

The Montana Chapter of the Wildlife Society 59th Annual Conference



Pillars of success: The intersection between
research, management, and implementation

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THE MONTANA CHAPTER OF THE WILDLIFE SOCIETY
59TH ANNUAL CONFERENCE, 2021

*“Pillars of success: The intersection between research, management
and implementation”*

February 23 - 25, 2021

*MT TWS Goes Virtual
(because we are in the future)*

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ABOUT THE WILDLIFE SOCIETY AND THE MONTANA CHAPTER

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

The principle objectives of The Wildlife Society are:

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

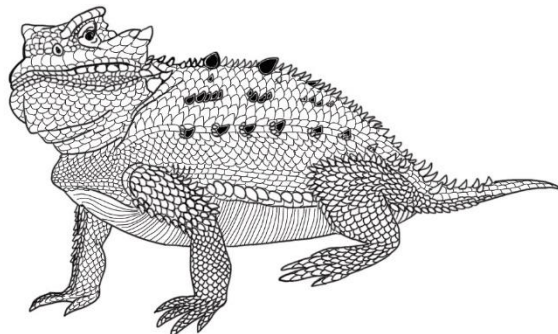
The Montana Chapter of The Wildlife Society was chartered in 1962 and formally organized with the election of its first officers in 1963. Adoption of chapter bylaws occurred in 1964. The mission of the Montana Chapter of The Wildlife Society is to encourage and support effective wildlife management in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

Core Values of the Montana Wildlife Society include:

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

Our chapter is only as strong as our members and participation. We have numerous committees that need active participation from members. We encourage member nominations to fill our elected positions, and presentations from both researchers and managers are always needed to continue communication between agencies and 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.



2020 - 2021 MONTANA TWS CHAPTER OFFICERS

President: Brett Dorak (Montana Fish, Wildlife & Parks)

Past-President: Liz Bradley (Montana Fish, Wildlife & Parks)

President-Elect: Andrew Jakes (National Wildlife Federation)

Secretary: Rebecca Mowry (Montana Fish, Wildlife & Parks)

Treasurer: Lorelle Berkeley (Montana Fish, Wildlife & Parks)

Montana State University Student Chapter President: Katie McCahan

University of Montana Student Chapter President: Wyatt Nielsen

2020 - 2021 MONTANA TWS COMMITTEE CHAIRS

Programs: Andrew Jakes

Awards: Megan O'Reilly

Education/Information: Brent Lonner

Financial Management: Lorelle Berkeley

Membership: Lorelle Berkeley

Nominating and Elections: Brett Dorak

Conservation Affairs: Steve Gniadek, MT TWS Past President

Scholarships: David Willey – 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

2021

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

WELCOME TO THE 59TH ANNUAL CONFERENCE OF THE MONTANA CHAPTER OF THE WILDLIFE SOCIETY

“Pillars of success: The intersection between research, management and implementation”

Greetings everyone and welcome to the 59th Annual MT TWS Conference!

Although this is the 59th Annual MT TWS Conference, it is our first (and hopefully, only) virtual conference. As I sit at my home office and reflect on this past year, the 58th Annual Conference seems like 29 years ago! So much has changed and yet in some aspects, time is standing still. As all of us have navigated the past year, I can't help but to think about the dedication and determination of so many, including wildlife professionals. The fact that folks are flexible and open to this new approach and that we can still provide almost all the same pieces of past conferences makes me proud in our profession's commitment (and IT savviness 😊). It has been an honor and privilege to serve as your president-elect over the past year and work with the Executive Board to put together our annual conference. This is the one time of year where many of us get to be together and celebrate another year's worth of research, knowledge gained while managing habitat and wildlife in the field, work on restoration and stewardship projects, and discuss any trials and tribulations that we have overcome while conserving Montana's resources. I hope that this virtual conference provides you with the platform needed to expand on your knowledge and that you walk away from here with some additional tools or ideas on how to improve on wildlife conservation in your respective location in Montana and beyond.

Pillars of success: The intersection between research, management and implementation

The theme this year realizes that Montana is a vast landscape with various social, economic, cultural and conservation needs. To sustain our goals of sound wildlife management based on a foundation of science, it is clear that working cooperatively provides the greatest chance towards successful on-the-ground projects. How agency, academic, non-profit, landowner and tribal entities interact to find balanced solutions is integral in realizing our commitment to wildlife and the habitats where they exist. This is exceedingly true within the matrix of private, public and tribal land ownerships. To advance our ultimate goal to conserve and manage for robust wildlife populations and sustain well-functioning habitats, we must strive to engage with multiple stakeholders at various spatial scales and find the common links that bind us.

Plenary Session

This year's plenary session on wildlife-transportation issues is a case example of working towards success through a cooperative approach - bringing together research, management and implementation components. We have six panelists, coming from different perspectives, but working towards a shared vision of mitigating our roads and highways to keep humans safe while allowing for continued movement of wildlife. Our panelists will share their experiences, successes and failures, and what they have learned and look to expand on in the future. The panelists will share their expertise and experience on wildlife-transportation issues and come from state agencies (MT FWP and MDOT), NGO, academic, tribal and private landowner perspectives.

Workshops

There are five workshops offered this year and we hope that you take full advantage of viewing them, especially as they will all be live sessions. The first looks at the history of the Boone & Crockett Club and the scoring techniques established, where presenters will go through examples to score various animals. The second will provide an introduction to sampling for Chronic Wasting Disease. The third offers effective advocacy and lobbying approaches for wildlife. The fourth is a wellness workshop – to help take the edge off our busy schedules. The final workshop presents an overview of climate adaptation and how these relate to fish and wildlife management.

Posters and Presentations

We are once again honored to have so many papers being presented during our conference.

Banquet

Our keynote speaker for this year's banquet is Mike Forsberg who is an award-winning photographer and currently serves on faculty at the University of Nebraska. His images and stories have been featured in national publications and documentary films, and he's the author of two books. The title of his talk is *Finding Home in Flyover Country, a Photographer's Journey*.

