-2022. At the beginning of the program, density was estimated at 47 deer/ mi² (CL: 35-64). Since then, estimates varied from a low of 14 deer/ mi² (CL: 12-20) in 2013, to a high of 64 deer/ mi² (46-88) in 2022. The program was suspended from 2019-2020, and density estimates increased. Overall, the City's management of urban deer was successful. Deer density decreased to below the social-tolerance threshold from 2013-2018, human-deer conflicts and deer-related 911 calls decreased, and 30,000-35,000 pounds of venison were donated.

CONSERVATION EASEMENTS AND LEASES MITIGATE POTENTIAL LOSSES OF GRASSLAND BIRDS IN MONTANA

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The primary aim of the Grassland Initiative Project pursued by FWP from 2017-2022 was to work towards stemming declines of grassland species through preservation of existing grassland habitat. Through these efforts, FWP has increased conserved grassland by approximately 10% statewide. Functionally, this strategy works to reduce further decline of wildlife populations through prevention of potential habitat loss, an outcome that, because it is avoided, is more effectively modeled than observed. We are modelling population loss of grassland bird species of conservation concern that has been theoretically mitigated through implementation of grassland conservation easements in Montana by manipulating land cover values in habitat-based bird density models. For the first study species, Sprague's pipits, models indicate a particular mitigation effect of conserved grassland along the Rocky Mountain front and near Glasgow. We will present findings that integrate the risk of grassland conversion into the models and expansion to additional species.

COMMON POORWILLS IN WESTERN MONTANA

Kate Stone*, MPG Ranch, Florence, MT

Mary Scofield, MPG Ranch, Florence, MT

Long-term banding efforts with Common Poorwills (*Phalaenoptilus nuttallii*) in western Montana reveal several aspects of their cryptic lives during the breeding season. We have banded more than 170 individuals within one landscape over 7 years of work.

Our high recapture rate indicates breeding- and natal-site fidelity and also reveals multiple individuals living for 5 or 6 years. We have also recorded successful breeding attempts by second-year birds, looked at diet and comparisons to other nocturnal insectivores including Common Nighthawks, and studied home range size. Our latest efforts include using the Motus network to look at migration and overwintering destinations.

IDENTIFYING CLIMATE CHANGE REFUGIA FOR RIPARIAN ZONES IN MONTANA

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Sarah Burton, National Climate Adaptation Science Center, U.S. Geological Survey, Arvada, CO

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Identifying climate change refugia, defined as relatively buffered areas that are likely to maintain ecological function under plausible future climates, can serve as an important climate adaptation planning tool. Riparian areas are especially important for climate adaptation because they provide habitat for many species, cool neighboring waters, and are often buffered against change relative to surrounding uplands. We used climatic and landscape attributes to identify and map potential riparian climate refugia (100 m) across Montana. We included two landscape factors hypothesized to confer resiliency (riparian connectedness, landscape diversity) and two factors of projected climate change likely to impact riparian areas (increases in warm days, landscape runoff). For the climate factors, we considered a future atmospheric carbon emission scenario of RCP 8.5 and two plausible climate change scenarios, 1) moderately hot and wet [CNRM-CM5] and 2) hot and dry [IPSL-CM5A-MR]. We compared historical climate (1971-2000) to two future time periods, mid-Century (2040-2069) and end of Century (2070-2099). Although we found current riparian connectedness is greater in western Montana, riparian areas in eastern Montana are projected to be better protected against climate change, likely due to greater landscape diversity near riparian areas, projected increases in moisture, and a smaller relative increase in warm days. Predicted refugia for some areas, such as portions of southeast Montana, depended greatly upon the climate scenario. Agencies and stakeholders can use the maps we produced to prioritize conservation and restoration of targeted refugia areas and for broader climate adaptation planning.

