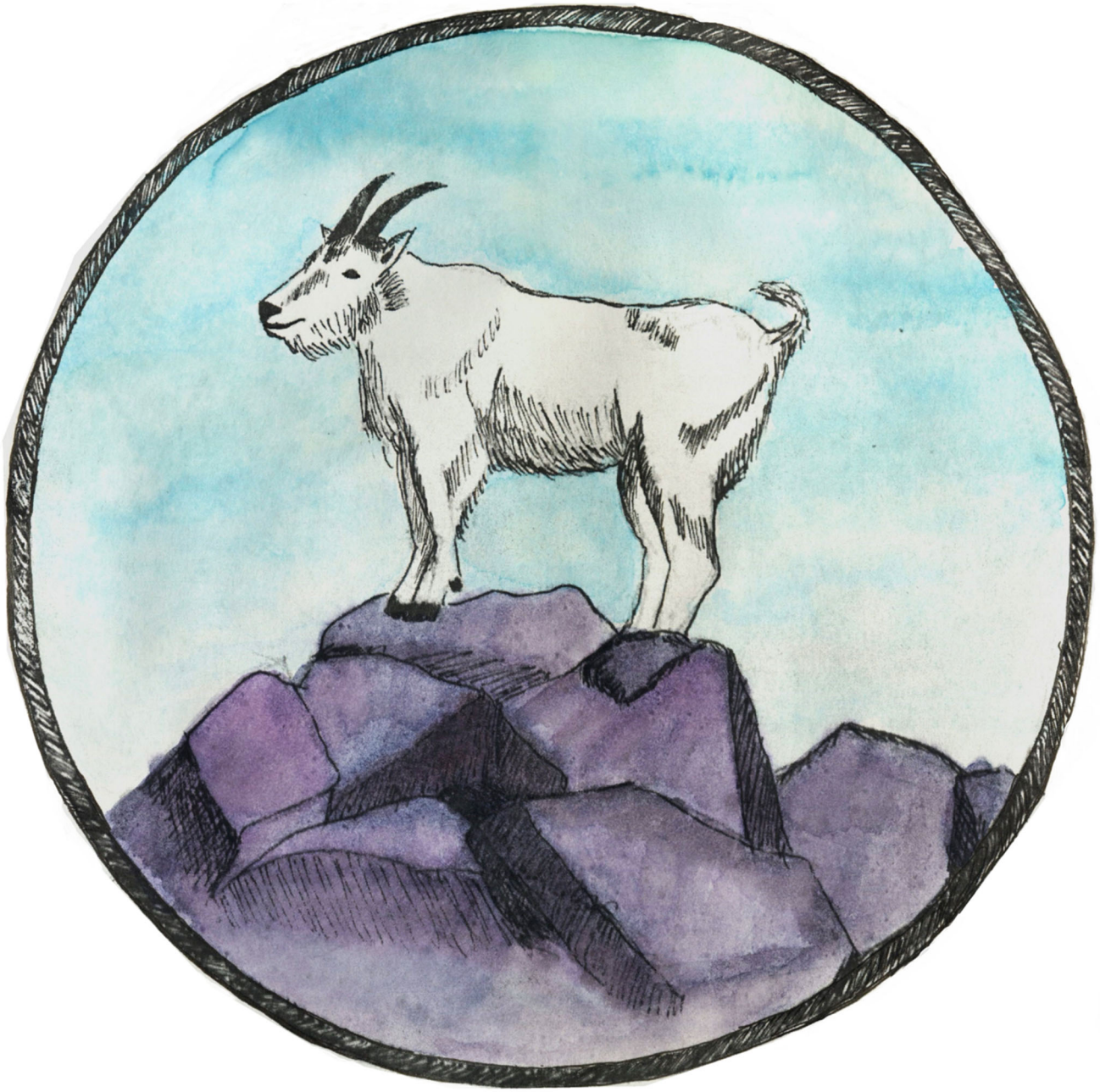
The Montana Chapter of the Wildlife Society
62nd Annual Conference



Cultivating Respect For Nature Without Destroying What We Seek

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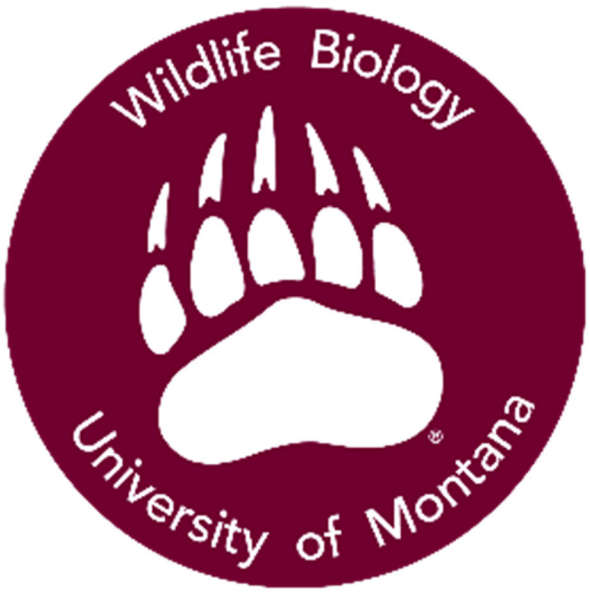

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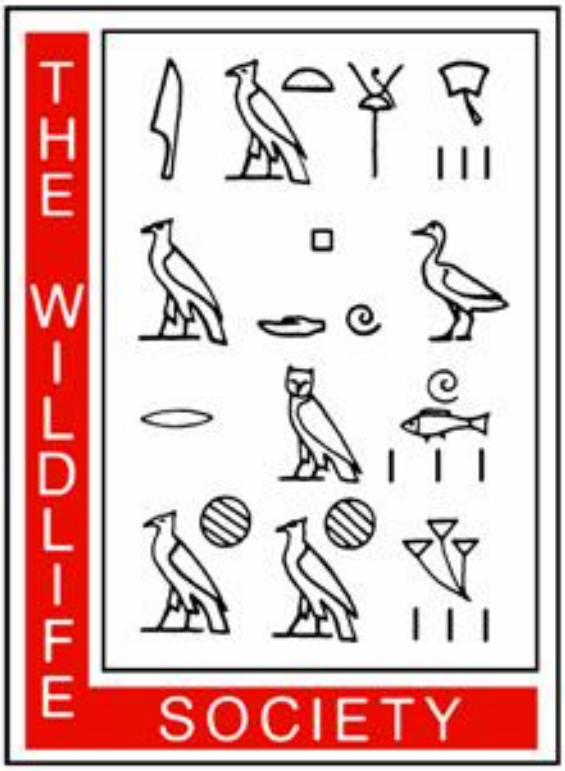

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THE MONTANA CHAPTER OF THE WILDLIFE SOCIETY

62nd ANNUAL CONFERENCE, 2024

"Cultivating Respect for Nature Without Destroying What We Seek"

February 6 - 9, 2024

Contents

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 Chapter of The 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.

2023 - 2024 MONTANA TWS CHAPTER OFFICERS

President: Chad Bishop (University of Montana)
Past-President: Andrea Litt (Montana State University)
President-Elect: Katie Benzel (Bureau of Land Management)
Secretary: Brandi Skone (Montana Fish, Wildlife & Parks)
Treasurer: Heather Brower (Natural Resources Conservation Service)

Montana State University Student Chapter President: Noah Sechrist
University of Montana Student Chapter President: Brandon Quamme

2023 - 2024 MONTANA TWS COMMITTEE CHAIRS

Programs: Katie Benzel
Awards: Megan O'Reilly
Education/Information: Brent Lonner
Financial Management: Heather Brower
Membership: Heather Brower
Nominating and Elections: Chad Bishop
Conservation Affairs: Andrea Litt, 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

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.

CONFERENCE WELCOME

WELCOME TO THE 62nd ANNUAL CONFERENCE OF THE MONTANA CHAPTER OF THE WILDLIFE SOCIETY

"Cultivating Respect for Nature Without Destroying What We Seek"

Greetings everyone and welcome to Butte, America! I feel like it was only a couple of months ago since we were together last February in Helena, and I had plenty of time to wrap my mind around planning a conference a year away. Yet here we are already! Thank you for the opportunity to serve as president-elect over the past year. I've enjoyed meeting and working with new people across Montana and other states, as well as learning more about TWS and the committed wildlife professionals in our Chapter. Getting to know the other Executive Board members has been especially notable. I'm excited for us to discuss, what I believe to be, an important conference theme, hearing different perspectives and connecting on common challenges.

Cultivating Respect for Nature Without Destroying What We Seek

This year's conference theme brings us together for a conversation about the challenges of engaging people to protect and conserve wildlife and wild places without displacing and destroying them with unsustainable human presence and use. An ever-increasing population in Montana and rapidly spread exposure of locations across the state are compounding human impacts on the landscape. From housing developments on big game winter range, motorized vehicles creating new routes cross-country leaving little wildlife security, noxious weeds invading native sagebrush grasslands, packed trailheads and close proximity camping at mountain lakes, hunting spots popularized, shed hunters disrupting wintering elk herds, to litter and other human sign along trails and at camping spots. The list gets long quickly. Our plenary session includes seven panelists who will discuss projects and issues they're working on and their perspectives for facing these challenges.

Workshops, Papers, Posters, and Banquet

We're excited about the four informative workshops on Tuesday and Wednesday of the conference: 1) Now You See Them, Now You Don't: Using Occupancy Models for Wildlife Management, 2) Wildlife Tracks and Sign, 3) Burnout, Stress, and Why Science Says They Matter, and 4) Lead-Free Ammunition in Montana. There are 38 oral presentations and 8 posters included in the program. Thanks to all of the workshop leaders and presenters for sharing your research and knowledge! You're all major contributors to the success of the conference.

The Thursday evening banquet speaker is not to be missed! The keynote banquet speaker is wildlife biologist Doug Chadwick. Doug has researched and written about a variety of species from mountain goats and wolverines in the Rocky Mountain alpine to snow leopards in the Himalayas to whales and coral. He is a natural history journalist who has authored 15 popular books and hundreds of magazine stories. Doug's vast experience and knowledge will no doubt be engaging.

ACKNOWLEDGMENTS

Putting together the annual conference cannot be done alone. The Executive Board's experience, support, and advice are invaluable. I sincerely thank Andrea Litt (Past President), Chad Bishop (President), Heather Brower (Treasurer), and Brandi Skone (Secretary). You are all highly motivated hard workers who were patient and kind guiding me through all of the details of being President-Elect and planning the conference, all while working full-time careers on top of being on the Board I You all contribute so much Including: Andrea's role as liaison with the TWS Northwest Section, organizing student travel awards, and putting together the conference program; Chad leading our board meetings, taking time out of his busy schedule to help me work through the catering order, meeting in Butte to tour the hotel and go through the conference details, and always encouraging; Heather for being on top of payments and refunds, administering funds for awards and scholarships, stepping up to print name tags on her weekends, researching supplies and equipment needed for TWS, and offering great ideas; and Brandi for hoodie design and ordering, website updates, writing newsletters, posting announcements/reminders/deadlines, and for excellent speaker suggestions. These mentions are only a few of the tasks and talents that you all provide.

Thanks to Doug Chadwick for graciously agreeing to be our banquet keynote speaker. His presentation is a conference highlight. I am also grateful to Joe Alexander, Malou Anderson-Ramirez, Brad Colin, Kerry Gunther, Randy Newberg, Matt Rinella, and Beth Shumate for sharing their knowledge and experience with us as plenary speakers. Thanks to Dan Walsh, Sara Lamar, Anna Rapson, Michael McTee, Hannah Leonard, Vince Slabe, Kate Stone, Robert Domenech, Adam Shreading, Brian Busby, and Becky Kean for leading workshops. I thank Dan Bachen, Allison Begley, and Lisa Bate for leading working groups.

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), John Kuntz (art on this year's conference hoodie), Brandi Skone (arranging the conference hoodie), Carly Segal (cover art on the program), Rebecca Mowry and John Kuntz (art throughout the program), Dan Bachen (abstract formatting guru!), Megan O'Reilly (awards), and Claire Gower (small grants).

A big thank you to our sponsors who enable us to host this conference! I owe thanks to the paper and poster presenters, session moderators, judges, and many other volunteers -without you, there wouldn't be a conference. The contributions of student and chapter advisors from universities and colleges across Montana are greatly appreciated. There are many people who have gone above and beyond their call of duty to make this year's conference happen. I apologize if I missed acknowledging anyone. I value everyone's contribution, big and small. Special thanks to all members of the Montana Chapter of The Wildlife Society. Your dedication to sustaining wildlife populations and habitats makes this Chapter the respected organization that it is. I always leave annual conferences inspired I Thank you to my family and friends for always having my back and supporting me.

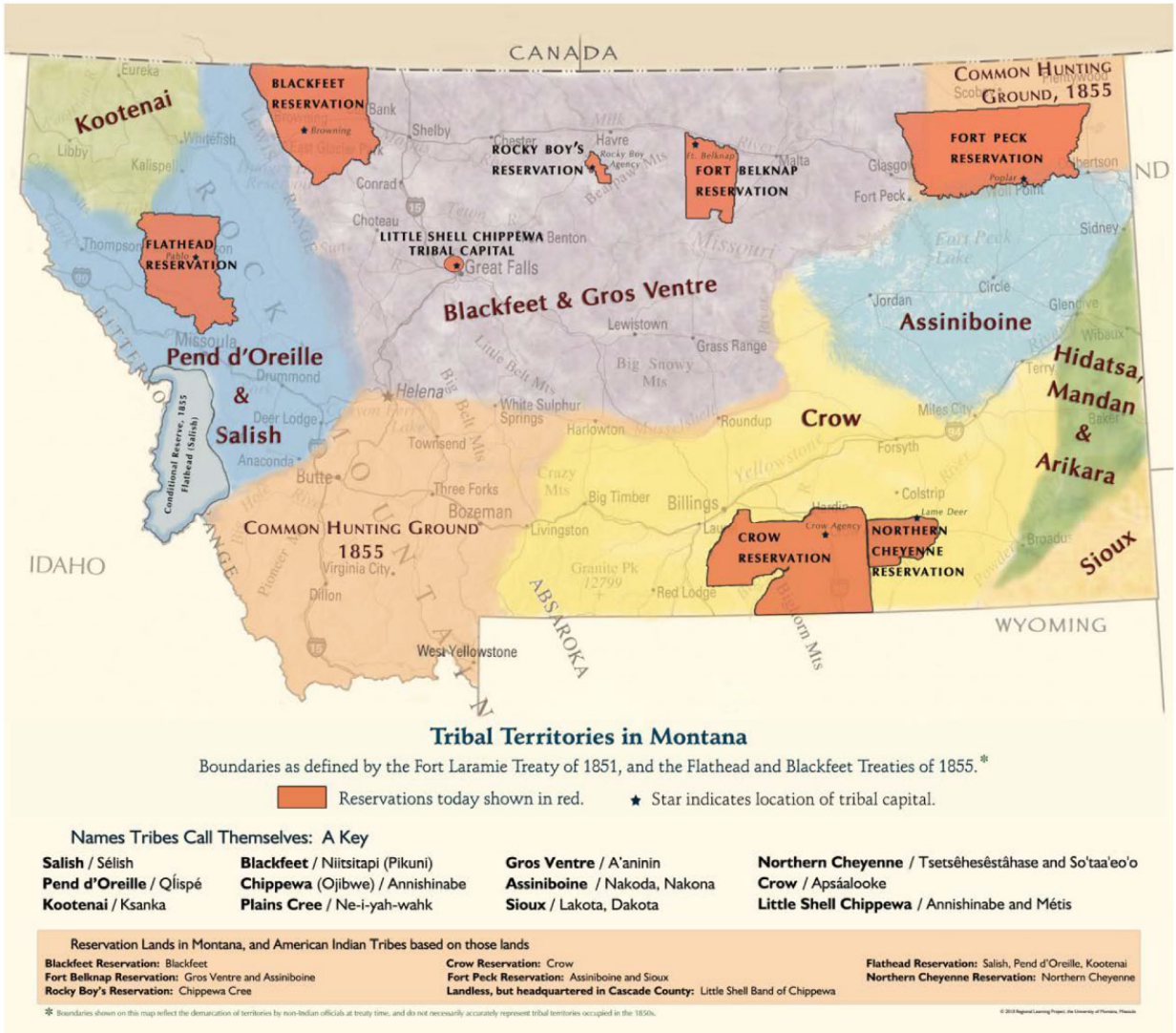
Katie Benzel
2023-2024 MTTWS President-Elect

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.