Acknowledgements

The MT TWS conference is not something that comes together overnight. It takes an entire year of dedication from the Executive Board, members, volunteers, sponsors, and everyone else involved to work diligently to produce such a great event, especially as we are putting on our first virtual conference! Throughout the past year there have been numerous people who have come forward to help in many facets. I will do my best to mention and thank everyone, but I do realize that there is a chance I may miss some individuals. So, to everyone, I want to say THANK YOU and know that your time, energy, and dedication to the MT Chapter and the conference is greatly appreciated.

First, to the state and national members of The Wildlife Society, I thank you for being a part of such a great organization and helping promote the organization's mission "To inspire, empower, and enable wildlife professionals to sustain wildlife populations and habitats through science-based management and conservation."

To the Executive Board: Liz Bradley, Brett Dorak, Lorelle Berkeley, and Rebecca Mowry – it has been a great time working with you all and the hard work and dedication you have shown have been second to none.

To the Next Great Event staff: Kerrell Dunsmore and Tricia Fry – without your assistance and commitment, we would not have been unable to pull this virtual conference off!

To all the attendees that have submitted abstracts to share your research and experiences through presentations and posters, thank you. It is through the sharing of these findings that makes the conference one to remember every year.

To the plenary session presenters: Marcel Huijser, Deb Wambach, Randy Arnold, Whisper Camel-Means, Liz Fairbanks and Bart Morris - I cannot thank you enough for taking a break from your busy schedules to present at the conference and share your perspectives for the common good.

To the keynote speaker, Mike Forsberg, for finding time in your ultra-busy schedule and provide us Montanans with some amazing images and wonderful food for thought.

Thanks to Josh Millspaugh, Jim Williams, John Thornburg, Nick Gevock, Amy Seaman, Michelle Doerr and, Alisa Wade who were responsible for putting on the incredible workshops that were offered this year. Providing the information you did in the five workshops helped increase the knowledge and ability of the wildlife professionals who attended, and will no doubt have a positive impact on future management.

To all the chairs, members, and volunteers in the different committees and working groups – thanks for the dedication to the conference and all the work associated with such incredible commitments. Special recognition to Dan Bachen, Allison Begley and Laura Strong.

To all the volunteers that helped throughout the conference by moderating, judging, filling in at the registration table and helping with any of the million random tasks that came up, thank you! I know I may miss some individuals here, but I will try my best and want to thank Kristina Smucker, Renee Lemon, Marco Restani, Dan Bachen (again), Torrey Ritter, Will Rogers, Lauri Hanauska-Brown, Keifer Titus, Savannah Grace, Simon Buzzard, Claire Gower, Megan O'Reilly, Kelvin Johnson and anyone else who filled in where needed.

To Shea Coons – for designing the perfect image to represent this year's theme, thank you

One last major THANK YOU to everyone for participating, and it is my honor to welcome you to the 59th Annual Conference of the Montana Chapter of The Wildlife Society!

Andrew Jakes

2020-2021 MTTWS President-Elect



In memory of our dear friend and colleague:

Stacy A. Courville

December 13, 1967 – February 18, 2021



2021 NOMINEES FOR EXECUTIVE BOARD OFFICERS

PRESIDENT-ELECT CANDIDATES



Andrea Litt

Andrea Litt is an associate professor in the Department of Ecology at Montana State University, where she has worked since 2011. Andrea is originally from southeastern Wisconsin and received her B.S. from the University of Wisconsin - Madison (1995) and M.S. from the University of Florida (1999). She worked for The Nature Conservancy before earning a Ph.D. at the University of Arizona (2007). Andrea also earned a minor in Statistics. She was a faculty member with the Caesar Kleberg Wildlife Research Institute at Texas A&M University - Kingsville before joining MSU. Andrea and her students work to understand how animal communities and populations are influenced by various human activities, including invasive plants, altered disturbance regimes, and changes in land use. She has worked on a variety of taxa - arthropods, herpetofauna, mammals, birds - selecting the taxonomic group that will best help to answer the question of interest. Through her work, she strives to collect information that can be used to develop practical solutions to ecological problems and help guide policy and management. Andrea really enjoys working with students and watching them as they develop into colleagues.





Tammy Fletcher

Tammy Fletcher works for the US Forest Service as the Northern Region Wildlife Program Leader based out of the regional office in Missoula. She started her federal career with the BLM while working on her M.S. in Wildlife Science from New Mexico State University. She worked 13 years with the BLM in SE Utah. While in Utah, Tammy was president of the Utah Chapter of The Wildlife Society in 2008-2009 and in 2010 she was the chair of the coordinating committee for The Wildlife Society annual conference in Snowbird, Utah. In 2010 she transitioned to the U.S Forest Service as a Forest Wildlife Biologist in eastern Idaho for 5 years before moving to Missoula for her current position in 2015. In her free time, she enjoys traveling all over the world to scuba dive. While home, she enjoys hiking, mountain biking and kayaking with her dogs in the mountains and riding her motorcycle along scenic byways and highways.



TREASURER CANDIDATES



Jason Hanlon

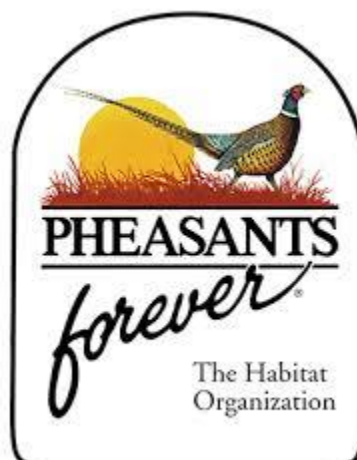
Jason Hanlon is the Northern Great Plains Land Steward for the Nature Conservancy. Originally from Albuquerque, NM, after high school Jason Hanlon moved to Boston, Massachusetts where he completed a five-year electrical apprenticeship. He worked for ten years as an electrician with the International Brotherhood of Electrical Workers. Not completely satisfied with his first career choice, he moved around a bit before coming to Montana to attend the University of Montana, earning a degree in wildlife biology. While attending UM, Jason worked seasonally for TNC at the Matador Ranch in eastern Montana. After working seasonally for a few years TNC brought him on as a full-time team member in 2017. Working for TNC, Jason has contributed to numerous research and monitoring projects, ranch operations, stewardship efforts, and is currently a certified drone pilot flying drones for TNC. Headquartered at the Matador, he enjoys being outdoors and taking in all that the grasslands offer.