POLICY, PREDATORS, AND THE PUBLIC TRUST

Brian Wakeling*, Wildlife Division, Montana Fish, Wildlife and Parks, Helena, MT

Although frustrating for many biologists (public trust managers), legislators and commissions (public trustees) play a legitimate role in establishing policy and providing direction for wildlife management and conservation to benefit the public (beneficiaries of the trust). Professional wildlife biologists need to remain objective and remain unbiased amid the often emotional and highly contentious political fray to maintain our own credibility. Biological inputs are only one aspect of the considerations that decision makers use when making determinations that influence wildlife policy. Recent (and ongoing) political action about predator management may at times seem short sighted or ill informed, yet it is important to carefully evaluate the effects of policy changes. Direction to reduce or increase predator populations by decision makers is not inherently incorrect because biologists do not have a definitive “right” number of predators to manage towards. Predators and prey may be managed at relatively low or high abundance without inflicting harm on the natural communities in which they live. Political hyperbole is damaging to the credibility for all that use it, and wildlife biologists must maintain high professional standards to avoid irreparable harm to the profession.

Based on the article with the same title from the Jan-Feb 2023 issue of The Wildlife Professional

**** BIRTH SITE SELECTION BY WHITE-TAILED DEER IN NORTHERN IDAHO (POSTER)**

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Female white-tailed deer (*Odocoileus virginianus*) must select habitats that will offer them the nutrition and protection necessary to successfully birth and raise their offspring. In northern Idaho, these deer are presented with a particularly harsh set of conditions including rugged terrain, varying forage availability, and a full complement of large predators. To manage in these conditions, individuals from a single population may migrate to higher elevations in the summer or may remain year-round on a single range. Migration has many inherent risks, but also offers the opportunity for increased forage quality and improved cover for hiding from predators. Conversely, not migrating may present deer with supplemented nutrition from agricultural lands, while also creating a “predator shelter” by which deer may avoid predation by staying nearer to human development. This study examines the characteristics of selected birth sites in the study area over four years (2019 to 2022; n = 180), comparing these selected microhabitats of both migratory and non-migratory does to all available habitat within the study area. Using a spatial approach, we assess selection by white-tailed does at multiple scales: seasonal home range within the larger study site, and birth site within the seasonal home range. This study aims to address gaps in the understanding of white-tailed deer ecology in northern Idaho, where research and monitoring is challenged by the terrain.

**** UNDERSTANDING BOREAL OWL DISTRIBUTION IN WESTERN MONTANA USING AUDIO RECORDING UNITS (ARUS) (POSTER)**

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The use of Autonomous Recording Units (ARUs) allows us to better understand Boreal Owl (*Aegolius funereus*) distribution throughout Western Montana and their conservation needs. As an elusive, nocturnal, and avian group, owls are understandably difficult to study and in the case of Boreal Owls, underevaluated in their Montana ranges, leading to their listing as a Species of Greatest Information Need. ARU surveying is a non-invasive method-of-study and depends on vocalizations to determine whether a species is present or not. Unlike callback surveys, ARUs use passive listening without broadcasting a call into the habitat, and have been

utilized by the Montana FWP for Great Gray Owl studies in suitable breeding habitat. This study utilized both callback surveys and ARU surveys to further understand Boreal Owl distribution after finding them at the Great Gray Owl sites. ARUs were deployed for 3-9 nights in Regions 1, 2, 3, 4, and 5- making up all of Western Montana. We used the audio software Kaleidoscope Pro to filter out collected audio similar in wavelength to Boreal Owls, then determined whether or not a Boreal Owl was present by comparing their territorial call to Kaleidoscope's processed WAV files. Although we still have many sites to process, Boreal Owls were detected at 4 of the 51 ARU sites and 20 of the 157 callback survey sites. These findings will help us determine habitat preferences and provide information about the location of this species for further studies.



THE MONTANA CHAPTER OF THE WILDLIFE SOCIETY IS HERE TO SERVE YOU AS WILDLIFE PROFESSIONALS

In order to be effective and to influence circumstances for Montana's wildlife resources, we must have an active and committed membership. Please consider volunteering and becoming an active member of any of the following committees or ad hoc committees. Your participation is always appreciated and needed. Refer to Bylaws for duties and composition of standing committees (Article VIII).

STANDING COMMITTEES 2022-2023

NOMINATING AND ELECTIONS

A three-member Nominating and Elections Committee shall be selected by the President of the Montana Chapter not later than October 1 of each year and shall submit to the Secretary on or before October 15, the names of two candidates for each of the elective positions; namely the President-Elect, and every third year the Secretary or Treasurer, depending on the position coming open.