2024 NOMINEES FOR EXECUTIVE BOARD OFFICERS

PRESIDENT-ELECT CANDIDATES

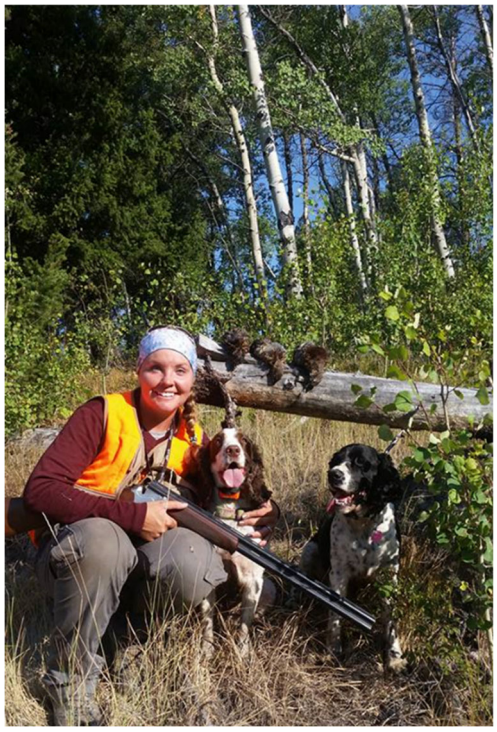
Rebecca Mowry

Rebecca Mowry has worked as the Bitterroot-area wildlife biologist with Montana FWP since 2014. She came to Montana via Texas Parks and Wildlife, University of Idaho (B.S.), and University of Missouri (M.S.), as well as a dozen or so odd tech jobs ranging from woodpeckers in the Black Hills to grizzly bears in Yellowstone. Rebecca was also your Montana Chapter secretary from 2020-2022 and is a TWS Leadership Institute alumnus (class of 2016).

Having served on the MTTWS board recently, Rebecca understands the challenges of making MTTWS more impactful and accessible to professionals and students. She would especially like to increase the Chapter's influence on current political and conservation issues, hoping to lean heavily on National TWS to change things for the better for Montana wildlife and its stewards.

When not fielding hunter phone calls, catching bighorn sheep, or mentoring local high school and college students, Rebecca enjoys doodling wildlife on meeting agendas (some of which become MTTWS t-shirts), writing novels, and backpacking the nearby wildernesses with her dog Willow.

PRESIDENT-ELECT CANDIDATES



Lindsey Parsons

Lindsey Parsons is the Helena Area Wildlife Biologist for Montana Fish, Wildlife & Parks (FWP). Lindsey grew up in Boulder, Montana, and her affection for the outdoors developed early in life through experiences of camping, hunting, hiking and fishing. This affection has continued to grow throughout her education and career. She attended Dawson Community College for one year before transferring to Montana State University, where she received a B.S. in Ecology in 2010. Following several years of technician work for FWP and Idaho Fish and Game/University of Montana Cooperative Wildlife Research Unit, Lindsey returned to school to earn a M.S. in Secondary Education from Black Hills State University (2015) and a PhD from South Dakota State University in Fish and Wildlife Management (2019). In 2019, Lindsey became the first Deer and Elk Coordinator for FWP where she led a statewide effort to update Montana's Elk Management Plan. Lindsey is married with two children and a springer spaniel.

Lindsey values the principle of using sound biological data to inform management decisions. When decisions also necessitate social input, she believes in finding and building on common ground amongst stakeholders. Working through the complex combination of biological data and social input to arrive at meaningful management actions is something Lindsey has found challenging yet also rewarding during her career thus far. If elected as TWS president, Lindsey would value her leadership role in advancing and advocating for Montana's wildlife science profession.

TREASURER CANDIDATE

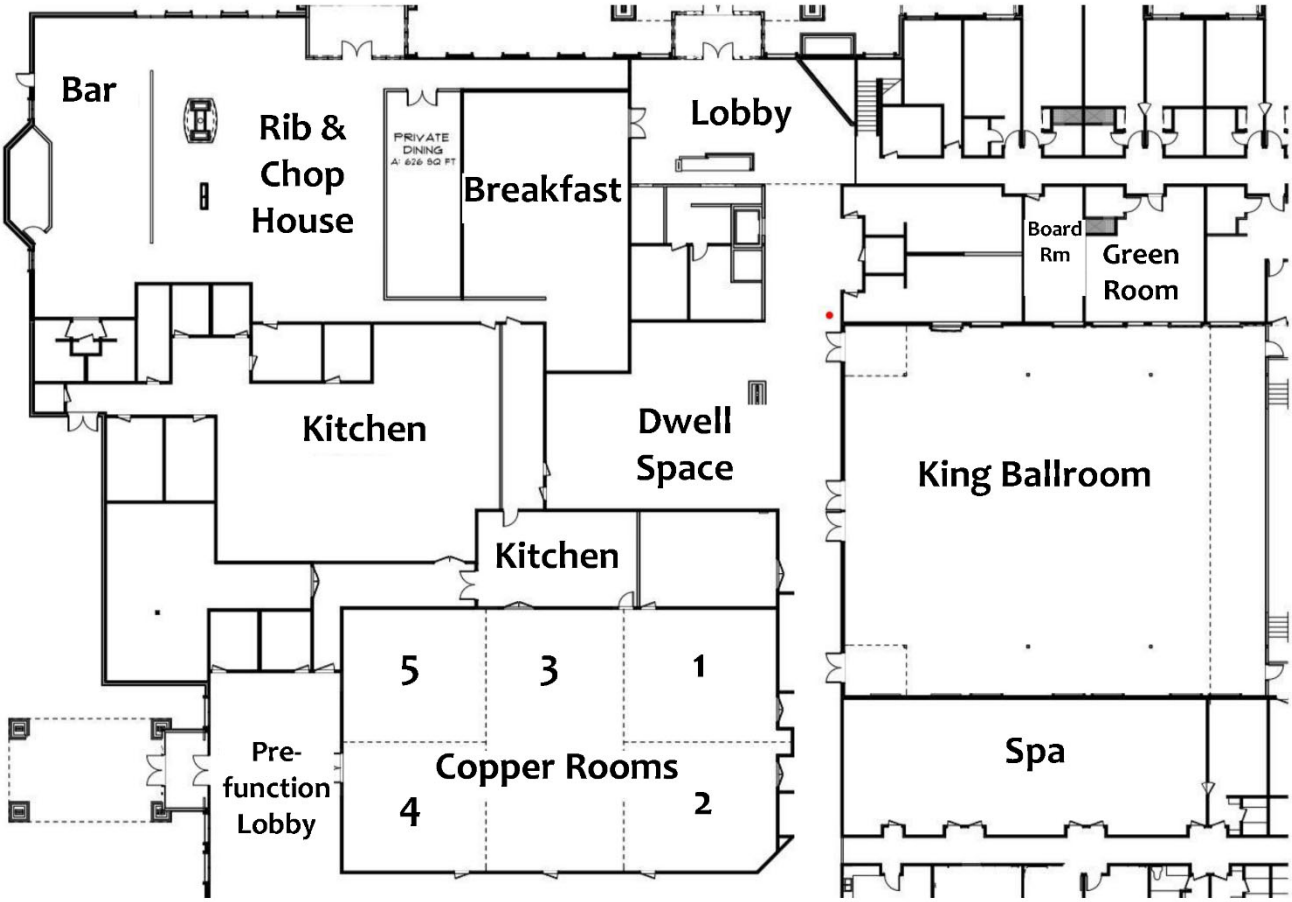
Heather Harris

Heather was born and raised in Northern Ontario, Canada, spending most of her time outdoors where she developed an interest in wildlife and conservation. She holds a B.S. in Biology from Trent University and a M.S. in Wildlife and Fisheries Science from Mississippi State University.

She started her career with Montana Fish, Wildlife, and Parks (FWP) in 2014 as the Region 6 Nongame/Furbearer Biologist. In this role she gained a deep appreciation for the grassland and sagebrush ecosystems and their associated species. In summer of 2021 she transitioned to the statewide Grassland/Wetland Coordinator for FWP based in Glasgow. In this role she works with private landowners, FWP staff, state wildlife agencies, federal partners, and NGOs to deliver conservation programs, with a focus on supporting sustainable ranching operations. She has been a member of TWS for over 10 years and is involved with multiple TWS working groups. In her 10-year career with FWP, she has witnessed the tireless conservation efforts of wildlife professionals and the role TWS plays in not only promoting wildlife conservation but also serving as a venue for exchanging ideas and forming collaborations. She would like to serve as treasurer to contribute to these efforts.

In her spare time, she enjoys camping, hiking, birding, dog training, and hunting with her cocker spaniel, Riggs.

HOTEL MAP



COPPER KING
HOTEL & CONVENTION CENTER

2024 SCHEDULE AT A GLANCE

All Times MST	Tuesday, Feb 6			Wednesday, Feb 7	Thursday, Feb 8		Friday, Feb 9
7:30							MTTWS Business Meeting *Copper 3*
8:00				Workshop: Burnout, Stress, and Why Science Says They Matter *Copper 4&5*	Updates from the NW Section of TWS *Copper 3*		
8:30							
9:00	Workshop: Now You See Them, Now You Don't: Using Occupancy Models for Wildlife Management *Copper 4&5*	Workshop: Wildlife Tracks and Sign *Copper 1&2*			Concurrent Session A *Copper 1&2*	Concurrent Session B *Copper 4&5*	Joint Session *Copper 4&5*
9:30							
10:00			Harlequin Duck Working Group *Copper 3*	Workshop: Lead-Free Ammunition in Montana *Copper 1&2*	Break		Break
10:30					Concurrent Session A *Copper 1&2*	Concurrent Session B *Copper 4&5*	Joint Session *Copper 4&5*
11:00							
11:30							
12:00					Lunch ***Ballroom***		Conference Adjourned Safe Travels!!
12:30							
13:00			Montana Bat Working Group *Copper 3*	Plenary Session: "Cultivating Respect for Nature Without Destroying What We Seek" *Ballroom*			
13:30					Concurrent Session A *Copper 1&2*	Concurrent Session B *Copper 4&5*	
14:00							
14:30							
15:00			MT Bird Conservation Partnership Working Group *Copper 3*		Break		
15:30					Concurrent Session A *Copper 1&2*	Concurrent Session B *Copper 4&5*	
16:00							
16:30							
17:00	Partners of the Americas Meeting *Copper 1&2*			MAFWB Meeting	Poster Session *Dwell Space*		
17:30							
18:00	MTTWS Welcome Reception *Ballroom*			Student-Professional Mixer *Trivia Night!* *Ballroom*	Awards Banquet and Silent Auction *Ballroom*		
18:30							
19:00							
19:30							
20:00							
20:30	Movie Night - *Ballroom*						

2024 CONFERENCE DAILY SCHEDULE

Tuesday, February 6

- **Workshops**
  - **Occupancy Modelling:** 9 am–3 pm (Copper 4 & 5)
  - **Wildlife Tracks and Sign:** 9 am–3 pm (Copper 1 & 2)
- **Working Group Meetings**
  - **Harlequin Duck Working Group:** 10:00am–12:00pm (Copper 3)
  - **MT Bat Working Group:** 1–3 pm (Copper 3)
  - **MT Bird Conservation Partnership Working Group:** 3–5 pm (Copper 3)
- **Partners of the Americas Meeting:** 5–6 pm (Copper 1 & 2)
- **Welcome Reception:** 6–8:30 pm (Ballroom)
- **Movie Night:** 8:30–9 pm (Ballroom)
  - **Range Rider by Colin Arisman** (30 min)

Wednesday, February 7

- **Workshops**
  - **Burnout, Stress, & Why Science Says They Matter:** 8–10 am (Copper 4 & 5)
  - **Lead-free Ammunition in MT:** 10 am–12 pm (Copper 1 & 2)
- **Plenary Session:** 1–5 pm (Ballroom)
  - **Welcome & State of the Chapter Address** (MT Chapter President Chad Bishop)
  - **Plenary Session & Panel Discussion: "*Cultivating Respect for Nature Without Destroying What We Seek*"** (Introduction by MT Chapter Pres-Elect Katie Benzel)
  - **Panelists:**
    - **Beth Shumate** – Assistant Administrator of the Parks and Outdoor Recreation Division of Montana Fish, Wildlife & Parks
    - **Joe Alexander** – U.S. Forest Service, Director of Recreation, Minerals, Lands, Heritage, and Wilderness Programs
    - **Kerry Gunther** – Bear Management Biologist and Program Leader for the Yellowstone National Park Bear Management Office
    - **Brad Colin** – BLM Montana/Dakotas Travel and Transportation Management Program Lead, Chair of BLM's National Travel and Transportation Management Team

- **Malou Anderson-Ramirez** – Grizzly Creek Ranch and co-founder of the Tom Miner Basin Association
- **Randy Newberg** – Host of hunting TV shows, podcasts, and other digital media platforms
- **Matt Rinella** – Research Ecologist, co-host of the Hunt Quietly Podcast, and founder of the Hunt Quietly movement

- **Montana Association of Fish & Wildlife Biologists Meeting**
  5–6 pm (Copper 1 & 2)
- **Student-Professional Mixer/Trivia Night:** 6–9 pm (Ballroom)

Thursday, February 8

- **Updates from the NW Section of TWS**
  8–9 am (Copper 3) – ***All are encouraged to attend***

  - **The NW Section is seeking your feedback! *Prizes available***
    Executive Members 2023-2024
    - Kerry "K" Nicholson – President
    - Wendy Wente – Past President
    - Nate Bickford – Incoming President
    - Alix Godar – Vice President
    - Alex "Al" Lewis – Secretary/Treasurer
- **Concurrent Session A:** 9 am–12 pm and 1:30–4:40pm (Copper 1 & 2)
- **Concurrent Session B:** 9 am–12 pm and 1:30–4:40pm (Copper 4 & 5)
- **Lunch provided by MT TWS:** 12-1:30 pm (Ballroom)
- **Poster Session:** 5–6 pm (Dwell Space)
- **Awards Banquet & Silent Auction:** 6–9 pm (Ballroom)

Friday, February 9

- **Annual Business Meeting for the MT Chapter of TWS**
  7:30–9 am (Copper 3) = ***All are encouraged to attend***
- **Joint Session:** 9–11:40am (Copper 4 & 5)

CONFERENCE LOGO ARTIST

AND WINNER OF THE 2024 STUDENT ARTWORK CONTEST

Carly Segal

MONTANA STATE UNIVERSITY

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 master's 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 provided a fun challenge to distill a big topic. I think that to cultivate respect and appreciation for natural spaces and species that we all love, we must cultivate connections, through education and experiences. In order to care, we have to experience some of what we want to care about and learn some of what is known and what mysteries the natural world still has for all of us. I think however, we can experience wonder with some distance. Seeing a goat through a spotting scope, for example, still thrills me just as much as running into one while on a trail-run in the mountains. In the future I hope to work as a biologist maintaining this lens of both cultivating respect and appreciation while still aiming for non-invasive options. - Carly

PROFESSIONAL DEVELOPMENT WORKSHOPS

We have four workshops available this year. One workshop covers occupancy modelling and how to use these models to address wildlife management questions. Our second workshop explores identifying wildlife tracks and sign. Our third workshop draws on science to help us learn tools to manage stress and burnout. Finally, our fourth workshop focuses on the problem of lead poisoning and spreading awareness of lead-free options.

Now you see them, now you don't: using occupancy models for wildlife management

Instructor: Dan Walsh (USGS Montana Cooperative Wildlife Research Unit and University of Montana)
Date and Location: Tuesday, February 6, 9 am – 3 pm (Copper 4 & 5)
Cost and participant limits: $35 for professional, $15 for student; 30 participants

In this workshop, participants will learn the statistical underpinnings of occupancy models and how they can be used to answer wildlife management questions. The course will be presented from a Bayesian perspective. We will also provide a laboratory session where participants will be able to gain experience creating and making inference from occupancy models. The workshop will conclude with an open session where participants can work with their own data and be able to ask questions of the instructors.