Heather Brower

Heather Brower has been a Farm Bill Wildlife Biologist with Pheasants Forever in Scobey Montana since December 2017. Originally from Eastern Washington, she earned her B.S. in Natural Resource Science emphasizing Wildlife Ecology and a minor in Forestry from Washington State University (2015). After graduating she worked as a wildlife technician for 3 years working with Greater Sage-Grouse in Roundup MT, Whitetail deer in South TX, and Eastern Wild Turkeys in Northern Missouri. Now she works out of the Natural Resource Conservation Service (NRCS) office to find ways to improve wildlife habitat while helping keep farmers and ranchers profitable and on the land. When not in the office, Heather enjoys bird hunting with her Brittney Spaniel and long-distance trail riding.



GENERAL CONFERENCE SCHEDULE

All Times MST	Tuesday, Feb 23			Wednesday, Feb 24		Thursday, Feb 25			
9:00	Poster and Oral Presenatations Available On-Demand	Bat Working Group		Poster and Oral Presenatations Available On-Demand	Welcome and Plenary: Pillars of success: The intersection between research, management and implementation – a wildlife-transportation case study	Poster and Oral Presenatations Available On-Demand	Workshop: Self-Care and Compassion During Epic Adaptive Challenge		
9:30									
10:00									
10:30									
11:00		Montana Bird Conservation Partnership Working Group					Birds and Bats Live Panel Q&A		MT TWS Business Meeting
11:30									
12:00									
12:30									
13:00		Workshop: A Storied History of Measurable Conservation and Measured Big Game	Common Loon Working Group				Workshop: Effective Advocacy for Conservation: Communication and Lobbying for Wildlife	Human Dimensions and Posters Live Panel	
13:30									
14:00									
14:30									
15:00			Workshop: Chronic Wasting Disease Sampling				Live Panel Q&A Mammals, Herps and Landscapes	Techniques and Analysis Live Panel Q&A	Workshop: Climate Adaptation: An Overview for Fish and Wildlife Manager
15:30									
16:00									
16:30									
16:30							Award Ceremony (concludes at 5:15)	MT TWS Board Wrap Up	
17:00							Happy Hour - Student Mixer with career topics (open at 5:15)		
17:30									
18:00									
18:30									
19:00				Quiz Bowl					

2021 CONFERENCE DAILY SCHEDULE

Tuesday, February 23

- **Pre-recorded Montana TWS Conference Presentations Available On-Demand (X-CD Main Platform)**
- **Working Group Meetings**
 - **Bat Working Group (Zoom):** 9:00am – 11:00am
 - **Montana Bird Conservation Partnership Working Group (Zoom):** 11:00am – 1:00pm
 - **Common Loon Working Group (Zoom):** 1:00pm – 3:00pm
- **Workshops**
 - **Boone and Crockett History and Scoring Workshop (Zoom):** 1:00pm – 3:00pm
 - **Chronic Wasting Disease Sampling (Zoom):** 3:00pm – 5:00pm

Wednesday, February 24

- **Pre-recorded Montana TWS Conference Presentations Available On-Demand (X-CD Main Platform)**
- **Welcome & Plenary Session (X-CD Live Channel):** 9:00am – 11:30am
 - **Welcome & State of the Chapter Address** (MT Chapter President Brett Dorak)
 - **Plenary Session & Panel Discussion: “*Pillars of success: The intersection between research, management and implementation: A wildlife-transportation case study*”** (Introduction by MT Chapter President-Elect Andrew Jakes)
 - **Panelists:**
 - Marcel Huijser – Western Transportation Institute (Research Ecologist)
 - Deb Wambach – Montana Department of Transportation (District Biologist)
 - Randy Arnold – Montana Fish, Wildlife and Parks (Region 2 Supervisor)
 - Whisper Camel-Means – Confederated Salish and Kootenai Tribes (Wildlife Biologist)
 - Liz Fairbank – Center for Large Landscape Conservation (Corridors and Crossings Program Officer)
 - Bart Morris – Oxbow Cattle Company (Owner)
- **Live Panel Question and Answer for Presentation Sessions**
 - **Birds (Session Breakout Room 1):** 12:00pm – 12:30pm
 - **Bats (Session Breakout Room 2):** 12:00pm – 12:30pm
 - **Mammals (Session Breakout Room 1):** 3:00pm – 3:30pm
 - **Herps and Landscapes (Session Breakout Room 2):** 3:00pm – 3:30pm
- **Workshop**
 - **Effective Advocacy for Conservation: Communication and Lobbying for Wildlife (Zoom):** 1:00pm – 3:00pm

- **MT FWP Biologist Union Meeting (Networking Lounge):** 3:30pm – 4:30pm
- **Banquet and Awards (Zoom)!!!**
 - **Banquet Speaker, Mike Forsberg (Conservation Photographer):** 4:00pm – 4:30pm
 - **Awards:** 4:30pm – 5:15pm
- **Happy Hour/Student Mixer (Networking Lounges):** 5:15pm – 6:30pm
 - **State Agency Professionals (Chat Room 1)**
 - **Federal Agency Professionals (Chat Room 2)**
 - **Non-Government Organizations Professionals (Chat Room 3)**
 - **Academic Professionals (Chat Room 4)**
 - **Tribal Professionals (Chat Room 5)**
- **Quiz Bowl:** 6:30pm – 7:30pm