Committee Chair: current MT TWS President (Andrea Litt, mttws.president@gmail.com)

MEMBERSHIP

This committee shall encourage the maximum number of qualified persons working or residing within the Chapter's organizational area to become members of The Wildlife Society, the Northwest Section, and the Montana Chapter. The Committee shall also recommend Honorary Membership for deserving individuals in accordance with Article IV, Section 4.

Committee Chair: current MT TWS Treasurer (Heather Brower, mttws.treasurer@gmail.com)

PROGRAMS

This committee shall arrange programs of all regular and annual meetings and provide the President with a proposed agenda for the Annual Meeting at least two months prior to the meeting date. The President-Elect shall serve as Chair of the Program Committee.

Committee Chair: current President-Elect (Chad Bishop, mttws.preselect@gmail.com)

FINANCIAL MANAGEMENT

This committee shall consist of a Chair and at least two other members, serving staggered three-year terms. The Financial Management Committee shall review the financial records and supporting documents of the Treasurer at least annually. The Committee also shall review these records and documents prior to any change in the office of the Treasurer. The Committee shall prepare an annual financial management plan for approval by the membership at the annual meeting.

Committee Chair: current MT TWS Treasurer (Heather Brower, mttws.treasurer@gmail.com)

EDUCATION AND INFORMATION

This committee shall seek and employ methods of informing the public of basic wildlife management concepts and of Chapter and Wildlife Society activity and interests.

Committee Chair: Brent Lonner (blonner@mt.gov)

RESOLUTIONS AND PUBLIC STATEMENTS

This committee shall receive proposed resolutions or public statements from members at any time, and shall prepare, submit, and recommend action on such items to the Executive Board in accordance with Article VII, Section 5. Submit resolutions/statements to the Executive Board.

Committee: Executive Board - Find email addresses: <https://mttws.org/>

CONSERVATION AFFAIRS

This committee shall: review legislative proposals, administrative regulations, environmental assessments and impact statements, and other subjects or issues affecting wildlife or wildlife habitat within the organizational area of the Montana Chapter and make recommendations to the Executive Board for any action that should be taken by the Montana Chapter; Prepare white papers on critical wildlife issues, and other issues affecting wildlife or wildlife habitat within the organizational area of the Montana Chapter; Receive proposed position statement, resolutions, and public statements from two or more members at any time, and shall prepare, submit, and recommend action on such items to the Executive Board in accordance with Article VII, Section 4; Communication with The Wildlife Society's Director of Government Affairs to elevate local or regional issues that may have national or international significance or precedent setting.

Committee Co-Chairs: Sonja Andersen
Lance McNew
Andrew Jakes (mttws.pastpres@gmail.com)

SCHOLARSHIPS

Each year, one instructor from the University of Montana and one from Montana State University, and a member-at large from the Chapter membership will select scholarship recipients for the Dr. Richard Mackie Award. The committee chairmanship will alternate every other year between the two universities. Each of the committee co-chairs also works with the faculty at their respective institution to select a recipient of the Wynn Freeman Award.

Committee Co-Chairs: Dave Willey (MSU) willey@montana.edu
Chad Bishop (UM) chad.bishop@umontana.edu

AWARDS

This committee shall consist of three members, one from each geographic region of the Chapter. A fourth member of the committee will be appointed by the President for input on selection of recipients for the Bob Watts Wildlife Communications Award. This fourth member will be one of the Board Members of the Bohemian Corners Foundation, until such time as all original members of the Bohemian Corners Foundation, as published in the June 1990 Chapter Newsletter, are no longer members of the Montana Chapter.

YEARLY AWARDS NOMINATIONS

The Chapter annually seeks nominations for four awards to be presented at the annual Conference.

1. The ***Distinguished Service Award*** is presented annually for cumulative, past, current and/or continuing achievements in wildlife conservation.
2. The ***Biologist of the Year Award*** is presented annually for significant achievements in wildlife conservation anytime during the five years immediately preceding the award presentation.
3. The ***Bob Watts Communication Award*** is presented for significant communication in media such as professional publications, popular wildlife articles, books, movies or videos that have a relatively wide audience.
4. The ***Wildlife Conservation Award*** is given to an individual or non-governmental organization for past, present or ongoing efforts that enhance wildlife conservation in Montana.
5. The ***Rising Professional Award*** recognizes emerging professionals and rising leaders in the wildlife field who are drivers of professional progress in Montana.
6. The ***Western Meadowlark Award*** recognizes an outstanding wildlife student enrolled at one of the 4-year wildlife university/college (excluding the main UM or MSU campuses).