Wildlife Tracks & Sign: A skill set for noninvasive wildlife monitoring

Instructor: Sara Lamar (Swan Valley Connections)
Date and Location: Tuesday, February 6, 9 am – 3 pm (Copper 1 & 2)
Cost and participant limits: $35 for professional, $15 for student; 25 participants

Identification of wildlife tracks and sign is a practical skill set for wildlife biologists that isn't often formally taught in wildlife biology programs. Correctly interpreting tracks and sign can not only confirm an animal's presence but also reveal behavior, habitat use, inter and intra-species interactions, and more. This workshop will cover common gait patterns, foot morphology, scat identification and common sign such as scent marking and feeding behavior. We will spend a few hours in the classroom building foundational knowledge and then apply these skills in the field for the rest of the afternoon. Snowshoes will be provided, but participants are welcome to bring their own if preferred.

Burnout, stress, and why science says they matter

Instructor: Anna Rapson (Licensed Clinical Social Worker and Licensed Marriage and Family Therapist)
Date and Location: Wednesday, February 7, 8 – 10 am (Copper 4 & 5)
Cost: FREE!! (Sponsored by the NW Section of The Wildlife Society)

Modern neuroscience reminds us that our brains are malleable and its elasticity has a longer trajectory than what was once believed. Therefore, there is no set point; we can change our brains, and the way we live our lives, whenever we choose. Evidence indicates overall health and happiness are not only impacted by external experiences, but also by our internal relationship to stress, thought and behavior patterns, and emotional and nervous system regulation.

This workshop will draw upon neuroscience and the science of mindfulness to learn practical, evidence-based tools to manage common work-life struggles with issues such as:

- Impacts of stress on the brain and the body
- Managing stress so it doesn't become chronic stress
- Expectations that may contradict with what is realistic and sustainable (self or supervisor imposed)
- Burnout – how to catch it and what to do with it
- Imposter Syndrome – how to work with self-doubt and/or comparative judgment
- Work-Life balance – how to keep work from leaking into your off-time or sleep-time!
- Dealing with a difficult or tense work environment
- How to identify and change patterns that ultimately contribute to dissatisfaction and disappointment

Lead-free Ammunition in Montana: Current Research, Outreach, and Opportunities

Instructors: Michael McTee (MPG Ranch), Hannah Leonard (Sporting Lead-Free), Vince Slabe (Conservation Science Global), Kate Stone (MPG Ranch), Robert Domenech (Raptor View Research Institute), Adam Shreading (Raptor View Research Institute), Brian Busby (Raptor View Research Institute), and Becky Kean (Montana Raptor Conservation Center)

Date and Location: Wednesday, February 7, 10 am – 12 pm (Copper 1 & 2)
Cost: $35 for professional, $15 for student

Hunters are increasingly going lead-free, whether to reduce lead exposure in wildlife, eliminate lead fragments in game meat, or gain a desired ballistic performance. Wildlife biologists and conservation professionals stand on the front lines of this topic, so it is important we understand the nuances behind this sometimes-controversial issue. In this workshop, participants will rotate through stations centered around 1) the problem of lead poisoning in wildlife, 2) the ballistics of lead-free bullets, and 3) effective messaging. This Montana-focused workshop will be a fantastic opportunity to network and help spread the awareness of lead-free ammunition across the state.

BANQUET SPEAKER

Doug Chadwick

Douglas H. Chadwick is a wildlife biologist who carried out research on mountain goat ecology and social behavior atop the Rockies for years and has assisted other scientists studying harlequin ducks, wolverines, grizzly bears, and whales. He is also a natural history journalist who has produced 15 popular books and hundreds of magazine stories. Many of his articles have been for the National Geographic Society on subjects from snow leopards high in the Himalayas to lowland rainforests and the underwater kingdoms of coral. A founding Board member of the Vital Ground Foundation, a conservation land trust (www.vitalground.org), Chadwick serves as well on the Board of the Liz Claiborne Art Ortenberg Foundation, which supports wildlife research and community-based conservation programs throughout the world (www.LCAOF.org.)

PLENARY SESSION ABSTRACT

"Cultivating Respect for Nature Without Destroying What We Seek"

I became a wildlife biologist because I wanted to work in the mountains with the purpose of conserving wildlife and habitat, managing for sustainable natural resources. The biggest surprise has been how much of my job involves dealing with people and their diverse values of nature. A part of this has been working not only with co-workers within the BLM but with various Federal and State agencies, non-governmental organizations, partnerships, and other groups on projects that make a meaningful difference on the ground and for wildlife, which is rewarding. These accomplishments are often shared far and wide, with the good intentions of giving recognition where it's due, education, and idea sharing. While that is an integral aspect of our jobs as wildlife biologists, the struggle within me arises when little known locations are advertised, big game hunting areas are revealed, and other information that draws people in from all over the world is disclosed, thanks to how quickly information is spread online.

In my personal life I have witnessed and heard about disheartening activities and aftermath that occur across the natural landscape. These include UTVs creating new two-tracks across previously undisturbed habitat, noxious weed spread, elk herds surrounded on all sides by hunters, trailheads that received little attention now packed with vehicles following a scenic post on social media with the location, apps advertising the best trails for any activity one is looking for, litter and other human sign left along trails and at camping spots, record-setting visitation at National Parks, and an ever-increasing population in Montana especially since Covid. Areas that received little human use are now being shared worldwide on social media and other platforms.

As wildlife professionals we highly value wildlife and habitat conservation and educating people about the importance of the natural world. The best way to cultivate respect for and conservation of nature is for humans to be exposed to it, spending time in the outdoors. While we want people to respect nature and have a connection to it, the more people there are on the landscape, the higher the potential for wildlife to be displaced and habitat degraded. Exposing people to the outdoors, including largely unvisited places, increases their interest in conservation-oriented activities, education, and policies. With this also comes an increase in these places being shared by word of mouth and online, quickly inundating these previously unknown locations with the associated issues of human use, to the detriment of wildlife and habitat.

The seven plenary speakers will discuss how they manage the challenges of cultivating respect for nature without destroying what we seek. The speakers have diverse backgrounds with informative perspectives, working in the outdoors across Montana. Our intent is to learn from each other and hear varying viewpoints, policies, and objectives. Also, to learn about projects and issues across the state dealing with different aspects of these challenges.

PLENARY SESSION SPEAKERS

Beth Shumate

Beth Shumate is Assistant Administrator of the Parks and Outdoor Recreation Division of Fish, Wildlife & Parks. In her current role, she helps oversee the management of 55 state parks, 350 Fishing Access Sites and visitor use management on 80+ Wildlife Management Areas, as well as 7 Outdoor Recreation Programs that provide funding and resources for all outdoor recreation and trail-related projects. Throughout her career she has gained extensive familiarity with Montana and developed a dynamic approach to building working partnerships with agencies, organizations, volunteers, and user groups. She believes that time spent outdoors provides all of us, regardless of age or ability, the opportunity to heal and care for ourselves and these precious resources through the powers of the natural world. Before her current position, Beth served as the Parks Division Administrator for 4 years and the Montana State Trails Administrator for 9 years as well as the Hell Creek State Park Manager near Jordan, MT for 3 years. Prior to her time with FWP, she was a wildland firefighter (Hotshot) based out of Arizona and fought fires throughout the Rocky Mountain West from AZ to Washington.

Joe Alexander

Joe Alexander graduated from the University of Montana with a Bachelor's Degree in Forestry and an emphasis in Range Management, in 1993. He started his career as a range management specialist on the Bitterroot NF and then on the Dakota Prairie Grasslands. Joe then transferred to the Humbolt-Toiyabe NF and worked as an Operations Team Leader.

In 2006, Joe began working as a District Ranger on the Deer River RD of the Chippewa National Forest, in Northern Minnesota. The new challenges in the Eastern Region suited him well and the Deer River Ranger District is leading the way in multiple-use management on the Chippewa. Joe then moved to Cody, WY where he was the Forest Supervisor for the Shoshone National Forest. He was Forest Supervisor there for seven years where he completed Forest Plan Revision and travel management. Joe was also very involved in the issues surrounding the Greater Yellowstone Ecosystem including grizzly bear de-listing, elk and mule deer migrations, and tourism. Joe moved back to Missoula seven years ago and is now the Director of Recreation, Minerals, Lands, Heritage, and Wilderness Programs. He is excited for the opportunity to work with communities and local governments on outdoor recreation and healthy communities.

While Joe always enjoys work in the Forest Service, his true passion in life is his wife and kids and all of the pursuits the great outdoors has to offer. Joe is also an enthusiastic outdoorsman and any day he can spend in the boat or in the field with his family and friends he feels is truly a special day!

Kerry Gunther

Kerry A. Gunther received his B.S. degree in Biology and Earth Science from Northland College and his M.S. degree in Fish and Wildlife Management from Montana State University. He began his career with the U.S. Forest Service working with black bears on the Superior National Forest in Minnesota and has also worked with Weddell seals in Antarctica. He is currently the Bear Management Biologist and program leader for the Yellowstone National Park Bear Management Office and a member of the Interagency Grizzly Bear Study Team for the Greater Yellowstone Ecosystem. He is also a member of the International Union for Conservation of Nature (IUCN), Species Survival Commissions (SSC), North American Bears Expert Team (NABET). He has worked in grizzly bear and black bear research, monitoring, and conflict management in Yellowstone for 40 years. His interests include the conservation of bears and finding practical solutions for reducing human-bear conflicts.

Brad Colin

Brad Colin is BLM's Travel and Transportation Management Program Lead for Montana and the Dakotas and currently serves as the Chair for BLM's National Travel and Transportation Management Team. He also serves as BLM's National Motorized Recreation Subject Matter Expert. Brad's previous BLM work experience includes 14 years as an Outdoor Recreation Planner in Butte, MT, as well as many years in Alaska, Utah, and California. He also worked seasonally for the U.S. Forest Service in Colorado and Wyoming. Brad has an Associate's degree in Forestry and a Bachelor of Science degree in Recreation Resources Management and a Minor in Wilderness Studies from the University of Montana – Go GRIZ!

Malou Anderson-Ramirez

Malou was raised and resides on her long-time family ranch in Tom Miner Basin, Montana, centered within the headwaters of the Greater Yellowstone Ecosystem, where the family has raised and managed livestock for nearly 70 years. The Anderson Family ranching values include adapting to and supporting natural systems, not dominating or imposing on them. Tom Miner Basin holds a thriving ranching community, as well as an abundance of all other wildlife from the Yellowstone region, including large carnivores like grizzly bears and wolves. With this abundance comes challenges in terms of coexistence, land health, community togetherness, and ranching in wild places, alongside elk and predators. To address these challenges as a community, Malou and her sister-in-law co-founded the Tom Miner Basin Association, which uses tools and techniques to reduce livestock loss and conflict as well as cultivating shared learning opportunities for community members. Malou and her husband Dre also manage Grizzly Creek Ranch and are raising their two daughters in the basin.

Randy Newberg

Host of hunting TV shows, podcasts, and other digital media platforms; including *Randy Newberg, Hunter; Fresh Tracks+; Hunt Talk Radio – Randy Newberg Unfiltered;* and *Elk Talk Podcast*, **Randy Newberg** has spent the last fourteen years hosting his popular hunting TV shows, podcasts, and other digital media platforms, all focused on self-guided public land hunting in the Western United States. Randy currently distributes video content on his YouTube channel *Randy Newberg, Hunter* and via his proprietary video platform *Fresh Tracks+* with his team of eight creative employees.

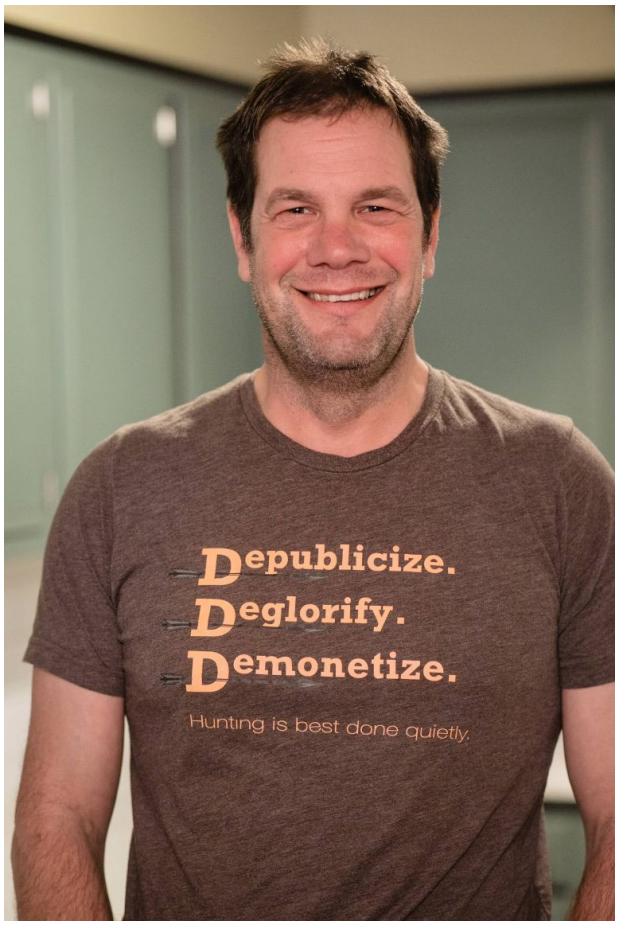
Randy's podcast, *Hunt Talk Radio – Randy Newberg Unfiltered* is a companion to his wildly (pun intended) popular web forum, HuntTalk.com. Randy is co-host of the *Elk Talk Podcast* with Corey Jacobsen, the premiere elk hunting podcast.

Wild lands and wild animals are what drives Randy in his advocacy for hunters and the public lands of America. His platforms are designed to show average hunters the remarkable public land experiences that are available for the price of a tag, the gas to get there, and the effort invested. Whether it be bugling elk or speeding pronghorn, rifle or bow, Randy will travel the far corners of the west in search of food and adventure.

Randy lives in Bozeman, Montana with his wife, Kim, where he volunteers for many national and regional conservation groups. When not hunting, Randy and Kim spend the summer traveling the high plains in search of western walleyes.

Matt Rinella

HuntQuietly.org



Matt Rinella is a research ecologist studying grasslands of the western U.S. He is a passionate hunter, co-host of the Hunt Quietly podcast, and founder of the Hunt Quietly movement. This movement is devoted to battling negative effects of hunting nonprofits, industry, and media on sportsmen, land access, and wildlife.