Thursday, February 25

- **Pre-recorded Montana TWS Conference Presentations Available On-Demand (X-CD Main Platform)**
- **Workshops**
 - **Self-Care and Compassion During Epic Adaptive Challenge (Zoom):** 9:00am – 11:00am
 - **Climate Adaptation: An Overview for Fish and Wildlife Manager (Zoom):** 2:00pm – 4:00pm
- **MT TWS Business Meeting (Zoom):** 11:00am – 1:30pm
- **Live Panel Question and Answer for Presentation Session**
 - **Movement Ecology (Session Breakout Room 1):** 12:00pm – 12:30pm
 - **Human Dimensions (Session Breakout Room 1):** 1:30pm – 2:00pm
 - **Poster Session (Session Breakout Room 2):** 1:30pm – 2:00pm
 - **Techniques and Analysis (Session Breakout Room 1):** 3:00pm – 3:30pm
- **MT TWS Board Wrap Up!!!! (Zoom):** 4:30pm – 5:00pm

Thanks, and safe travels!!!...oh wait...well safe travels from your chair to your sofa!

CONFERENCE LOGO ARTIST

AND WINNER OF THE 2021 STUDENT ARTWORK CONTEST



Shea Coons



Shea grew up in Montana, where the wealth of outdoor opportunities and resulting exposure to wildlife inspired her artwork and current trajectory toward a career in wildlife biology. She left Montana to attend college at Colorado State University and subsequently hopped around the West working as a wildlife technician. She is currently a master's student in the Wildlife Biology Program at the University of Montana studying white-faced ibis and wetlands. She continues to paint and draw in her free time and hopes that her art sparks a connection between the audience and the wildlife that the art portrays.

About the cover

"Using research to synthesize new information, inform management strategies, and implement conservation actions is integral to conservation success. This piece highlights the mosaic of species and systems that benefit from this holistic approach." -Shea

PROFESSIONAL DEVELOPMENT WORKSHOPS

Boone and Crockett History and Scoring Workshop

Instructors: Dr. Josh Millspaugh (B&C Chair at the University of Montana) and Jim Williams (Official B&C scorer)

Date and Location: Tuesday, February 23, 1:00pm – 3:00pm (Zoom)

Cost and participant limits: Free, NA

The Boone and Crockett Club has a long and storied history in wildlife conservation, policy, and education. In addition to discussing this rich history, we will share current activities and how the Club continues to serve an important role in affecting modern conservation. Additionally, we will describe the role of the Club's University Programs, research activities, and the Theodore Roosevelt Memorial Ranch in meeting the Club's mission. This presentation will be followed by a big game measuring techniques demonstration and then Josh and Jim will be available for questions.

Chronic Wasting Disease Sampling

Instructor: John Thornburg (Montana FWP)

Date and Location: Tuesday, February 23, 3:00pm – 5:00pm (Zoom)

Cost and participant limits: Free, NA

Montana Fish, Wildlife & Parks' Chronic Wasting Disease (CWD) Surveillance Program has sampled 18,886 cervids statewide and found 434 CWD suspect/positive animals since renewed testing began in 2017. Where CWD is present, prevalence at the hunting district level ranges from less than one percent to twenty-five percent among deer. Hotspots with prevalence above five percent exist in the Sheridan/Twin Bridges area, Libby area, South Central Montana, and along the Hi-line.

In 2020, FWP transitioned to a new ArcGIS online (AGOL) based data management system in an effort to streamline the data entry and result reporting process for field personnel and the public. FWP will continue to employ this system during the 2021 CWD surveillance season.

The primary focus of this workshop is to show procedures for collecting a CWD sample and how to enter sample data into the new AGOL database in preparation for the 2021 sampling season. We will start with a presentation on CWD background and a synopsis of the 2020 CWD sampling season. We will then demonstrate how to properly collect and package a CWD sample, how to download and create a sample submission spreadsheet, and the proper way to package and ship CWD samples to the Montana Veterinary Diagnostic Lab. Lastly, we will review how FWP uploads the sample submission spreadsheet into the AGOL database and how to find the results of submitted samples.

Legislative Workshop

Instructors: Amy Seaman (Montana Audubon), Nick Gevock (Montana Wildlife Federation)

Date and Location: Wednesday, February 24, 1:00pm – 3:00pm (Zoom)

Cost and participant limits: Free, NA

Please join Nick Gevock, Conservation Director for the Montana Wildlife Federation, and Amy Seaman, Director of Policy & Science for Montana Audubon, for a workshop geared towards finding your voice when it comes to talking policy and conservation. Learn about communication tools, including testifying on zoom during the "remote session", communications strategies, and avenues available for reaching others with your message. Whether communicating with professionals, peers, legislators, or the public, being thoughtful is essential to spreading your message, but speaking up is the first step. Let us help you get started!

Self-Care and Compassion During Epic Adaptive Challenge

Instructors: Michelle Doerr (Anavah Consulting)

Date and Location: Thursday, February 25, 9:00am – 11:00am (Zoom)

Cost and participant limits: \$30, NA

We are experiencing a stressor (COVID19) that is unlike most others we have experienced before with an unknown future ending. Our brains and bodies are feeling a legitimate threat that must be processed. For ourselves and our teams to overcome this challenge, we need our conservation leaders to be at their best. Self-care is more important than ever. In this workshop, we will discuss the importance of self-care and our daily needs to process the current stressor. We will explore the range of emotions affecting us and our teams. Compassion and encouragement will be used as the focus to help us move to action. Expect this space to be safe to share your experience and acknowledge our fears in dealing with COVID19. You will walk away with tools to use for yourself and your team in navigating the near future with everyone's health and wellbeing in mind.