Committee Chair: Megan O'Reilly (moreilly@mt.gov)

AD HOC COMMITTEES

GRANTS

This ad hoc committee shall receive and review applications for Montana Chapter Grants and make recommendations to the Board. Grants mayor may not be distributed annually depending on the financial status of the Chapter. See GRANTS page on website.

Committee Chair: Claire Gower (cgower@mt.gov)

EFFECTS ON RECREATION

This ad hoc committee oversees distribution and updates of the Montana Chapter report entitled, Effects of Recreation on Rocky Mountain Wildlife - A Review for Montana. See Recreation in Wildlife Habitat: <http://joomla.wildlife.org/Montana>

Committee Chair: Bryce Maxell (bmaxell@mt.gov)

SPECIES OF CONCERN

This ad hoc committee oversees the review of the status of terrestrial animal species in Montana through;

1. Development of a status paper which summarizes all relevant information on the biology and status of the species in Montana, and
2. Completion of the NatureServe status model which evaluates population size, range extent or area of occupancy, short and long-term population trends, intrinsic vulnerability, environmental specificity, and scope, severity, and immediacy of threats.

Status papers and status scores are reviewed, revised if necessary, and voted on by committee members. Approved status papers and status recommendations are forwarded to the joint Montana Natural Heritage Program and Montana Department of Fish, Wildlife and Parks Species of Concern Committee. Portions of status papers are posted on the online Montana Animal Field Guide and status recommendations are used to update the Montana Animal Species of Concern Report. The Montana Animal Species of Concern Report provides a basis for resource managers and decision-makers to direct limited resources to priority data collection needs and address conservation needs pro-actively.

Committee Chair: Dan Bachen (dbachen@mt.gov)

MEMBERSHIP IN THE MONTANA CHAPTER OF THE WILDLIFE SOCIETY

Membership in the Montana Wildlife Society is open to all individuals interested in the perpetuation of Montana's wildlife resources. Voting membership in the Chapter is available to all paid regular, retired and student members. Governing board members must be current members of TWS. Membership activities continue to be a priority for our Chapter. In addition to increasing our own membership, we encourage our members to also become members of the Northwest Section and the National Wildlife Society.

Membership Benefits

Becoming a member of the Montana Chapter of The Wildlife Society has many benefits to offer both professionals and students including:

1. Close association with a group dedicated to wise use of our state's wildlife resources. Members come from universities, colleges, high schools, environmental consulting firms, state and federal agencies, private organizations, and business.
2. Reduced registration fee for participation in the Annual Conference, where timely resource topics are explored.
3. Workshops that permit exploration of selected wildlife topics and management activities.
4. The Newsletters, containing reports on items of interest to wildlife professionals in Montana.
5. The opportunity to influence state and federal policy through an organization capable of providing a unified professional opinion on Montana's wildlife issues.
6. Providing support for the Intermountain Journal of Sciences.

Information Updates

Our chapter newsletter is distributed twice a year and provides information about upcoming events as well as opportunities to get involved with one of our working committees.

Peer Network

Increase your peer network by attending chapter meetings along with The National Society's annual conference. These meetings and conferences allow you to interact with people who represent the diversity of the profession. Students can take advantage of the unique opportunity to meet and learn from seasoned professionals and potentially meet future employers.

Continuing Education

Gain in-depth exposures to timely wildlife management concerns by attending chapter meetings. National membership also allows you to demonstrate your dedication to professional development by achieving and maintaining the status of a Certified Wildlife Biologist®.

Professional Growth

Students can obtain leadership skills and enhance their professional growth by serving as an officer, on a committee, or giving a presentation at a chapter meeting. We welcome you to join the Montana Chapter of The Wildlife Society. There is a role in the Chapter for the wildlife biologist, manager, technician, conservation officer, educator, naturalist, and any individual concerned about the welfare and future of Montana's wildlife resources.

Becoming a Montana Chapter Member

To become a member log onto <https://mttws.org/membership/>



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- IJS has a world-wide presence through its website, Montana State University's Open Journal Systems (archival home of IJS) & Search Engines.
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