SCHEDULE OF ORAL PRESENTATIONS

Thursday Morning, February 8		
	CONCURRENT SESSION A: Copper 1&2 **Moderator: Mike McTee**	**CONCURRENT SESSION B: Copper 4&5** **Moderator: Justine Becker**
9:00	**A. EMMEL - Investigating Raptor Perception of Snowshoe Hare Coat Color, Camouflage, and Mismatch	**L. MAGEE - Moose Abundance and Recruitment on the Blackfeet Indian Reservation and Glacier National Park
9:20	V. SLABE - Efficacy of Non-lead Ammunition Distribution Programs to Offset Fatalities of Golden Eagles in Montana and Wyoming	**R. DINES - Long-Term Moose Population Trends and Consequences for Willow Condition in the Southern Absaroka-Beartooth Wilderness
9:40	B. BUSBY - Breeding Biology and Migration Ecology of Turkey Vultures in Western Montana	S. ANDERSEN - The Little Belt Mountains Wild Sheep Restoration Effort
10:00	**BREAK** **Moderator: Jessy Coltrane**	**BREAK** **Moderator: Brad Schmitz**
10:20	S. HILTY - Current Status of White-nose Syndrome and Bat Monitoring Efforts in Montana	S. CLEVELAND - Linking Prey Abundance to Predator Occupancy Under Variable Winter Conditions
10:40	D. BACHEN - Impact of the Presence of *Pseudogymnoascus destructans* on Activity of Montana's Bat Species	**M. VINKS - Effects of Timber Harvest and Wildfire Disturbance on Grizzly Bear Space Use in the Northern Continental Divide Ecosystem
11:00	N. HUSSEY - Swift Fox Census Survey in Northeast Montana	W. SARMENTO - Reinventing Ancient Human Practices: Efficacy of Livestock Guard Dogs at Keeping an Apex Predator Away from People
11:20	K. SZCODRONSKI - Montana's 2025 State Wildlife Action Plan Revision	**N. WOLESLAGLE - Wolf Predation on Elk Populations in Yellowstone National Park in Relation to Climate Change
11:40		A. METCALF - Montanans' Changing Attitudes Toward Wolves (2012 - 2023)
12:00 PM	**LUNCH**	**LUNCH**

**** Student Presenter**

Thursday Afternoon, February 8		
	CONCURRENT SESSION A: Copper 1&2 **Moderator: Kristina Harkins**	**CONCURRENT SESSION B: Copper 4&5** **Moderator: Shane Petch**
1:30	**H. HOLMES - Investigating Non-Invasive Survey Methods for Studying Harlequin Ducks (*Histrionicus histrionicus*) on Their Breeding Grounds in the Northern Rockies	**E. PIZZINI - The Effect of Precipitation Accumulation on Bull Elk Harvest in the Big Hole Area of Montana
1:50	**A. KURTIN - Improving Black-Billed Cuckoo Monitoring in Montana	**N. LOPEZ - A Dead Bone's Story: The Ecological, Biomechanical, and Behavioral Approach to Assess Antler Weapon Design in Montana Elk (*Cervus canadensis*)
2:10	**A. SULLIVAN - Evaluating the MOTUS Wildlife Tracking System for Monitoring Ground-Dwelling Birds	W. MOSS - Lessons from Wyoming Mule Deer Herds on the Effectiveness of Recreational Harvest in Controlling Chronic Wasting Disease
2:30	**K. STRICKFADEN - Assessing the Accuracy of Temperature Measurements from Reconyx Cameras	A. BEERS - Montana Elk Winter Habitat Distribution as a Function of Winter Severity
2:50	**BREAK** **Moderator: Ken Plourde**	**BREAK** **Moderator: Kelly Bockting**
3:20	K. HARKINS - Evaluating Community Assembly Using Species Niche Strategies Within a Multispecies Occupancy Modeling Framework	**L. DYKSTRA - Reintroducing Sharp-Tailed Grouse to Western Montana - First Year of Translocations
3:40	T. RITTER - Beavers and Their Role in Riparian Restoration in Montana	V. BOCCADORI - Greater Sage-Grouse Ecology in the Upper Big Hole Valley
4:00	J. PAYNE - Rest-rotation Grazing and Streambank Restoration after Two Growing Seasons of Rest	J. McFADDEN - Spatiotemporal Review of Montana's Sage-Grouse Habitat Mitigation Framework
4:20	E. GOMEZ - Amphibian Larva Occupancy of Inland Northwest Wetlands - Threat of Non-Native Fish	M. O'REILLY - Whose Job Is It to Engage the Watchable Wildlife Community?
4:40 PM	**ADJOURN**	**ADJOURN**

**** Student Presenter**

Friday Morning, February 9	
	JOINT SESSION: Copper 4 & 5 **Moderator: Vanna Boccadori**
9:00	N. KLUGE - Montana Furbearer Monitoring: A Cyclical Approach to Track Species Occupancy and Spatial Distribution
9:20	B. DAVIS - A Portable Structure for Identifying Individual Wolverines and Lynx Using Integrated Cameras and Hair Snags
9:40	J. CUNNINGHAM - Evaluating Citizen Science Mountain Goat Ground Counts Using GPS-Collared Goats in Southwest Montana
10:00	**BREAK** **Moderator: Elise Loggers**
10:20	S. SELLS - Predicted Grizzly Bear Habitat in the Bitterroot Ecosystem
10:40	A. METCALF - The Influence of Social Identity on Montanans' Attitudes Toward Grizzly Bears
11:00	T. GRAVES - Evaluating Density-Weighted Connectivity of Black Bears (*Ursus americanus*) in Glacier National Park with Spatial Capture-Recapture Models
11:20	N. STARLING - Black Bear Harvest Summaries and Harvest Sustainability in Southwest Montana from 2013-2023
11:40 AM	**ADJOURN**

LIST OF POSTER PRESENTATIONS

Thursday, February 8
Dwell Space **5-6 pm**
K. BAUGHAN - A Portable Structure for Identifying Individual Wolverines and Lynx Using Integrated Cameras and Hair Snags
**E. ESTEY - Human Dimensions of Wolverine (*Gulo gulo*) Perspectives and Attitudes of Backcountry Winter Recreationists
J. GARBY - Golden Eagle Migration Pathways along the Continental Divide in Alberta and Montana
**M. GOMEZ - Comparison of Beaver Dam Densities Between Drainages Open and Closed to Trapping
K. HARKINS - Evaluation of Sex and Age Identification Characteristics in Sharp-tailed Grouse
**C. HERNANDEZ – Examining Influences on Capture Probability of Migrating Raptors
M. KUHLMAN - Montana Bumble Bee Atlas Project - Engaging Community Scientists to Fill Distribution Gaps for Declining Bumble Bees in Montana
T. RITTER - Beavers and Their Role in Riparian Restoration in Montana

ABSTRACTS - ORAL AND POSTER PRESENTATIONS

Alphabetical by Presenter's Name

*Indicates Presenter
**Indicates Student Presentation

(ORAL PRESENTATION) CURRENT STATUS OF WHITE-NOSE SYNDROME AND BAT MONITORING EFFORTS IN MONTANA

Emily Almberg, Montana Fish, Wildlife & Parks, Bozeman, MT
Shannon Hilty*, Montana Fish, Wildlife & Parks, Helena, MT
Dan Bachen, Montana State Library, Montana Natural Heritage Program, Helena, MT
Matt Becker, Montana Fish, Wildlife & Parks, Bozeman, MT
Jennifer Ramsey, Montana Fish, Wildlife & Parks, Bozeman, MT
Kristina Smucker, Montana Fish, Wildlife & Parks, Helena, MT

White-nose syndrome (WNS), the disease caused by the cold-adapted fungus, *Pseudogymnoascus destructans* (Pd), has killed millions of North American bats since its detection in New York in 2006. National surveillance efforts have tracked the spread of Pd and WNS westward across North America, and in 2019, partners in Montana began collaborating on a project to assess spread and impact on Montana's bats. This effort includes annual statewide monitoring to estimate the distribution of the fungus and disease. We conducted hibernacula surveys, live animal trapping, and pooled guano and environmental sampling in the winter and spring at hibernacula, emergence sites, and maternity roosts. We first detected Pd in eastern Montana in 2020, followed by the disease, WNS, in 2021. In 2023, we surveyed 31 sites; nine sites were Pd-positive and four were confirmed/suspected positive for WNS, including two of the state's largest known hibernacula for Myotis species. To date, Pd has been detected in four species across 16 counties within Montana. WNS has been documented in three species within six of those counties. While we documented the continued spread of Pd and WNS, we have yet to detect either in the western-most portion of the state, including west of the Continental Divide. This effort, coupled with annual acoustic monitoring, as part of the North American Bat Monitoring Program to assess bat occupancy and activity, will inform decisions related to management and conservation strategies, including potential use of treatments specific to WNS or ecological approaches toward offsetting the costs of disease.

(ORAL PRESENTATION) IMPACT OF THE PRESENCE OF *PSEUDOGYMNOASCUS DESTRUCTANS* ON ACTIVITY OF MONTANA'S BAT SPECIES

Dan Bachen*, Montana Natural Heritage Program, Montana State Library, Helena, MT
Christian Stratton, Montana State University, Bozeman, MT
Kathryn M. Irvine, Northern Rocky Mountain Science Center, U.S. Geological Survey, Bozeman, MT
Emily Almberg, Montana Fish Wildlife and Parks, Bozeman, MT
Alexis McEwan, Montana Natural Heritage Program, Montana State Library, Helena, MT
Shannon Hilty, Montana Fish Wildlife and Parks, Helena, MT
Kristina Smucker, Montana Fish Wildlife and Parks, Helena, MT

In 2019 the pathogenic fungus *Pseudogymnoascus destructans* (Pd) which causes the disease White-Nose Syndrome (WNS) was first detected in Montana. In 2020 Montana began surveys following guidance from the North American Bat Monitoring Program (NABat) to determine the status and inform management of bat species within the state. This effort uses acoustic recording units to record echolocation calls of bats at up to four sites within 10 by 10 km cells. Over the past four years, partners have surveyed 1476 sites within 122 cells. Over 3 million calls have been recorded representing 13 of Montana's 15 species. Making inference about the trend of WNS impacted species using counts of recorded calls is difficult as calls may represent one or many bats. The large amount of data increases reliance on identifications suggested by the classification software but similarity between calls made by different species can reduce confidence in the suggested species. To address these challenges and minimize risk of misclassification we used a thresholding approach based on characteristic frequency to identify calls made by WNS susceptible species. These calls were then used as a response variable in a Bayesian, hierarchical, spatially misaligned regression model that included environmental and geographics factors as covariates, and allowed for estimation of the impact of fungus presence on the log-mean bat relative activity. Our results indicate that fewer calls from WNS species are recorded in areas where Pd has been detected, confirming that despite differences in overwintering ecology of bats within the West, declines are likely.

(ORAL AND POSTER PRESENTATIONS) A PORTABLE STRUCTURE FOR IDENTIFYING INDIVIDUAL WOLVERINES AND LYNX USING INTEGRATED CAMERAS AND HAIR SNAGS

Kalon Baughan, Wild Ideas, LLC, Helmville, MT
Bret Davis*, Wild Ideas, LLC, Helena, MT
Philip Ramsey, MPG Ranch LLC, Florence, MT
Kristy Pilgrim, Rocky Mountain Research Station, USFS, Missoula, MT
Scott Jackson, US Forest Service, Missoula, MT
Michael Schwartz, Rocky Mountain Research Station, US Forest Service, Missoula, MT
Mikaela Howie, Wildlife Inventory Services & Enrichment (WISE), LLC, Bozeman, MT

We tested and modified the system design of camera and hair snag (C&H) monitoring stations developed by Audrey Magoun to identify individual wolverines (Magoun et al. 2011). Our methods were applied to focal species wolverine (*Gulo gulo*) and Canada lynx (*Lynx canadensis*) individuals in western Montana. Our objectives were to (1) test and adapt the Magoun methodology to fit our study area and research goals and enhance overall data capture, (2)

evaluate the cost-effectiveness of the method while targeting the maximum number of recovered individual genotypes of focal species and limiting the number of analyzed genetic samples by integrating photographic analysis with the selection of the set of genetic samples for analysis, (3) experiment with the Magoun methodology as it could apply to Canada lynx, and (4) demonstrate the use of efficient individual identification (ID) to monitor health, behavior, and reproduction of focal species. We deployed 16 C&H stations across a 325 mi^2 study area over 4 consecutive years and successfully identified 10 wolverine individuals (8 M, 2 F) and 4 Canada lynx individuals (3 M, 1 F). Our use of photographic analysis for individual identification and sex determination of the 14 focal species individuals was 100% consistent with genetic analysis of linked hair samples. C&H stations provide a cost-effective and less invasive technique for detecting and monitoring individual rare meso-carnivores in remote, mountainous habitats.

(ORAL PRESENTATION) MONTANA ELK WINTER HABITAT DISTRIBUTION AS A FUNCTION OF WINTER SEVERITY

Aidan Beers*, Department of Ecology, Montana State University, Bozeman, MT
Kelly Proffitt, Montana Fish, Wildlife, and Parks, Bozeman, MT
Jay Rotella, Department of Ecology, Montana State University, Bozeman, MT

Understanding the quality and distribution of winter habitat is an essential component of delineating the most important wildlife habitat requirements throughout the year for large ungulates. Severe winters can be an important cause of winter mortality in elk (*Cervus canadensis),* especially in populations that are less able to access seasonal resources without large migrations. Therefore, it is critical to study how elk respond to severe winter weather and how that response impacts the distribution of suitable habitat. In order to derive a more mechanistic understanding of elk winter habitat in Montana, we used more than 36,000 elk location points from winter aerial surveys from 2010-2022 to build regional random forest models optimized for studying wildlife-habitat relationships and explicitly evaluated the effects of minimum temperatures and snow cover on elk distributions and how those elements of weather influenced their selection for land cover and terrain features. These models performed very well in predicting out-of-sample data and we used them to create new maps of elk winter habitat in Montana. We found that minimum temperature was among the most important variables driving elk distribution in each region and that both minimum temperature and snow water equivalent interacted with shrub cover density, tree cover density, and topographic heterogeneity to determine where elk were most likely to be found. We also found that in each region, the distribution of predicted habitat varied depending on the severity of recent winter weather. In combination with explicitly mapped model prediction uncertainty, the maps our models produced provide actionable information for biologists and habitat managers across the state, and could inform future habitat management actions at landscape scales. Further, our methods may be a template for researchers and managers in other states interested in developing models of ungulate winter habitat that explicitly vary with recent weather severity.

(ORAL PRESENTATION) GREATER SAGE-GROUSE ECOLOGY IN THE UPPER BIG HOLE VALLEY

Vanna Boccadori*, MT Fish, Wildlife & Parks, Butte, MT
Todd Cross, Crosswinds Ecological Consulting, LLC, VT
Jim Magee, US Fish & Wildlife Service, Dillon, MT

We used greater sage-grouse (GSG) movement data generated from GPS-marked hens 2018 – 2022 to increase our understanding of GSG ecology within the Upper Big Hole Valley (UBHV), define seasonal habitat use and characterize the UBHV population's genetic contribution to the wider GSG population in SW MT.

We used movement data to define seasons that represent biologically meaningful separations. We calculated the mean net displacement of all individuals from their point of capture over the entire calendar year to determine consolidated changepoints in net displacement, i.e. breaks between periods of relative movement consistency. Changepoints suggested the following seasons specific to the UBHV GSG population: (1) 2/13–4/13 = spring staging & migration; (2) 4/14–7/05 = breeding/nesting/early brood rearing; (3) 7/05–10/29 = late brood rearing & fall staging; (4) 10/29–11/14 = fall migration; (5) 11/14–02/12 = winter. We used these seasonal dates for subsequent analyses of habitat and landownership use.

Lastly, we examined the genetics of the GSG population in the UBHV relative to within the study area and across SW Montana. The leks in the UBHV are part of the Southwestern-North subpopulation identified by Cross et al. (2017) and the greater Central Rockies subpopulation identified by Oyler-McCance et al. (2022). Per-locus and overall genetic diversity within the UBHV population indicates genetic diversity has been maintained despite the UBHV's peripheral location relative to the overall species range and within the UBHV we found fine-scale genetic structure reflective of lek philopatry.

(ORAL PRESENTATION) BREEDING BIOLOGY AND MIGRATION ECOLOGY OF TURKEY VULTURES IN WESTERN MONTANA

Brian Busby*, Raptor View Research Institute, Missoula, MT
Adam Shreading, Raptor View Research Institute, Missoula, MT
Rob Domenech, Raptor View Research Institute, Missoula, MT

In recent decades, Turkey Vulture (*Cathartes aura*) populations have both increased and expanded northward in western North America. At our annual fall migration count site in the Bitterroot Valley of western Montana, the number of vultures seen per 100 observation hours more than tripled from an average of 174 birds in the first four years of the count (2011 to 2014) to 581 birds in the last four years (2019 to 2022). Given their recent population growth and expansion in the west, coupled with knowledge gaps in Turkey Vulture breeding biology and migration ecology, we outfitted more than 50 birds with GPS transmitters over the last five years to better understand the western subspecies of Turkey Vulture (*C. a. meridionalis*). We discuss our early findings from this project, including the timing, distance, and fidelity of migration routes and the difficulty in identifying and locating breeding individuals. We also touch on ecotoxicology and sources of mortality, including the second documented case of a Golden Eagle predating a Turkey Vulture.

(ORAL PRESENTATION) LINKING PREY ABUNDANCE TO PREDATOR OCCUPANCY UNDER VARIABLE WINTER CONDITIONS

Shawn Cleveland*, Environmental and Forest Biology, Pacific Lutheran University/SUNY ESF, Tacoma, WA/Syracuse, NY
Brian Underwood, USGS Eastern Ecological Science Center/SUNY ESF, Syracuse, NY
Andy MacDuff, New York Department of Environmental Conservation, Watertown, NY

Linking predator and prey has been a central concept in ecology since the Lotka-Volterra population models. The ability to link prey occupancy and abundance to the occupancy patterns of predators has been something that has largely eluded ecologists, but is a needed concept given the vast utility of occupancy models and joint species distribution models. We present some of the first examples of linking single visit surveys intended to estimate prey abundance (snowshoe hare) to that of repeat visit forest carnivore occupancy surveys (camera trap surveys) at different spatial scales via Bayesian hierarchical modeling and species interaction factors. Our results show strong links between snowshoe hare abundance and the occupancy patterns of fisher, coyote and bobcat. Further, we demonstrate an increase in the species present in the predator guild during below average snow conditions, which is becoming more common under climate change forecasts.