Climate Adaptability

Instructor: Alisa Wade (North Central Climate Adaptation Science Center)

Date and Location: Thursday, February 25, 2:00pm – 4:00pm (Zoom)

Cost and participant limits: Free, NA

Wildlife and wildland managers are challenged to support species and their habitats under changing climatic conditions. In Montana, temperatures are rising, winters have gotten drier, flash droughts are now a thing, and fires have increased in number and acres across the state. These changes are projected to continue for the foreseeable future. In this two-hour workshop, we'll take a whirlwind tour of climate trends and projections for Montana, plausible impacts to wildlife and ecosystems, and approaches natural resource managers can take now to consider, plan for, and adapt to coming changes.

BANQUET SPEAKER

Michael Forsberg



MICHAEL FORSBERG
photography 

Michael Forsberg is a Nebraska native whose 25-year career as a photographer has been dedicated to wildlife and conservation stories in North America's Great Plains. His images and stories have been featured in national publications and documentary films, and he's the author of two books, *On Ancient Wings- The Sandhill Cranes of North*

America, and *Great Plains – America's Lingering Wild*. In 2011, Mike co-founded Platte Basin Timelapse (PBT), an ongoing documentary project using time-lapse photography and multimedia storytelling to help build community around a watershed. In 2017, Mike received the Ansel Adams Award for Conservation Photography from the Sierra Club, and his image of sandhill cranes was selected as a Forever stamp to celebrate Nebraska's 150-year anniversary of statehood. Mike currently serves on faculty at the University of Nebraska and is a senior Fellow with the International League of Conservation Photographers. He lives in Lincoln with his family and two unruly dogs.

****Mike has been in southeast Texas over the past two weeks working on wildlife issues. Due to the recent disaster that Texas has experienced, Mike has been displaced and may not be able to attend. As a backup, several short films may be shown at this time.**

PLENARY SESSION

Pillars of Success – the intersection between research, management and implementation: A Wildlife-Transportation Case Study

Wildlife – transportation concerns have been a long-standing issue for human safety and property, as well as movement and mortality of wildlife. More recently, Montana held a ‘Wildlife-transportation Summit’ in December 2018 to discuss the complex challenges in mitigating both these issues. Stakeholder engagement was high, with participation from multiple state and federal agencies, tribes, NGO’s, universities and private landowners. Conservation and management efforts stemming from the 2018 Summit continue with shared agreements in place between state and NGO partners. These and localized efforts indicate that a holistic approach from partners with multi-discipline backgrounds, and that are built on trust, are required to make tangible and lasting impacts on the ground. This approach is also required to help build capacity and support to ensure funding is used in the most judicious and effective manner across the matrix of private and public landownership. Today, we will discuss the complexities, opportunities and challenges when planning wildlife-transportation mitigation across Montana. Our panelists have a well-versed background and hands-on experience in the subject and share their perspectives as to why this issue is important to Montanans, how to plan for projects at multiple spatiotemporal scales and, how the conservation and management community may fit the pieces together to accomplish durable mitigation efforts. The reality is that there is no specific ‘formula’ that can be standardized and followed across Montana and beyond. However, there seems to be fundamental components that can proactively be identified so as opportunities arise, a prepared project development and implementation strategy can be applied.

PLENARY SESSION SPEAKERS



Marcel Huijser



Marcel is a research ecologist with 28 years of experience. Specializing in road ecology since 1995, he has conducted research in Europe, North America, South America and Asia. His focus is on the ecological impacts of transportation infrastructure as well as mitigation measures aimed at reducing these impacts. Most of his research relates to reducing large mammal-vehicle collisions, providing safe crossing opportunities for wildlife, and cost-benefit analyses regarding the implementation of mitigation measures. While he is originally from The Netherlands, he has been in Montana since 2002 where he works for the Western Transportation Institute at Montana State University.



Deb Wambach



Deb has worked as a District Biologist with the Montana Department of Transportation for over 20 years. She is responsible for analyzing, minimizing, and mitigating the impacts of highway projects on biological resources including wetlands, rivers and streams, fisheries, T&E species, species of concern, and wildlife connectivity. Deb serves as the MDT representative on the Planning and Implementation Team for the Montana Wildlife & Transportation Steering Committee, formed following the 2018 Montana Wildlife-Transportation Summit. She is also honored to serve as the current conference chair for the International Conference on Ecology and Transportation.

Deb graduated from the University of Wisconsin Madison in 1997 with a B.A. in Conservation Biology and a B.S. in Wildlife Management and Ecology. Outside of work, she enjoys the outdoor recreational opportunities abound in Montana, including camping, hiking, river floating, and fishing. In the past few years, she added cross country skiing and mountain biking, and dusted off those figure skates, though she doesn't jump as high or twirl as fast as she once did!



Randy Arnold



Randy grew up in Denver, Colorado. He began his career in the outdoors working for an outfitter in the Bridger Wilderness in the Wind River Range, Wyoming. He worked as a Wilderness Guard for the USFS in the Bob Marshall Wilderness as he attended the University of Montana. After receiving his BS in Wildlife Biology, Randy began his career with Montana Fish, Wildlife and Parks as a Game Warden Trainee in Missoula. Over about 19 years, he was stationed as a game warden in Forsyth, a criminal investigator in Helena, and game warden sergeant in Billings. He moved with his wife and two daughters to Missoula where he has been regional supervisor for the last 7 years.