(ORAL PRESENTATION) EVALUATING CITIZEN SCIENCE MOUNTAIN GOAT GROUND COUNTS USING GPS-COLLARED GOATS IN SOUTHWEST MONTANA.

Julie Cunningham*, Montana Fish, Wildlife and Parks, Bozeman, MT
Kelly Proffitt, Montana Fish, Wildlife and Parks, Bozeman, MT

Accurate wildlife population counts ensure sustainable harvest rates. This is particularly important for mountain goats as they are challenging to count and susceptible to over-harvest. We evaluated a citizen-science ground counting method to obtain minimum counts and population estimates for mountain goats in the Bridger Mountains, southwest Montana. From 2017 through 2023, the Rocky Mountain Goat Alliance and Montana Fish, Wildlife and Parks (FWP) partnered to perform 5 ground-based surveys. Surveys occurred by strategically posting volunteers at the same day and time throughout goat habitat within the mountain range. We hosted mandatory training sessions before each survey, where volunteers were taught how to identify mountain goats by age and sex and how to accurately record required data. After the survey, FWP evaluated sightings using an algorithm considering time, location, and group size/composition to eliminate duplicates. Detection rates were evaluated during two surveys (2022 and 2023) using information gained from 14 GPS-collared mountain goats. The presence of collared animals during the surveys allowed FWP to evaluate whether observers detected the marked animals and estimate the total population. We then employed mark-resight population estimates and estimated the percentage of the total population observed. Observers saw 77% of collared goats in 2022 and 83% of collared goats in 2023. Mark-resight estimates of the total population were 121 in 2022 and 124 in 2023. Results suggest that ground counts can be a replicable and informative means to survey mountain goats.

** **(ORAL PRESENTATION) LONG-TERM MOOSE POPULATION TRENDS AND CONSEQUENCES FOR WILLOW CONDITION IN THE SOUTHERN ABSAROKA-BEARTOOTH WILDERNESS**

Rachael Dines*, Animal and Range Sciences, Montana State University, Bozeman, MT
Dan Tyers, United States Forest Service, Bozeman, MT
Bok Sowell, Animal and Range Sciences, Montana State University, Bozeman, MT
Doug Smith, National Park Service, Bozeman, MT (retired)

In the 1980s, agency managers were concerned about the status of willow in the southern Absaroka-Beartooth Wilderness (ABW). Stands appeared suppressed by ungulate browsing. In response, a 36-year effort to monitor the resident moose population and willow status was conducted. Our research summarizes these data on moose population trends and willow browsing rates and height. Our objectives are: 1) characterize moose population trends from 1985-2021, and 2) assess whether moose population fluctuations influenced willow height. We used several indices to monitor moose relative abundance from 1985-2021, including observations on a 177km trail transect each fall, and an 89km road transect multiple times monthly. We also assessed height and browsing rates on 179 marked willow plants each spring from 1988-2021 and analyzed data from a willow exclosure that was read every decade since 1961. To address the influence of abiotic variables on willow growth, we included snow telemetry (SNOTEL) data as predictors of willow height in our analysis. We found that moose relative abundance exponentially declined since 1988 (-18% annually), supporting findings from Tyers (2003) who documented a significant decrease in moose winter habitat in the ABW following the 1988 Yellowstone fires. This population decline was also correlated with reduced willow browsing. After accounting for annual precipitation, we found that willow height increased with reduced moose browsing. Our research demonstrates that the moose population decline following habitat loss in 1988 was a major contributor to willow recovery in the southern ABW, reinforcing the significance of herbivory suppression on willow.

** **(ORAL PRESENTATION) REINTRODUCING SHARP-TAILED GROUSE TO WESTERN MONTANA - FIRST YEAR OF TRANSLOCATIONS**

Laura Dykstra*, Department of Animal & Range Sciences, Montana State University, Bozeman, MT
Ty Smucker, Montana Fish, Wildlife and Parks, Helena, MT
Beau Larkin, MPG Ranch, Missoula, MT
Lance McNew, Department of Animal & Range Sciences, Montana State University, Bozeman, MT

Sharp-tailed grouse (*Tympanuchus phasianellus*) historically occupied intermountain grasslands west of the Continental Divide in Montana but were likely extirpated by the early 2000s. Montana Fish, Wildlife and Parks recently began efforts to reintroduce sharp-tailed grouse to two sites in western Montana. For prairie grouse, translocation failure rates are high, so monitoring is essential to evaluate translocation success and inform future reintroduction efforts. We monitored the dispersal movements and demography of sharp-tailed grouse captured in east-central Montana and translocated to the Blackfoot and Bitterroot Valleys in April – May 2023. We tracked 75 female grouse fitted with GPS-PTT (25 grouse), VHF (26), or Motus transmitters (24) and monitored 20 nesting attempts and 9 broods. Some PTT-tagged

females made long exploratory movements following release, traveling up to 75 km from the release site. However, many birds remained within 1–5 km of the release sites or moved to properties 11–17 km from the release sites where new leks had been established. Survival was relatively low following translocation, and 100-d post-release survival was 0.28 (95% C.I.: 0.18–0.44). Survival increased following this initial period, and 200-d post-release survival was 0.22 (0.13–0.39). The nest initiation rate was high for surviving birds (0.75 for PTT-tagged females), and nests were often located near newly established lek sites. Apparent nest survival (0.45) and brood survival (0.56) were similar to resident populations of sharp-tailed grouse. Translocations and monitoring will continue through 2026, and our results will inform ongoing sharp-tailed grouse reintroduction efforts in western Montana.

** **(ORAL PRESENTATION) INVESTIGATING RAPTOR PERCEPTION OF SNOWSHOE HARE COAT COLOR, CAMOUFLAGE, AND MISMATCH**

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Nate Bickford, Natural Sciences, Oregon Institute of Technology, Klamath Falls, OR
Scott Mills, Research & Creative Scholarship, University of Montana, Missoula, MT

Research around climate-change induced coat color mismatch in seasonally polymorphic species has largely focused on mismatched animals' capacity to adapt to new conditions and avoid associated fitness loss. While snowshoe hares (*Lepus americanus*) are known to face increased mortality during periods of mismatch, there is little understanding of which of their many predators contribute to this increased predation. Using experiments with falconry-trained goshawks (*Accipiter atricapillus*), we investigate raptor perception in relation to camouflage and mismatch using lures and model hares. In addition to testing effects of mismatch on hunting ability, we also investigate these effects in relation to movement and habitat structure. Preliminary results indicate that mismatch influences raptors' perception of stationary models, but not moving targets. Additional effects of habitat structure are also evident. Knowledge of both predator and prey perception and behavior is necessary to form a complete understanding of shifting trophic interactions under climate change.

** **(POSTER PRESENTATION) HUMAN DIMENSIONS OF WOLVERINE (GULO GULO) PERSPECTIVES AND ATTITUDES OF BACKCOUNTRY WINTER RECREATIONISTS**

Eli Estey*, Environmental Science, University of Idaho, Missoula, MT
Jan Eitel, Natural Resources and Society, University of Idaho, McCall, ID
Karla Eitel, Natural Resources and Society, University of Idaho, McCall, ID
Kenneth Wallen, Natural Resources and Society, University of Idaho, Moscow, ID

With their young being born and subsequently raised beneath the snow's surface each winter, the wolverine (*Gulo gulo*) is a species whose ecology is deeply tied to snow and its persistence on the landscape. Across the Northwest, areas of deep, long-lasting snow are not only important to the wolverine, but to the region's backcountry recreationists. Studies have shown both wolverine behavior and landscape occupancy to be impacted by motorized, and non-motorized winter recreation (i.e., backcountry skiing and snowmobiling). While in recent years more work has been done to evaluate the impact of winter recreation on wolverine ecology, very little has been done in the way of evaluating the human dimensions of this relationship. As

climate change continues to alter the winter landscapes of the Northwest and threatens to diminish and concentrate the region's winter snowpacks, it is of utmost importance that we strive not only to understand the ecological consequences of overlap between wolverines and winter recreationists, but also the attitudes of these recreationists towards wolverines and their conservation. As the North American wolverine has just been granted threatened status under the Endangered Species Act (ESA), improving our understanding of public perceptions of the species will play a vital role in species management.

(POSTER PRESENTATION) GOLDEN EAGLE MIGRATION PATHWAYS ALONG THE CONTINENTAL DIVIDE IN ALBERTA AND MONTANA

Jess Garby*, Crown of the Continent Research Learning Center, Glacier National Park, West Glacier, MT
Jami Belt, Crown of the Continent Research Learning Center, Glacier National Park, West Glacier, MT
Lisa Bate, Science and Resource Management, Glacier National Park, West Glacier, MT
Rob Domenech, Raptor View Research Institute, Missoula, MT

The number of Golden Eagles (*Aquila chrysaetos*) counted annually at fall migration sites in western North America has been declining in recent years. This decline in migration count numbers could be attributed to factors such as lead poisoning, habitat loss, declines in prey species, and climate change. Given widespread population declines, efforts to continue monitoring population trends are needed. Prior to 1987, Golden Eagle migration corridors through Glacier National Park (GNP) were unknown. In response, researchers conducted three years of fall and spring migration counts, averaging 1973 Golden Eagles in the fall. As a result, GNP established the Mount Brown raptor migration site to monitor the long-term migration trends of Golden Eagles and other migratory raptor species. The Mount Brown hawk watch site was officially established in 2018 and is situated between two other fall hawk watch sites along the Continental Divide with long term datasets: Mount Lorette and the Bridger Mountains. All three migration sites are along the primary flyway for migrating Golden Eagles; however, count numbers can vary widely among sites on similar dates. In this poster, we analyzed Golden Eagle count data among three migration sites and inferred potential eagle flyways along the Continental Divide from Alberta to Montana. We used count data during peak fall migration at each site from 2020 through 2023 to synthesize and visualize potential Golden Eagles flight paths across the flyway, examine the similarities and differences of the results, and propose further research questions.

(ORAL PRESENTATION) AMPHIBIAN LARVA OCCUPANCY OF INLAND NORTHWEST WETLANDS - THREAT OF NON-NATIVE FISH

Erim Gomez*, Wildlife Biology Program - Charismatic Minifauna Lab, University of Montana, Missoula, MT
Rodney Sayler, School of the Environment, Washington State University, Pullman, WA

Amphibians are the most endangered vertebrate taxa globally. Amphibian conservation and management strategies will benefit from understanding ecological and environmental variables that predict occupancy. We studied amphibian larvae occupancy in four ecoregions along a

gradient extending from the Northern Rockies of western Montana to central Washington's Columbia River Basin. We used classification and boosted regression trees to evaluate the performance of 32 environmental variables in ecological models predicting occupancy of over 7000 amphibian larvae of 6 of the 10 species captured in 106 wetlands. We found that classification trees and boosted regression trees used 3-5 variables to correctly predict amphibian larvae occupancy in wetlands with relatively high accuracy (i.e., 62-99% correct classifications) for Long-toed Salamander (*Ambystoma macrodactylum*), Pacific Chorus Frog (*Pseudacris regilla*), Columbia Spotted Frog (*Rana luteiventris*), Barred Tiger Salamander (*Ambystoma tigrinum mavortium*), Northern Leopard Frog (*Rana pipiens*), and American Bullfrog (*Lithobates catesbeianus*). Qualitative models were used to describe the occurrence of the Sierra Chorus Frog (*Pseudacris sierra*), Western Toad (*Anaxyrus boreas*), Great Basin Spadefoot Toad (*Spea intermontane*), and Rough-skinned Newt (*Taricha granulosa*) due to their limited detection in our study. Occupancy of amphibian species varied among the species but often included landscape variables such as proximity to grasslands, forested or woodland areas, streams, and species assemblage. Across three of the four ecoregions, native amphibian occupancy was negatively associated with the presence of non-native fish. Our results suggest that non-native fish may depress native amphibian populations in inland northwest lentic wetlands.

****(POSTER PRESENTATION) COMPARISON OF BEAVER DAM DENSITIES BETWEEN DRAINAGES OPEN AND CLOSED TO TRAPPING**

Matthew Gomez*, College of Forestry and Conservation, University of Montana, Missoula, MT
Torrey Ritter, Region 2 Nongame Wildlife Biologist, Montana Fish Wildlife, and Parks, Missoula, MT
Lisa Eby, College of Forestry and Conservation, University of Montana, Missoula, MT

Montana Fish, Wildlife and Parks has implemented beaver trapping closures in 19 drainages within 11 counties throughout the state. Since beaver trapping closures were implemented, there has not been an analysis of beaver activity in these drainages, nor has there been a comparison to drainages with similar characteristics that remained open to trapping. Using the Beaver Restoration and Assessment Tool (BRAT), we identified drainages that were comparable in the amount of suitable beaver habitat but have remained open to trapping. We included information on public versus private land ownership and level of accessibility to these drainages, variables that may affect beaver dam counts and trapping pressure. We used Google Earth to conduct beaver dam counts as a measure of beaver occupancy and influence. Initial results from 12 pairs of drainages show a majority of drainages that have been closed to trapping have more beaver dams per kilometer of suitable habitat than paired drainages that have remained open to trapping, though this trend is inconsistent across the study area. Although the scope of this study does not account for other confounding factors such as disease and land use, our preliminary results suggest trapping closures may influence the impact of beavers in stream drainages in Montana. Our results can help inform biologists on

where further study is needed and what actions could be taken to influence beaver populations. Our future plans are to find multiple open drainages for each closure for a more robust study.

(ORAL PRESENTATION) EVALUATING DENSITY-WEIGHTED CONNECTIVITY OF BLACK BEARS (*URSUS AMERICANUS*) IN GLACIER NATIONAL PARK WITH SPATIAL CAPTURE-RECAPTURE MODELS

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Sarah Carroll, Northern Rocky Mountain Science Center, Contractor to the U.S. Geological Survey, Fort Collins, CO
Greta Schmidt, Ecology, San Diego State University, San Diego, CA
John Waller, Glacier National Park, National Park Service, West Glacier, MT

Recent spatial-capture recapture (SCR) models provide a framework to formally connect inference about individual movement, connectivity, and population density, but few studies have applied this approach to empirical data to support connectivity planning. We used 924 genetic detections of 598 American black bears (*Ursus americanus*) from 2004 with SCR ecological distance models to simultaneously estimate density, landscape resistance to movement, and population connectivity in Glacier National Park northwest Montana, USA. The mean density estimate was 16.08 bears/100 km^2 (95% CI = 12.52 – 20.6) for females and 9.27 bears/100 km^2 (95% CI = 7.70 –11.14) for males. Density increased with forest cover for both sexes. For male black bears, density decreased at higher grizzly bear (*Ursus arctos*) densities. Drainages, valley bottoms, and riparian vegetation decreased landscape resistance to movement for male and female bears. For males, forest cover also decreased estimated resistance to movement, but the US2 transportation corridor bisecting the study area strongly increased resistance to movement presenting a barrier to connectivity. Density-weighed connectivity surfaces highlighted areas important for population connectivity that were distinct from areas with high potential connectivity. For black bears in Glacier and surrounding landscapes, consideration of both vegetation and valley topography could inform the placement of underpasses along the transportation corridor in areas characterized by both high population density and potential connectivity. Our study demonstrates that the SCR ecological distance model can provide biologically realistic, spatially explicit predictions to support connectivity planning across large landscapes.

(ORAL PRESENTATION) EVALUATING COMMUNITY ASSEMBLY USING SPECIES NICHE STRATEGIES WITHIN A MULTISPECIES OCCUPANCY MODELING FRAMEWORK

Kristina Harkins*, Montana Fish, Wildlife and Parks, Missoula, MT
Doug Keinath, U.S. Fish and Wildlife Service, Cheyenne, WY
Merav Ben-David, Department of Zoology and Physiology, University of Wyoming, Laramie, WY

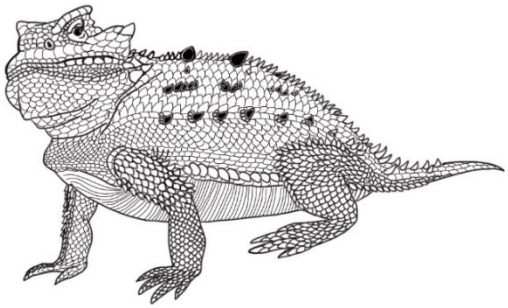
Identifying species according to the type and flexibility of their niche strategies may afford ecologists a way to predict how species are structured within their communities. Small mammal communities offer an ideal study system to test relationships between species niche strategies and bottom up (habitat) influences on assembly. Most North American small mammals belong

to a single species-rich taxonomic order (Rodentia), with a wide range of physiological and behavioral adaptations to various terrestrial environments. They often occur in multi-species communities where both interspecific competition and resource limitations may influence occupancy and abundance. The transition from the short- and mixed-grass prairie (High and Northwest Great Plains) to the sagebrush steppe (Wyoming and Great Basins) supports a gradient of abiotic and biotic conditions that facilitate the establishment of variable small mammal communities. Using multispecies occupancy models we evaluated the impact the grassland-sagebrush gradient and species niche strategies have on species richness and community assembly. Species richness is an essential measurement of biodiversity and vital towards evaluating community health with species declining globally. Using a combination of bottom up and species biological strategies within a framework that requires only presence/absence for species can be an advantageous method for monitoring ecosystem health and community persistence.