Whisper Camel-Means



Whisper is a Wildlife Biologist for the Confederated Salish and Kootenai Tribes Wildlife Management Program. She started her career with CSKT as a Biologist Trainee in 1997 while studying Environmental Studies at Salish Kootenai College in Pablo, MT. She then transferred to the University of Montana, Missoula where she earned a Bachelor of Science Degree in Wildlife Biology. From there she attended Montana State University, Bozeman to pursue her Masters of Science degree in Fish and Wildlife Management. She was awarded a fellowship from The Wildlife Conservation Society (WSC) and The Western Transportation Institute (WTI) to study ungulate movements across US Highway 93 in the pre-construction phase. While in Bozeman, she was employed by WTI to participate in other highway and wildlife related projects including all pre-construction wildlife movements along US 93, an animal detection system prototype project in Yellowstone National Park; as well as a wildlife warning signing system on Bozeman Pass. Upon completing her Master's program, she returned to the Flathead Reservation to continue working for the CSKT Wildlife Management Program. Her current duties include US Highway 93 post-construction monitoring of the wildlife mitigation tools that have been implemented. Outreach and education is an important part of the project. She is a member of The Wildlife Society, on the national and state levels, has achieved her Certified Wildlife Biologist status, and is a former Montana TWS Chapter officer. Whisper has recently completed fellowships with the National Conservation Leadership Institute: Cohort 12 and is a Wilburforce Fellow in Conservation Science.



Liz Fairbank



Liz is currently a Conservation Associate in the Corridors and Crossings Program at The Center for Large Landscape Conservation. Liz got her start working on wildlife and transportation issues as a research assistant monitoring wildlife crossing structures on Highway 93 North in Montana during her time in graduate school at the University of Montana. After completing her Masters in 2013, her work has continued to focus on finding solutions to increase habitat permeability and reduce wildlife-vehicle conflict through research, community engagement, education, fundraising, and legislative and administrative policies seeking to integrate wildlife considerations into planning processes across multiple scales and jurisdictions.



Bart Morris



Bart is the owner of Oxbow Cattle Company with his wife Wendy Morris in Missoula, Montana. In 2014 Bart and Wendy started Oxbow Cattle Company, a regenerative ranch that produces grassfed, grass-finished beef as well as goat meat that is sold directly to the community of Missoula. The Oxbow Cattle Company

Mission is to regenerate the ecosystem, respect all animals, connect with our community and produce high quality and healthy food that nourishes the body and soul. In 2019 they received the Missoula County Land Stewardship Award for their ranching practices.

Prior to full time ranching Bart worked for the Wyoming Game and Fish and Montana Fish, Wildlife & Parks. Bart's first job after graduating for the University of Wyoming was trapping Grizzly Bears in the Yellowstone Ecosystem, followed by becoming a Game Warden and Access Enhancement Coordinator. After working for Wyoming for 8 years, Bart and Wendy moved to Missoula, where Bart worked as the Regional Access Coordinator for FWP Region 2.



CONCURRENT SESSION AND POSTER ABSTRACTS

Alphabetical by Presenter's Name

*Indicates Presenter

**Indicates Student Presentation

Acoustic Monitoring of Bat Species to Support Multi-Scale Monitoring and Conservation

Dan Bachen*, Montana Natural Heritage Program

Alexis McEwan, Montana Natural Heritage Program

Kristina Smucker, Montana Fish, Wildlife and Parks;

Tammy Fletcher, US Forest Service

Abstract: With the spread of *Pseudogymnoascus destructans*, the pathogen that causes White-Nose Syndrome, into Montana and the increasing footprint of wind energy and mortality of bats at turbines, Montana's bat species face significant and increasing threats to persistence. Monitoring of species presence and population trend is necessary to assess impacts of these threats and help guide conservation efforts. In 2020 the state, with support from federal agencies and volunteers, conducted surveys using acoustic methods to detect bats at sites across the state. Survey locations were prioritized using the North American Bat Monitoring Program (NABat) sampling grid with four detectors deployed in selected cells over four nights. We surveyed and recorded data at 350 sites within 96 cells and recorded 588,489 call sequences. Automated analysis indicates the detection of 13 species. These data provide information that can be used across management scales. The observations themselves provide managers with confirmation of species presence at the local level and are valuable for project planning. At the regional level these observations can be used to inform species distribution models and explore habitat associations. At the state-wide level analysis of site occupancy and detection probabilities can be used to establish baselines and guide future monitoring to determine trend. As surveys were performed following a national sampling protocol, these data are compatible with other efforts undertaken in states and provinces across the US and Canada as part of the NABat and will be used to provide information on the species across their continental range.

Assessment of Conservation Status of Montana's Wildlife and Implications for Inventory and Monitoring

Dan Bachen*, Montana Natural Heritage Program

Abstract: The assessment of the conservation status of species provides valuable information for highlighting species that are undergoing declines or are threatened with extirpation in some or all of their range, allowing managers to prioritize actions to support conservation. In Montana, ranks for animals, plants, and ecosystems are calculated by the Montana Natural Heritage Program (NHP) using standardized NatureServe methodologies that account for the species rarity, threats to persistence, and trends in population. For terrestrial vertebrates,

proposed changes to ranks and constituent criteria are reviewed by a committee of NHP and Montana Fish Wildlife and Parks staff with consultation of taxonomic experts before final ranks are accepted. Recently NHP staff have undertaken a comprehensive review of the methodology and systems that support rank calculation. During this process we have reviewed the rank data for all birds, mammals, reptiles, and amphibians, and developed database driven tools to increase the transparency of status ranks and better display these information to wildlife professionals. We identified data deficiencies within these ranks to provide recommendations for future research to address these deficiencies. Across the Species of Conservation Concern reviewed we found that all had data to assess rarity, 48 lacked short-term trend data and 26 more lacked current trend data, and 18 lacked data to assess threats to persistence. Identification of data deficiencies can help structure future research by providing clear goals for baseline inventories, monitoring intervals, collection of life history data and the precision required for any indices used in the ranking process.

Bumble Bee Selectivity of Native and Non-Native Flowers in Northwest Montana**

Rustin Bielski*, Salish Kootenai College

Abstract: Loss of native pollinators can have adverse effects on native plant communities. Likewise, the loss of native plant communities can have adverse effects on our native pollinator community. Non-native flowers have been known to detriment native ecosystems, but how does this affect our native pollinators? Bumble bees are a keystone pollinator in Northwest Montana, but bumble bee species have been declining globally in recent years. This study looks at the preference of bumble bees between native and non-native flowers throughout their foraging season. It incorporates two methods of observations, a focal survey of bumble bee activity, and a sweep net capture. Host plant selectivity is compared to the relative abundance of native and non-native flowers. In total, 133 bees were recorded, 59% seen on native flowers and 49% on non-native. The data shows a clear preference towards native flowers throughout the season.

Part I: Tracking small wildlife migration collaboratively across the West

William Blake*, MPG Ranch

Kate Stone, MPG Ranch

Abstract: Wildlife movement, including migration, influences the ability for species to adapt and survive. Without a better understanding of movement and connectivity, most species-focused conservation strategies may not reflect full annual cycles. The Motus Wildlife Tracking System, or Motus, helps to fill that void by deploying miniaturized and digitally encoded VHF tags on wildlife, called Motus tags, in combination with strategic placement of automated receiving units, called Motus stations. In fall of 2018, MPG Ranch spearheaded the

“Intermountain West Collaborative” (IWC) Motus Project aiming to expand the western Motus network for all researchers to use. In 2019, the IWC Motus Project grew a network of 12 Motus stations in western Montana and researchers tagged 120 birds and bats. The following year, IWC expanded the array to 23 Motus stations across Montana, Idaho and Oregon, and increased tagging efforts to more than 200 birds and bats. We have detected various species during migration, using this technology, renewing our appreciation for connectivity and our understanding of movement of small wildlife. The Motus network expansion in the West speaks to the collaborative interest many biologists and conservationists hold in unravelling migratory habits of small wildlife and conserving their habitat. In 2021, we are planning to install an additional 20-30 Motus stations throughout the West and as far as Mexico. The flourishing Motus projects in our region will provide species life-history information such as dispersal, survival, departure and arrival dates, and a better understanding of wildlife habitat connectivity throughout the West.

Part II: Tracking small wildlife migration collaboratively across the West

Kate Stone*, MPG Ranch

William Blake, MPG Ranch

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Montana's Non-bat Cave Life: Incidental Observations and Informal Studies by the Bigfork High School Cave Club

Hans Bodenhamer*, Bigfork High School Cave Club

Jayda Anderson, Bigfork High School cave Club

Jessop Lochlan, Bigfork High School cave Club

Abstract: The Bigfork High School Cave Club, as a result of their involvement with bat studies related to White Nose Syndrome, have accrued numerous incidental observations of wildlife use of Montana caves. Observations include use of caves by wood rats, bears, wolverine. mountain goat, bighorn, sheep, marmot, porcupine, and other species. The club has conducted two informal microinvertebrate studies, one noncollecting study of amphipods, planaria and isopods in caves on Glacier National Park and another statewide study for which macroinvertebrate specimens are being archived at Montana State University for eventual identification and further study.

Comparing Fence Modeling and Mapping Approaches to Support Wildlife Management and Research in Southwest Montana**

Simon Buzzard*, University of Montana

Andrew Jakes, National Wildlife Federation

Len Broberg, University of Montana, Environmental Studies Program

Abstract: Fences pose significant challenges to wildlife movement, but their effects are difficult to quantify because fence location and fence type data are lacking on a global scale. We developed a fence location and density model in southwest Montana, USA to provide data to researchers and managers, and test whether previous models could be applied to a new region and retain suitable levels of statistical accuracy. Our model used local expert opinion to inform how road, land cover, and ownership spatial layers interacted to predict fence locations. We validated the model against fence data collected on random 3.2 km road transects ($n = 330$). The model predicted 37,687 km of fences across the study area, with a mean fence density of 1.6 km/km² and a maximum density of 11.3 km/km². Additionally, we manually digitized fences in Google Earth Pro in a random sample of 50 survey townships (roughly 4,650 km²) within the study area and validated the accuracy of this method to compare results against the fence model predictions. Our fence model showed lower agreement (Cohen's Kappa = 0.56) with known samples than manually-digitized fences in Google Earth (Cohen's Kappa = 0.76), yet had an improved level of accuracy over previous models. The fence model outputs are likely most useful for large scale analyses of ecological influences of fence densities, whereas the Google Earth digitizing method is likely useful to locate individual fences for fine-scale analyses.

Attitudes of Montanans Regarding Grizzly Bears and their Management

Cecily Costello*, Montana Fish, Wildlife & Parks

Holly Nesbitt, University of Montana

Alexander Metcalf, University of Montana

Elizabeth Metcalf, University of Montana

Lori Roberts, MT Fish Wildlife and Parks

Justin Gude, Montana Fish, Wildlife and Parks

Michael Lewis, Montana Fish, Wildlife & Parks

Abstract: In 2019-20, a collaborative study was conducted by Montana Fish, Wildlife & Parks (FWP) and the University of Montana to better understand Montanans thoughts about grizzly bears and grizzly bear management in Montana. Survey findings revealed generally positive attitudes towards grizzly bears. Despite a high level of support for the presence of grizzly bears in Montana, results from this survey demonstrate that acceptance of bears declined relative to human occupancy and agricultural-ranching use of the landscape. Montanans views were mixed regarding whether grizzly bears should be allowed to live anywhere they become established on their own. Most Montanans agreed grizzly bears numbers are expanding in Montana. However, a large percentage of Montanans reported knowing little about grizzly bear numbers across different geographic areas of the state, and the remainder expressed views across a spectrum from “much too low” to “much too high”. There was generally wide support for hunting this species, with half of Montanans reporting they support enough hunting to manage their population size. About 17 percent of Montanans believe grizzly bears should never be hunted. Montanans reported diverse beliefs regarding the success of grizzly bear management and their satisfaction with that management in Montana. However, trust in FWP to manage grizzly bears was relatively high. The results from this important study will be used by FWP as part of ongoing efforts to include public input in grizzly bear management decision-making processes going forward.