(POSTER PRESENTATION) EVALUATION OF SEX AND AGE IDENTIFICATION CHARACTERISTICS IN SHARP-TAILED GROUSE

Kristina Harkins*, Montana Fish, Wildlife and Parks, Missoula, MT
Mikel Newberg, Montana Fish, Wildlife and Parks, Helena, MT
Ty Smucker, Montana Fish, Wildlife and Parks, Helena, MT

Sharp-tailed Grouse are a popular upland game bird for sportsman and a species with a long history of population reintroductions and augmentations. Center rectrices have been used as a dominant sex identifier for Sharp-tailed Grouse with an accuracy rate of 85% to 93%. When managing small populations or reintroduction efforts for a species, error rates as small as 7% could still have significant consequences when calculating population parameters. Often sex and age characteristics are reevaluated for a species, or experts are tested on this knowledge for accuracy. Our objectives are (1) to evaluate the specific measurements or characteristics present to determine sex and age in Sharp-tailed Grouse and (2) to develop a more detailed key to aid in effective management and monitoring of Sharp-tailed Grouse populations. To evaluate these characteristics, we will test wildlife professionals at the Montana Chapter Annual Conference on sex and age of Sharp-tailed Grouse using harvested feathers and wings. Identification data from professionals will be compared against genetic results of the grouse samples. Following the comparative analysis, feather characteristics will be evaluated and an identification key will be developed and tested on a group of non-experts. Creating thorough tools towards proper sex criteria will strengthen adaptive management for Sharp-tailed Grouse in the future.



** **(POSTER PRESENTATION) EXAMINING INFLUENCES ON CAPTURE PROBABILITY OF MIGRATING RAPTORS**

Chloe Hernandez*, Raptor View Research Institute, Missoula, MT
Brian Busby, Raptor View Research Institute, Missoula, MT
Adam Shreading, Raptor View Research Institute, Missoula, MT
Rob Domenech, Raptor View Research Institute, Missoula, MT

Throughout North America, researchers operate annual fall trapping stations to assess patterns, health, and quantities of migrating diurnal raptors. In Montana, Raptor View Research Institute has been trapping diurnal raptors during fall migration along Montana's Continental Divide since 2004. While we observe over 1,000 raptors migrating each fall, we typically only capture around 150 individuals per season. Examining factors that determine our trapping success would not only provide us with a greater knowledge of these sensitive apex predators but also increase our capture yield. We investigate a variety of temporal, environmental, and species-specific variables to determine what factors influence capture probability, including time of year, weather, and the age and sex of individual raptors. We share our findings for some of our most frequently caught species, including Golden Eagles, Red-tailed Hawks, Coopers Hawks, and Sharp-shinned Hawks, and offer insight into factors that could affect capture rates at migration stations.

** **(ORAL PRESENTATION) INVESTIGATING NON-INVASIVE SURVEY METHODS FOR STUDYING HARLEQUIN DUCKS (HISTRIONICUS HISTRIONICUS) ON THEIR BREEDING GROUNDS IN THE NORTHERN ROCKIES**

Holli Holmes*, Wildlife Biology, University of Montana, Missoula, MT
Hannah Specht, Wildlife Biology, University of Montana, Missoula, MT
Joshua Millspaugh, Wildlife Biology, University of Montana, Missoula, MT
Lisa Bate, Science and Resource Management, Glacier National Park, West Glacier, MT

Long-term monitoring of Harlequin Ducks (HADU) in Montana, Idaho, and Alberta has documented population declines on their breeding grounds leading to broad concerns about population status in the Northern Rockies. Additionally, biologists have struggled to monitor the status and trends in the Northern Rockies breeding population due to their rarity and the ruggedness of their habitat. Previous methods have primarily relied on direct, in-person observations. However, results from these ground-based foot surveys are highly variable owed to factors outside the observer's control such as late spring flooding which can result in HADU nests being washed out and females leaving breeding streams earlier. This can affect detections of broods causing false negatives on potential breeding streams. Thus, there is a critical need to better understand the efficacy of existing methods and to explore other survey strategies to assess HADU population status and trends. We are comparing detection probabilities of eDNA, game camera, and ground-based foot surveys to determine their relative efficacy in detecting HADU on streams. Given that HADU breeding habitat is highly variable and complex, we are evaluating these methods as related to habitat covariates. During 2022 and 2023, we visited ten streams two times each season and tested our three methods over three days. We were able to detect HADU during the late incubation and the brood rearing season using all three methods. We will discuss field techniques and preliminary results of our efforts.

(ORAL PRESENTATION) SWIFT FOX CENSUS SURVEY IN NORTHEAST MONTANA

Nicole Hussey*, Wildlife, Montana Fish, Wildlife & Parks, Glasgow, MT

Swift foxes (*Vulpes velox*) were surveyed across an area of 11,420 km^2 on the prairies of northeast Montana from October 2022 – March 2023. The purpose of this survey was to determine changes in relative distribution, estimate population within the census area, and compare those results to previous census findings. Live trapping and remote camera methods were used to collect data in the field. Surveys were conducted in 74 townships across the census area. Township occupancy analyses were used for camera data and live trap data were analyzed using mark-recapture estimation. Live traps detected swift foxes at 36 of 45 townships, which resulted in 146 captures of 91 unique individuals. Camera traps detected swift foxes in 16 out of 29 townships, which resulted in 47 visits. Incidental canid observations during the survey period yielded 35 coyotes, 30 red foxes, and 109 swift foxes. It was not possible to identify individuals from camera traps or incidental observations, so some visits could be the same individual. Preliminary results for relative distribution show a slight western expansion within the census area. Comparing live trap results to previous census surveys we see a significantly higher catch per unit effort in 2022 than in 2014, 2005, and 2000. These results indicate a potential increase in the northeast Montana population of swift fox. Recent swift fox reintroductions bordering the census area could be a source of inflation in the population estimate. A comprehensive population survey will be conducted in Canada and Montana in upcoming years.

(ORAL PRESENTATION) MONTANA FURBEARER MONITORING: A CYCLICAL APPROACH TO TRACK SPECIES OCCUPANCY AND SPATIAL DISTRIBUTION.

Nathan Kluge*, Wildlife, Montana Fish, Wildlife and Parks, Helena, MT

The state of Montana offers a diverse array of wildlife species including a long list of furbearers. Montana Fish, Wildlife and Parks (FWP) actively monitors a number of these species on a 5-year cycle to keep track of population level changes in occupancy and overall spatial distribution. Since 2016, FWP has deployed over 604 camera stations to monitor Canada lynx (*Lynx canadensis*), fisher (*Pekania pennanti*), marten (*Martes caurina*), swift fox (*Vulpes velox*), and wolverines (*Gulo gulo*) using a nested grid design based on the species average female home range size. These ongoing efforts are a part of the WAFWA multi-species forest carnivore monitoring program conducted at a multi-state scale. We use single-species, single-season occupancy modelling while considering modelled species habitat and other spatial features to estimate over-winter (Dec 1 – April 31) occupancy and detection probabilities. The results of these projects help Montana, Idaho, Wyoming, and Washington effectively delineate and prioritize areas for future research, conservation, and management efforts in hopes for maintaining the distribution of these species across all suitable habitats.

(ORAL PRESENTATION) THE LITTLE BELT MOUNTAINS WILD SHEEP RESTORATION EFFORT

Jay Kolbe, Montana Fish, Wildlife & Parks, White Sulphur Springs, MT
Sonja Andersen*, Montana Fish, Wildlife & Parks, Lewistown, MT

Montana's Bighorn Sheep Conservation Strategy, published in 2010, calls for Montana Fish, Wildlife & Parks (MFWP) to establish "new viable and huntable populations [of bighorn sheep]." In 2020, MFWP began one of the first restoration efforts in over 20 years in the Little Belt Mountains of central Montana in partnership with numerous organizations, local landowners, the Wild Sheep Foundation, and the Montana Woolgrower's Association. In Decembers 2020 and 2021, FWP captured 49 and 33 bighorn sheep, respectively (8 rams, 74 ewes), from the Missouri River Breaks sheep herd and released them in the eastern Little Belts. All 82 sheep were fitted with GPS collars to collect locations every 13 hours, while providing mortality notifications as well as a geo-fence to help detect comingling with domestic sheep. With extensive monitoring, we documented lamb production in 2021 and 2022. During the first year, we documented 20 mortalities (15 caused by mountain lion) and between the second release and April 2022, an additional 7 ewes were killed by mountain lions—most from the second (or newer), 'naïve' cohort. In spring 2022, we documented several sheep sick with or that had died from pneumonia. Having collars on all adult animals in the population provided a unique opportunity to monitor and track the outbreak and mortalities as they occurred. Sixteen sheep succumbed to pneumonia or predation (while symptomatic) since April 2022, along with 16 other (mostly predation) mortalities. However, observations of previously sick animals suggest some may have recovered. To date, 13 collared sheep (including one ram) and at least eight uncollared sheep (lambs born in 2021, 2022, and 2023) are still alive. We will continue to monitor surviving sheep for symptoms and determine next steps in the coming year.

(POSTER PRESENTATION) MONTANA BUMBLE BEE ATLAS PROJECT - ENGAGING COMMUNITY SCIENTISTS TO FILL DISTRIBUTION GAPS FOR DECLINING BUMBLE BEES IN MONTANA

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Rich Hatfield, Xerces Society, Portland, OR
Amanda Hendrix, Region 1, U.S. Forest Service, Missoula, MT
Dean Pearson, Rocky Mountain Research Station, U.S. Forest Service, Missoula, MT

Bumble bees provide vital pollination services to native ecosystems and agricultural production, yet these important pollinators face an uncertain future. Nearly one-quarter of North American bumblebee species face some degree of extinction risk. In the U.S., two species have been added to the Endangered Species Act (ESA), and several have been petitioned for listing, with positive 90-day findings and pending Special Status Assessments (SSA). Montana is home to 4 species with pending SSAs, but existing data limit our ability to accurately assess populations or effectively manage landscapes with evidence-based conservation measures.

To address this shortfall, we will be implementing a Montana Bumble Bee Atlas in 2024. This comprehensive monitoring program will provide a baseline understanding of bumble bee populations and fill knowledge gaps in their current distribution, site occupancy, and habitat associations. The project will mirror the successful bumble bee atlas projects ongoing in 15 U.S. states, which have engaged thousands of volunteer community scientists who have conduct

standardized inventories over broad geographic areas and generated over 50,000 bumble bee observations since 2018. The robust dataset created from this project can inform pending SSAs and ESA decisions, be used to develop regional and state bumble bee conservation plans, and provide information for land management agencies in creating evidence-based habitat management and restoration strategies to improve the survival and recovery of at-risk bumble bees.

****(ORAL PRESENTATION) IMPROVING BLACK-BILLED CUCKOO MONITORING IN MONTANA**

Anna Kurtin*, Wildlife Biology, The University of Montana, Missoula, MT
Erim Gomez, Wildlife Biology, The University of Montana, Missoula, MT
Nicole Hussey, Montana Fish, Wildlife, and Parks, Glasgow, MT
Anna Noson, Wildlife Biology, The University of Montana, Missoula, MT
Megan O'Reilly, Montana Fish, Wildlife, and Parks, Billings, MT
Tessa Rhinehart, Biological Sciences, The University of Pittsburgh, Pittsburgh, PA
Brandi Skone, Montana Fish, Wildlife, and Parks, Miles City, MT
Bella Wengappuly, The University of Montana, Wildlife Biology, Missoula, MT
Andy Boyce, Smithsonian Migratory Bird Center, Missoula, MT

Understanding species distribution and ecology are critical first steps towards biodiversity conservation. While monitoring common, conspicuous species can be relatively straightforward, collecting sufficient data for rare and cryptic species presents unique challenges. Black-billed cuckoos (*Coccyzus erythropthalamus*) are an example of a regionally rare, cryptic, and data deficient species in Montana. Due to their infrequent vocalizations, preference for dense vegetation, and cryptic plumage, this species is difficult to detect using the conventional method of in-person playback surveys. Especially when applied in Montana, these surveys are resource and time intensive. In this study, we compare the conventional method with non-invasive passive acoustic monitoring paired with machine learning classification. From 2021-2023, we conducted playback surveys and deployed autonomous recording units at sites with historic cuckoo records. In 2023, we created an improved machine learning model to detect multiple call types from acoustic data. We present preliminary results of the effectiveness of each method based on cost, survey effort, and detections. This research tests an application of non-invasive monitoring methods for rare species of local conservation concern. Additionally, results will improve the efficiency of monitoring as practitioners in Montana create a long-term species monitoring and conservation plan.

**** (ORAL PRESENTATION) A DEAD BONE'S STORY: THE ECOLOGICAL, BIOMECHANICAL, AND BEHAVIORAL APPROACH TO ASSESS ANTLER WEAPON DESIGN IN MONTANA ELK (*CERVUS CANADENSIS*)**

Nicole Lopez*, Ecology and Evolution, University of Montana, Missoula, MT
Douglas Emlen, Ecology and Evolution, University of Montana, Missoula, MT

Sexually selected weapons are morphological adaptations that arose from strong intrasexual selection and are commonly male biased. Sexual weapons are found across multiple phyla taking on various designs for male-male competition. While the benefits of large weapon sizes are well understood, relatively little is known about variation in weapon shape. The most

common explanation for why weapons vary amongst species is changes in fighting styles. If animals experience major changes in habitat or if they change sufficiently in overall body size, then the ways that males encounter each other in a fight may change, resulting in new or different forces applied to the weapons. Extreme animal weapons, like elk antlers, push the boundaries of the possible. The largest males with antlers awkward and expensive help bulls win battles with rival males. The aim of my research is to use several approaches to understand what factors may influence elk antler design and male fighting behavior. I will (1) use field studies to describe intrasexual behaviors pre- and during rut to assess how males use these traits in contest and determine which portions of the antler perform as a signal or as tool; (2) 3D modeling and finite element analysis to rigorously model antler performance and relate specific components with a fighting or signaling function, (3) assess how different levels of harvest pressure across the state may influence fighting behavior and antler shapes, and lastly, (4) determine if the parasite, Toxoplasma gondii, influences male fighting behavior and antler development in Montana elk populations.

**** (ORAL PRESENTATION) MOOSE ABUNDANCE AND RECRUITMENT ON THE BLACKFEET INDIAN RESERVATION AND GLACIER NATIONAL PARK**

Landon Magee*, Wildlife Biology, University of Montana, Missoula, MT
Chad Bishop, Wildlife Biology, University of Montana, Missoula, MT
Joshua Millspaugh, Wildlife Biology/Boone and Crockett, University of Montana, Missoula, MT

Across much of their range, moose (*Alces alces*) abundance and recruitment rates have been declining, including areas in and around Montana. These concerning trends have prompted wildlife managers to implement monitoring plans to assess the status of their moose populations. However, moose are often difficult to monitor given their unique behavior and ecology. Moose are relatively shy animals that rarely aggregate and exist at low densities in densely forested regions. In addition, they have no unique markings to differentiate individuals. Given these difficulties and current trends in moose populations, we used two relatively new survey methods to estimate the abundance and calf recruitment rate of moose on the Blackfeet Indian Reservation and Glacier National Park. During the summers of 2022 and 2023, we randomly placed 100 cameras across our study area. We analyzed moose detection data from our cameras using two alternative models, Space-to-Event and Time-to-Event. The Blackfeet Tribe, in conjunction with the University of Montana and Glacier National Park, will determine the efficacy of these models to estimate moose abundance and recruitment, and assess the population's status and potential trajectory. Results obtained from this research will guide conservation strategies on the Reservation and in the Park. Suitable management strategies are crucial because the Blackfeet Tribe takes a conservative approach to moose management in the absence of baseline data. Sustainable management of moose is especially crucial as moose provide a significant source of revenue for the Blackfeet Fish and Wildlife Department through the sale of hunting permits.

(ORAL PRESENTATION) SPATIOTEMPORAL REVIEW OF MONTANA'S SAGE-GROUSE HABITAT MITIGATION FRAMEWORK

Jamie McFadden*, Sage Grouse Habitat Conservation Program, Department of Natural Resources and Conservation, Helena, MT
Therese Hartman, Sage Grouse Habitat Conservation Program, Department of Natural Resources and Conservation, Helena, MT
Logan Cain, Sage Grouse Habitat Conservation Program, Department of Natural Resources and Conservation, Helena, MT
Nate Wold, Sage Grouse Habitat Conservation Program, Department of Natural Resources and Conservation, Helena, MT

In 2015, Montana established the Sage Grouse Conservation Strategy in a range-wide effort to avoid listing of greater sage-grouse (*Centrocercus urophasianus*) under the Endangered Species Act. As part of this effort, Montana implemented a compensatory mitigation system for sage-grouse habitat in 2019. Since then, Montana has experienced an almost 6% statewide human population growth rate, likely increasing the wildland-urban interface within sage-grouse habitat. This ever-increasing complexity across the landscape poses unique challenges for the Sage Grouse Habitat Conservation Program (Program) charged with conserving sage-grouse habitat to maintain sage-grouse populations. The development and application of the Habitat Quantification Tool (HQT) provides a non-biased, science-based, and stakeholder-supported process to quantify sage-grouse functional habitat within the compensatory mitigation framework. The HQT is an integrated deterministic, state-based, geospatial model. Using biophysical sage-grouse habitat attributes, the HQT establishes a statewide baseline of existing functional habitat represented by the HQT Basemap. Over time, the HQT Basemap is updated with new data, including impacts from new projects (both development and conservation) implemented across the landscape. By reviewing changes in functional habitat estimated with various iterations of the HQT Basemap, the Program can use this assessment in conjunction with other metrics to determine whether Montana is meeting its goal of no net loss (net gain preferred) of sage-grouse habitat. Using adaptive management, the Program can assess the HQT's accuracy and revise the HQT and associated Basemap through time based on new available science and provide additional recommendations for improving the effectiveness of the sage-grouse mitigation system.

(ORAL PRESENTATION) MONTANANS' CHANGING ATTITUDES TOWARD WOLVES (2012 - 2023)

Alexander Metcalf*, Wildlife Biology Program, University of Montana Human Dimensions Lab, Missoula, MT
Max Birdsong, Department of Society & Conservation, University of Montana Human Dimensions Lab, Missoula, MT
Elizabeth Metcalf, Wildlife Biology Program, University of Montana Human Dimensions Lab, Missoula, MT
Michael Lewis, Montana Fish, Wildlife and Parks, Helena, MT
Justin Gude, Montana Fish, Wildlife and Parks, Helena, MT

Many of the fundamental objectives guiding wolf management in Montana relate to the human dimensions, including maintaining positive working relationships, increasing public acceptance

of harvest, and open and effective communication to inform decisions. To measure progress on these and other objectives, FWP and UM have partnered to conduct three large surveys of Montana residents over the past 10 years to measure people's attitudes toward wolves, their tolerance of the species, satisfaction with wolf management, and many other social variables. Here, we report results from the 2023 survey iteration (*n*=3,401; margin of error=+3.7%), including longitudinal data on how Montanans' perspectives have shifted over time and comparisons between general residents and some distinct groups including deer/elk hunters, wolf license holders, and large landowners. Results show that tolerance of wolves on the MT landscape has increased markedly for general residents, deer/elk hunters, and landowners while remaining stable for wolf hunters. In 2023, 74% of general residents were tolerant or very tolerant of wolves, up from 41% in 2012. Tolerance of wolf hunting has remained high for most groups, but dipped slightly for general residents (71% in 2012 to 58% in 2023). Wolf trapping receives less social support with only 36% of general residents finding it tolerant or very tolerant. The presentation will review these and other descriptive statistics, along with the methods used to collect, weight, and analyze these survey data, and a discussion of how social theory may explain why we're seeing these changes and what we might expect in the future.

(ORAL PRESENTATION) THE INFLUENCE OF SOCIAL IDENTITY ON MONTANANS' ATTITUDES TOWARD GRIZZLY BEARS

Alexander Metcalf*, Wildlife Biology Program, University of Montana Human Dimensions Lab, Missoula, MT
Max Birdsong, Department of Society and Conservation, University of Montana Human Dimensions Lab, Missoula, MT
Elizabeth Metcalf, Wildlife Biology Program, University of Montana, Missoula, MT
Michael Lewis, Montana Fish, Wildlife and Parks, Helena, MT
Justin Gude, Montana Fish, Wildlife and Parks, Helena, MT
Holly Nesbitt, Human Environment Systems, Boise, ID

Wildlife conservation and management depends on social support, often measured using attitudinal scales on surveys. In MT and elsewhere, human dimensions researchers have observed differences in wildlife-related attitudes between groups, such as hunters and non-hunters. Less studied is whether social identities associated with these groups might help explain how these attitudes form and why they differ. This presentation reports results from a structural equation model analyzing mail-back survey data from MT residents (*n*=1,758) to test how social identities affected the relationship between experiences with grizzly bears and attitudes toward the species. Our final model (r^2=0.51) showed the hunter identity magnified negative effects of 'vicarious' property damage (hearing of others' property damage) on attitudes toward grizzly bears (β=-0.381 ± 0.203 [95% CI], p<0.001) and species acceptance (β=-0.571 ± 0.040, p<0.001). These results demonstrate that in-group social interactions among hunters are the primary driver of hunters' attitudes toward grizzlies. Similarly, group dynamics among non-hunters may simultaneously lead non-hunters to disregard out-group members' negative experiences with these bears. Social identity is a powerful social force in myriad contexts and the patterns we observed here suggest wildlife conservation is no exception. Although polarization between hunters and non-hunters is currently low and overall attitudes

toward grizzly bears in Montana are generally positive, differential experiences between these groups may exacerbate future divisions, particularly if negative encounters with grizzlies become more frequent. We conclude our presentation with suggestions for managers and conservationists hoping to avoid identity-related polarization with respect to grizzly bears and other wildlife species.

(ORAL PRESENTATION) LESSONS FROM WYOMING MULE DEER HERDS ON THE EFFECTIVENESS OF RECREATIONAL HARVEST IN CONTROLLING CHRONIC WASTING DISEASE

Wynne Moss*, Northern Rocky Mountain Science Center, U.S. Geological Survey, Bozeman, MT
Paul Cross, Northern Rocky Mountain Science Center, U.S. Geological Survey, Bozeman, MT
Samantha E. Allen, Wyoming Game and Fish Department, Laramie, WY
Justin Binfet, Wyoming Game and Fish Department, Laramie, WY
Hank Edwards, Wyoming Game and Fish Department, Laramie, WY
Embere Hall, Wyoming Game and Fish Department, Laramie, WY
Jessica Jennings-Gaines, Wyoming Game and Fish Department, Laramie, WY

Recreational harvest is a commonly discussed and periodically used strategy for controlling chronic wasting disease (CWD) in cervid populations across the United States and Canada. Evaluating the efficacy of this strategy, however, is not straightforward, due to time lags, feedbacks, and confounding variables. For example, correlations between harvest rates and CWD prevalence may be due to the causal role of hunting on CWD or the reverse (e.g., the impact of CWD on harvest rates or quotas). We analyzed two decades of surveillance data (2000 – 2022) from 10 Wyoming mule deer herds to estimate the effects of harvest on CWD prevalence, using statistical approaches informed by causal inference theory to better control for feedbacks and confounding variables. We found that herds with consistently high harvest pressure across 20 years had significantly lower CWD prevalence. Our models predicted that harvesting 25% of adult males per year across 20 years would result in a prevalence of <10%, whereas if only 15% of males were harvested in each year, prevalence would increase to nearly 30%. Moreover, shifting the relative harvest pressure within a herd over a shorter period (e.g., three years) altered subsequent CWD prevalence, albeit to a smaller degree. Although high harvest is unlikely to completely eradicate CWD, our analysis suggests that maintaining hunting pressure on adult males is an important tactic for slowing CWD epidemics within Western mule deer herds. Our study also provides guidance for future analyses of longitudinal surveillance data, including the importance of demographic data and appropriate time lags.

(ORAL PRESENTATION) WHOSE JOB IS IT TO ENGAGE THE WATCHABLE WILDLIFE COMMUNITY?

Megan O'Reilly*, Wildlife Division, Montana Fish Wildlife and Parks, Billings, MT
Kristina Smucker, Wildlife Division, Montana Fish, Wildlife and Parks, Helena, MT

Watchable wildlife or wildlife viewing is the recreational activity of observing animals or signs of animals in their habitats. Promoting and fostering opportunities for the public to get out and enjoy wildlife viewing is key to getting people involved in wildlife conservation. The 2022 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation found an economic contribution of $395 billion to the US Economy, with wildlife watchers making up the majority

of participants and contributing 63% of the total dollars spent on wildlife-related recreation. Interest in wildlife watching has never been higher and Montana Fish, Wildlife and Parks (FWP) has seen increased public use at FWP properties. In this talk we will (1) explore ways to increase collaboration to enhance, elevate and promote wildlife viewing and appreciation of nature for the benefit of people of all abilities, and (2) showcase some examples of successful FWP watchable wildlife sites and projects around the state.

(ORAL PRESENTATION) REST-ROTATION GRAZING AND STREAMBANK RESTORATION AFTER TWO GROWING SEASONS OF REST

Jarrett Payne*, Habitat Bureau, Montana Fish, Wildlife & Parks, Dillon, MT

In the fall of 2020, the French Creek Streambank Restoration Project was completed on the Mount Haggin Wildlife Management Area (WMA). The purpose of this project was to enhance aquatic and wildlife habitat through softbank restoration techniques and reactivating floodplain connection. The project restored 2,350' of streambank with excessive lateral streambank erosion and poor riparian vegetation establishment. Baseline vegetation conditions were measured in early summer of 2020 to track vegetation response across all streambanks post restoration. Following two growing seasons of complete rest, grazing occurred in the project area during the early summer (light stocking rate; 0.09AUM/hectare). Vegetation conditions along streambanks remained in excellent stable condition following the summer grazing (stability index = 9.1/10). The three-year post-monitoring highlights successful native, riparian vegetation establishment for willows and herbaceous understory following this grazing event. In addition, introduced graminoid establishment along the streambanks remains at significantly lower densities in 2023 than pre-restoration conditions. Continued monitoring will track the effectiveness of softbank restoration techniques developed for the French Creek streambank project to increase riparian vegetation expansion and connectivity over the next two years in tandem with a rest-rotation grazing system. Overall, rest-rotation grazing appears suitable following a minimum of two growing seasons for this riparian setting.

** **(ORAL PRESENTATION) THE EFFECT OF PRECIPITATION ACCUMULATION ON BULL ELK HARVEST IN THE BIG HOLE AREA OF MONTANA**

Emily Pizzini*, Organismal Biology, Montana Technological University, Butte, MT

This study examined the relationship between bull elk harvest in southwestern Montana and precipitation during Montana's general big game hunting season. My hypothesis was that increased precipitation during November would correlate to higher bull elk harvest. I used harvest data gathered from Montana Fish, Wildlife & Parks' hunter check stations located to intercept hunters from several hunting districts surrounding the upper Big Hole Valley from Jackson to Divide, MT. I censored the harvest data to only include bull elk aged ≥2.5 years old since bulls younger than this are often still associated with cow-calf groups and not with bachelor herds. This study provides insight into the intricate relationship between weather patterns and bull elk harvest and suggests that factors beyond precipitation influence elk harvest in the Big Hole area.

(ORAL AND POSTER PRESENTATION) BEAVERS AND THEIR ROLE IN RIPARIAN RESTORATION IN MONTANA

Torrey Ritter*, Montana Fish, Wildlife and Parks, Missoula, MT
Michelle McGree, Fisheries, Montana Fish, Wildlife and Parks, Helena, MT
David Schmetterling, Fisheries, Montana Fish, Wildlife and Parks, Missoula, MT
Claire Gower, Wildlife, Montana Fish, Wildlife and Parks, Bozeman, MT
Vanna Boccadori, Wildlife, Montana Fish, Wildlife and Parks, Butte, MT

Beavers are one of the most influential species on Montana's landscapes. In the right situations and settings, their activities can greatly enhance patch-scale and landscape-scale biodiversity through the creation of complex, unique floodplain habitats. Beaver dams in headwater streams can slow the progression of snowmelt, prolonging water resources later into the year to benefit both wildlife and humans. Because of these potential benefits, reestablishing beavers in areas of their former range has become the focus of international efforts to restore degraded stream systems. In recognition of the importance of beavers on the landscape, in 2023 a team of fisheries and wildlife biologists with the Montana Department of Fish, Wildlife and Parks released a white paper on the role of beavers in riparian restoration in Montana. This document covers the five major forms of beaver restoration: 1) conflict management, 2) land management changes, 3) beaver mimicry, 4) encouraging natural colonization, and 5) transplantation. The overarching goal of this document is to outline the settings and situations where beaver restoration can be implemented to achieve the benefits of beavers while discussing the limitations or pitfalls of restoration that can limit the use of these techniques. Using the white paper as a guide, this poster and presentation will highlight each of these five forms of beaver restoration and provide examples of current and future projects related to beaver restoration in Montana.

(ORAL PRESENTATION) REINVENTING ANCIENT HUMAN PRACTICES: EFFICACY OF LIVESTOCK GUARD DOGS AT KEEPING AN APEX PREDATOR AWAY FROM PEOPLE

Wesley Sarmento*, Montana Fish, Wildlife and Parks, Conrad, MT
Julie Young, Utah State University, Logan, UT

Historic practices to reduce dangerous interactions between people, livestock, and large carnivores are returning alongside the recovery of some large carnivore populations. Emerging novel scenarios where people and carnivores interact make it important to identify nonlethal tools to reduce risk to people and facilitate coexistence. We tested an ancient practice in a novel way by placing livestock guard dogs (LGDs) at farmsteads (i.e., areas with a family home and grain bins) with chronic interactions with grizzly bears (*Ursus arctos*). Grizzly bears are attracted to spilled grains around storage bins, causing concern over human safety near homes. We found several lines of evidence supporting the use of LGDs to deter bears and protect people in areas where grizzly bears visit farmsteads. There were 58-fold fewer camera detections of bears visiting farmsteads with LGDs compared to paired neighbor farmsteads that did not receive an LGD (i.e., control sites). After LGDs were deployed, there was an 87.5% reduction in bear collar locations near farms relative to before. At sites with LGDs, uncomfortable behaviors in bears increased. LGDs did not wander uncontrollably and were primarily active at night when bears were also more likely to be near farmsteads. Farmers had a

positive experience using LGDs and would recommend them to others. Our results suggest LGDs can serve to protect specific locations and offer a new use of an old tool.

(ORAL PRESENTATION) PREDICTED GRIZZLY BEAR HABITAT IN THE BITTERROOT ECOSYSTEM

Sarah Sells*, University of Montana, USGS, Montana Cooperative Wildlife Research Unit, Missoula, MT
Cecily Costello, Montana Fish, Wildlife and Parks, Kalispell, MT

Many conservation actions must be implemented with limited data or scientific models. This is especially true when planning recovery efforts for extirpated populations, such as grizzly bears (*Ursus arctos*) within the Bitterroot Ecosystem (BE) of Idaho and Montana, where strategies for reestablishing a resident population are currently being evaluated. Here, we applied individual integrated step-selection models developed for the nearby population in the Northern Continental Divide Ecosystem to predict movement and habitat selection in the BE. We approached simulation two ways, to predict how grizzly bears might naturally recolonize the BE, and how reintroduced bears or an established population would use the BE. Recolonizing bears used the region northeast of the BE and in the northern two thirds of the BE most heavily. Reintroduced bears used the northern two thirds of the BE along with the areas west of this most heavily. In both cases, public and private lands were important to simulated bears. These results can inform conservation decision and success of grizzly bear recovery efforts.

(ORAL PRESENTATION) EFFICACY OF NON-LEAD AMMUNITION DISTRIBUTION PROGRAMS TO OFFSET FATALITIES OF GOLDEN EAGLES IN MONTANA AND WYOMING

Vincent Slabe*, Conservation Science Global, Bozeman, MT
Ross Crandall, Conservation Science Global, Bozeman, MT
Todd Katzner, U.S. Geological Survey, Boise, ID
Adam Duerr, Conservation Science Global, Cape May, NJ
Tricia Miller, Conservation Science Global, Cape May, NJ

Golden eagles face many anthropogenic risks including electrocution, collision with wind turbines and vehicles, and lead poisoning. Minimizing or offsetting eagle deaths caused by human-caused sources is often viewed as an important management objective. Despite this, there are few available and legally acceptable options to offset deaths of eagles in the USA. We implemented non-lead ammunition distribution programs in Wyoming and Montana and report preliminary results here. In an ongoing program in Montana, we distributed vouchers to offset the cost of 1 box of non-lead ammunition by $20 to 855 licensed hunters. In Wyoming, we distributed 2 boxes of non-lead ammunition to 699 hunters at no cost over the course of two hunting seasons in 2020 and 2022. For the Wyoming program, we have also evaluated the effectiveness of this program as a compensatory mitigation action to offset incidental take (i.e., fatalities) of golden eagles at wind energy facilities. The Wyoming hunters that used our non-lead ammunition harvested 296 pronghorn, 14 deer, and 33 elk. Road surveys in 2020 suggested an estimated density of 0.036 (95% CI = 0.018 – 0.058) golden eagles per km2 during the big game hunting season in our study area. Established mitigation calculations suggest that our non-lead ammunition distribution program offset the fatality of 3.84 (SE = 6.10) eagles over

the course of these two hunting seasons. We look forward to replicating these mitigation estimates for Montana. Our work illustrates the usefulness of non-lead ammunition distribution programs as an action to mitigate eagle fatalities caused by wind facilities or other anthropogenic sources.

(ORAL PRESENTATION) BLACK BEAR HARVEST SUMMARIES AND HARVEST SUSTAINABILITY IN SOUTHWEST MONTANA FROM 2013-2023

Noah Starling*, Wildlife Division, Montana Fish, Wildlife & Parks, Bozeman, MT

This report is a summary of black bear hunter harvest in Region 3 of Southwest Montana between 2013 and 2023 using FWP's mandatory report database data. In the last eleven years, a total of 2,890 bears have been harvested with a mean harvest of 263 bears each year. Hunters harvested more bears on average in spring than fall. Brown-phase bears were more commonly harvested in spring, whereas black-phase bears were more commonly harvested in fall. In the combined seasons, hunters harvested a total of 1,151 brown phase, and 1,189 black phase bears. Non-resident hunters harvested a higher percentage of bears during spring season and a lower percentage of bears in fall. Rifles were the most common weapon type used in harvest of bears at 81.6% of harvest. Archery, and handguns accounted for 16.3% and 1.5% of harvest respectfully. Teeth were collected for aging in 2018 and 2019, and 2021-2023. I evaluated if bear harvest has met sustainability metrics (female harvest ≤40%, average male age ≥=4, average female age ≥6) in the region since 2013. One hunting district was close to sustainable bear harvest thresholds and will require monitoring. Bear Management Unit 319 (Bridger Mountains) met the criteria for percent female in harvest (42.7%, 95% C.I. = 38.9% - 46.4%), the criteria for female age (average age at harvest is 7.0, 95% C.I. 6-8) and average male age (4.2, 95% C.I. = 3.7 – 4.7). Confidence Intervals overlap what is considered not sustainable and should be closely monitored.

** **(ORAL PRESENTATION) ASSESSING THE ACCURACY OF TEMPERATURE MEASUREMENTS FROM RECONYX CAMERAS**

Kaitlyn Strickfaden*, Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT
Adrienne Marshall, Hydrologic Science and Engineering, Colorado School of Mines, Golden, CO
Leona Svancara, Idaho Department of Fish and Game, Boise, ID
David Ausband, Idaho Cooperative Fish and Wildlife Research Unit, US Geological Survey, Moscow, ID
Timothy Link, Forest, Rangeland, and Fire Sciences, University of Idaho, Moscow, ID

Remote cameras provide important insight into wildlife demography, ecological processes, and behavior. Cameras often have built-in temperature sensors that output a temperature reading with every image. Which could provide valuable fine-scale temperature data. However, no camera manufacturers report on the accuracy of temperature measurements made by their cameras, making the quality of these data unknown. We sought to 1) assess the accuracy of temperature readings made by Reconyx® cameras, and 2) determine the time constant of Reconyx cameras, i.e., the amount of time a camera takes to equilibrate with air temperature. We paired two Reconyx cameras with a weather station which collected corrected air

temperature measurements in order to assess error in the field for 3 weeks. In general, camera temperatures agreed well with temperatures from the weather station, with the correlation being 0.72. Mean bias error of uncorrected temperatures was -0.41°C, so cameras tended to underestimate temperatures. However, the maximum daily temperature could be overestimated by as much as 20°C by cameras. Next, we performed a time constant experiment with a single camera in a still-air environment with no shortwave radiation. In the lab setting, the camera took between 3 and 4 hours to fully equilibrate with air temperature. Given the widespread use of cameras for natural resources applications and particularly for wildlife studies, these findings suggest that temperatures can be reliable but may become less reliable when radiation loading is high or when temperatures change rapidly in a short time.

**** (ORAL PRESENTATION) EVALUATING THE MOTUS WILDLIFE TRACKING SYSTEM FOR MONITORING GROUND-DWELLING BIRDS**

Aubrey Sullivan*, Department of Animal and Range Sciences, Montana State University, Bozeman, MT
Beau Larkin, MPG Ranch, Florence, MT
Chris Hammond, Montana Fish, Wildlife and Parks, Kalispell, MT
Kristina Smucker, Montana Fish, Wildlife and Parks, Helena, MT
Ty Smucker, Montana Fish, Wildlife and Parks, Helena, MT
Lance McNew, Department of Animal and Range Sciences, Montana State University, Bozeman, MT

The Motus Wildlife Tracking System is a collaborative research network that uses automated radio telemetry arrays to record transmitter detections remotely and distribute the data to researchers through the Motus database system. While Motus technologies have successfully been used to track the phenology and large-scale habitat use of migrating birds via Motus towers placed strategically worldwide, they have not yet been assessed for use in evaluating fine-scale space use, particularly of ground-dwelling birds. Our goal is to estimate the accuracy, precision, detection rates, and effective detection distances of Motus compatible transmitters relative to standard VHF transmitters. We completed 222 triangulations of transmitters using handheld Motus compatible and VHF radio telemetry technologies during the 2022 and 2023 field seasons. We fit a preliminary set of generalized linear (GLM) models to 180 successful triangulations. The data supported strong effects of transmitter type on all measures of transmitter performance metrics. Estimated location precision was greater for the Motus compatible technology at short distances but VHF technology was more precise at farther observer distances. Estimated locations of the Motus compatible technology were more accurate than VHF technology across all observed distances. However, the maximum observable distance of VHF transmitters was nearly twice that of the Motus compatible transmitters. Our results have important implications for monitoring of ground-dwelling birds, including the space use and habitat selection of reintroduced sharp-tailed grouse in western Montana.

(ORAL PRESENTATION) MONTANA'S 2025 STATE WILDLIFE ACTION PLAN REVISION

Kimberly Szcodronski*, Montana Fish, Wildlife and Parks, Missoula, MT
Kristina Smucker, Montana Fish, Wildlife and Parks, Helena, MT

State Wildlife Action Plans (SWAPs) play a critical role in prioritizing conservation for Species of Greatest Conservation Need for state fish and wildlife agencies. SWAPs identify aquatic and terrestrial Species of Greatest Conservation Need and their habitats, describe threats that impact those species and habitats, highlight conservation actions to address those threats, and outline a monitoring plan. SWAPs are submitted on a 10-year cycle to the U.S. Fish and Wildlife Service and are required for states to be eligible for grants through the State Wildlife Grant Program. Montana Fish, Wildlife and Parks (FWP) is currently working on the third iteration of Montana's SWAP in preparation for its release in fall of 2025. To accomplish the 2025 revision, FWP hired a SWAP coordinator, who then formed a SWAP Steering Committee to guide the revision and set up 4 internal SWAP teams (terrestrial species team, aquatic species team, habitat team, and spatial team) to help write the revision. FWP will also develop a process for soliciting feedback on plan components from external partners throughout the revision process. In this talk, we will 1) provide background information on Montana's SWAP, 2) share Montana's plan to complete the revision, 3) outline Montana's proposed major revisions for the 2025 SWAP, and 4) seek input from the audience on what revisions they would find most useful in the 2025 SWAP.

** **(ORAL PRESENTATION) EFFECTS OF TIMBER HARVEST AND WILDFIRE DISTURBANCE ON GRIZZLY BEAR SPACE USE IN THE NORTHERN CONTINENTAL DIVIDE ECOSYSTEM**

Milan A. Vinks*, Montana Fish, Wildlife, and Parks; Montana Cooperative Wildlife Research Unit, Wildlife Biology Program, University of Montana, Missoula, MT
Sarah N. Sells, Montana Cooperative Wildlife Research Unit, Wildlife Biology Program, University of Montana, Missoula, MT
Cecily M. Costello, Montana Fish, Wildlife and Parks, Kalispell, MT
Lori L. Roberts, Montana Fish, Wildlife and Parks, Kalispell, MT

Timber harvest and wildfire disturbance can have long-term effects on wildlife habitat. Studies have demonstrated both positive and negative effects of forest disturbance on grizzly bears. Balancing grizzly bear conservation and managing forest disturbances is a complex and dynamic challenge for land managers. Research on the effects of timber harvest and wildfire disturbance on grizzly bears can aid in developing strategies that balance species conservation and forest management objectives. Using GPS data from grizzly bears in Montana's Northern Continental Divide Ecosystem (NCDE), we aim to understand how grizzly bears respond to forest disturbance. We hypothesize that grizzly bears use forest disturbance but that factors such as access to foods, security, and cover influence grizzly bear space use in and around disturbance patches. Our long-term dataset (24 years) for collared grizzly bears and the NCDE's detailed records of timber harvests and wildfires provide a unique opportunity to study these effects for a range of disturbance conditions.

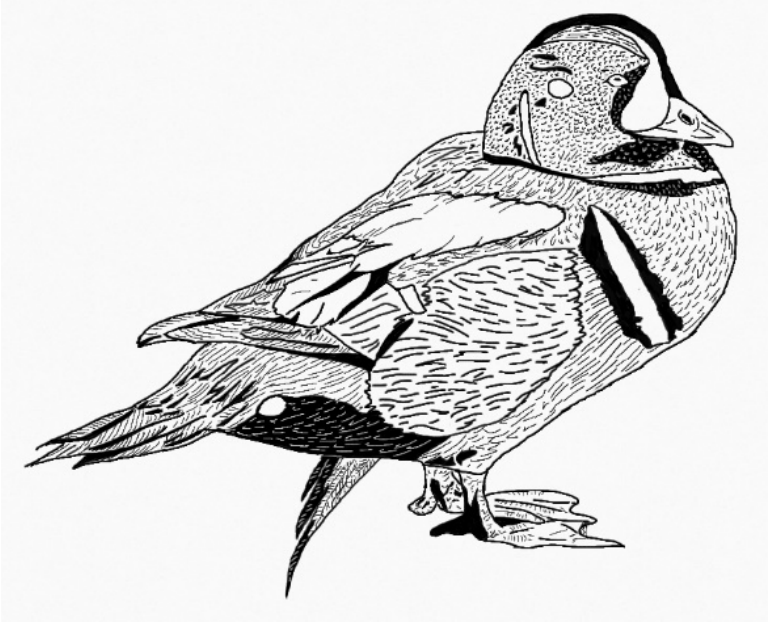
** **(ORAL PRESENTATION) WOLF PREDATION ON ELK POPULATIONS IN YELLOWSTONE NATIONAL PARK IN RELATION TO CLIMATE CHANGE**

Nathan Woleslagle*, Natural Resources, Salish Kootenai College, Pablo, MT

Climate change drove ecosystem change within Yellowstone National Park over the past five decades (Vucetich 2005). The wolf population within Yellowstone National Park grew due to warm weather patterns favoring wolf (*Canis lupus*) reproduction success rates. Elk (*Cervus canadensis nelson*) interactions with wolves became more frequent leading to increased elk mortality. As elk are a keystone species of the Yellowstone ecosystem, increased mortality led to holistic ecosystem change.

Elk calf survival rates fell 35% since the introduction of wolves to Yellowstone National Park (Christianson 2014). Cow elk mortality increased by 37% in areas of the park known to have wolf pack dens near elk herds. Researchers expected population decreases in elk herds after wolf reintroduction, however the rate of decline of the Yellowstone elk population outpaced predictions.

This research hypothesized that wolf predation on elk within Yellowstone National Park increased due to climate change causing wolf population growth. While research has addressed that wolf population growth occurred due to warming weather and elk population declines occurred due to wolf reintroduction within Yellowstone National Park, no research has addressed the relationship linking climate change to elk mortality from wolf predation.



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

To be effective and 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 2023-2024

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 (Chad Bishop, 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 (Katie Benzel, 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)

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
Andrea Litt (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.

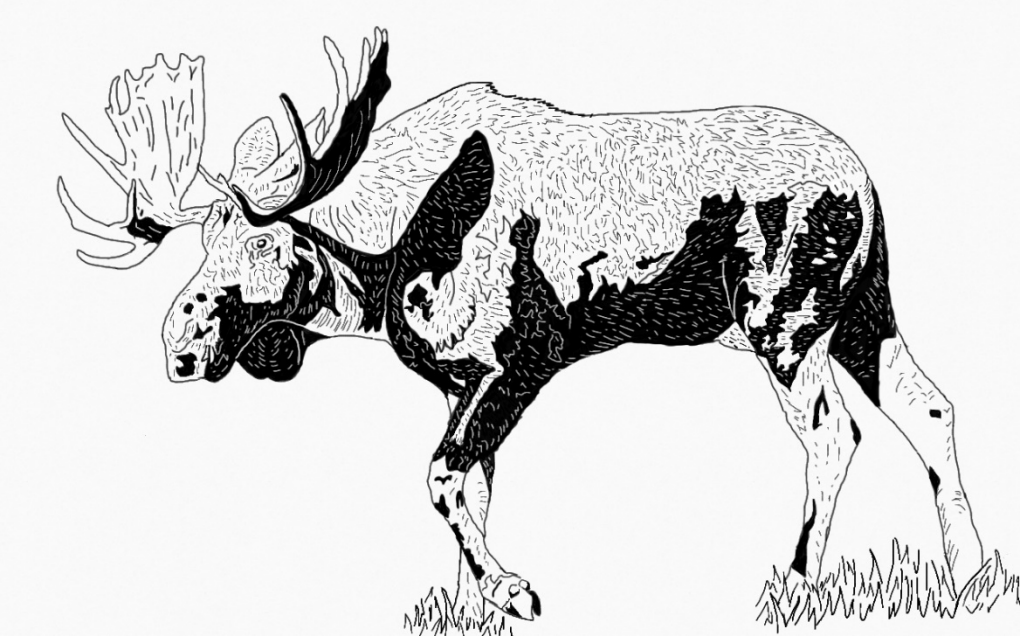
Committee Co-Chairs: Dave Willey (MSU, willey@montana.edu)
Paul Lukacs (UM, paul.lukacs@umontana.edu)

AWARDS

The Chapter annually seeks nominations for 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 may or 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: https://mttws.org/recreational-effects-on-montanas-wildlife/

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 proactively.

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

MEMBERSHIP IN THE MONTANA CHAPTER OF THE WILDLIFE SOCIETY

Membership in the Montana Chapter of The Wildlife Society is open to all individuals interested in perpetuating Montana's wildlife resources. Voting 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. We also encourage our members to join our parent organization, The Wildlife Society, and the Northwest Section of TWS.

Membership Benefits

Becoming a member of the Montana Chapter of The Wildlife Society has many benefits to 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 activities.
4. The Newsletters, containing 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 periodically with information about upcoming events as well as opportunities to get involved with our working committees.

Networking

Develop your network by attending annual meetings of the Montana chapter, NW section, and The Wildlife Society. These conferences allow you to interact with people who represent the diversity of the profession. Students can take advantage of unique opportunities to meet and learn from seasoned professionals and potentially meet future employers.

Continuing Education

Gain in-depth exposure 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 everyone!

Becoming a Montana Chapter Member

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