Natural and Anthropogenic Landscape Features Influence Greater Sage-Grouse Seasonal Habitat Selection in Carbon County, Montana**

Erin Gelling*, University of Wyoming

Aaron Pratt, George Miksch Sutton Avian Research Center

Jeffrey Beck, University of Wyoming

Abstract: Quantifying resource selection by animals assists wildlife and land managers in making habitat decisions that can be used for restoration and conservation planning. Greater sage-grouse (*Centrocercus urophasianus*; hereafter ‘sage-grouse’) are the focus of much research and conservation efforts owing to their obligate relationship with sagebrush (*Artemisia* spp.) and dramatic population declines over the last 50 years. Sage-grouse typically utilize different habitats during breeding, summer, and winter seasons and resource use varies throughout the home range of an individual animal. Our objective was to identify natural and anthropogenic landscape features that influence resource selection for female sage-grouse

during breeding, summer, and winter seasons. We used data from 85 GPS-tagged female sage-grouse in Carbon County, Montana and Park County, Wyoming from April 2018–2020. We examined resource use based on intensity of use by implementing a Resource Utilization Function (RUF) for each season. We identified natural landscape features from remotely sensed data and identified anthropogenic features such as roads, oil and gas development, agriculture, and houses. We evaluated each variable at multiple scales ranging from 100 m to 3200 m across each season. We found differences in sage-grouse resource use based on scale and season. Wildlife managers should consider not only seasonal habitat used by sage-grouse, but also those areas that are used most frequently and the habitat characteristics associated with increased areas of sage-grouse use.

Wild Ruminants Variably Possess a Rumen Microbial Metabolism that Degrades the Toxic Alkaloid Methyllaconitine**

Savannah Grace*, Montana State University

Carl Yeoman, Montana State University

Abstract: Tall Larkspur (*Delphinium* spp.) grows abundantly in the North-western United States, where it presents a serious toxicity danger to rangeland cattle. Consumption of the toxic alkaloid, methyllaconitine (MLA) found in Tall Larkspur causes an estimated loss of 5-15% of rangeland cattle annually. While detrimental to the agriculture community, cattle mortality due to larkspur poisoning is also of concern for wildlife and land managers, as livestock carcasses attract predatory animals to public lands creating unsafe conditions for recreationists. Due to the wide distribution of Larkspur, wild ruminants in the western US must also be exposed to larkspur while foraging, however, there is no evidence to suggest these species are affected by their toxic alkaloids suggesting they may be less sensitive to MLA. We hypothesized that wild ruminants possess a gut microbial metabolism capable of degrading MLA. Foregut samples were collected from each of Montana's wild ruminant species by volunteer hunters and assayed for total alkaloid- and MLA-degradation activities over 48 hours in in vitro incubations. Separate incubations were performed to assess the relative influence of gut bacterial, fungal, and abiotic activities. Prior to and following incubations total alkaloid was extracted and measured spectrophotometrically and MLA was measured by High-Performance Liquid Chromatography Mass Spectrometry (HPLC), respectively. Preliminary analysis has demonstrated alkaloid degradation occurs in the majority of wild ruminant species at varying levels. Based on these findings, we believe wild ruminant species may provide novel microbial metabolisms that may be developed to benefit both the livestock industry and minimize human:carnivore conflicts on overlapping public lands.

Mountain goat declines in Glacier National Park associated with early summer precipitation and temperature

Tabitha Graves*, U.S. Geological Survey

Jami Belt, U.S. Geological Survey

William Janousek, U.S. Geological Survey

Michael Yarnall, Montana Fish Wildlife and Parks

Abstract: A shifting climate poses threats to alpine-adapted species including mountain goats. We used a 12 year citizen science dataset and a Bayesian N-mixture model to examine population trend of mountain goats in Glacier National Park. Median goats per site declined by 45% (95% CRI = 32%, 57%) from 77.8 (95% CRI = 64.4, 95.1) in 2008 to 42.3 (95% CRI = 34.3, 52.2) in 2019, with detectable consistent declines from 2008 until 2015, when numbers stabilized.. These declines exceed IUCN criteria for vulnerable, with >30% declines over only 2 generations. Climate variables had the greatest influence on population growth rate, particularly precipitation between May 15 and June 15 of the previous summer. Higher growth occurred with greater snow water equivalent, mean winter temperature, early summer temperature and early summer precipitation. In addition, the presence of permanent snow and glaciers strongly influenced initial abundance of goats. We are not able to determine the relative contribution of vital rates to this apparent decline. However, the patterns of decline are consistent with other data sources. Research to estimate the population size, evaluate genetic structure, assess changing habitat, human recreation and forage, and to forward project climate effects on persistence will be crucial to conserving this iconic, meta-population at the southern edge of the distribution of native mountain goats.

Montana Fish, Wildlife and Parks' Strategy for the Conservation of Wildlife Movement and Migration

Lauri Hanauska-Brown*, Montana Fish, Wildlife and Parks

Justin Gude, Montana Fish, Wildlife and Parks

Renee lemon, Montana Fish, Wildlife and Parks

Brian Wakeling, Montana Fish, Wildlife and Parks

Kristina Smucker, Montana Fish, Wildlife and Parks

Peggy O'Neill-McLeod, Montana Fish, Wildlife and Parks

Abstract: Conservation of wildlife habitat is a core function of Montana Fish, Wildlife and Parks (FWP) dating back to 1940 when FWP first pursued conservation of high-value habitats. A critically important role of quality habitat is providing space and security for animals to move across the landscape to utilize seasonally important resources. FWP has been working with private landowners, federal agencies, the Montana Department of Transportation, and other partners to facilitate wildlife movements and conserve important habitats. In 2018 the U.S. Department of Interior (DOI) issued Secretarial Order (SO) 3362, which charged DOI agencies to work with 11 eleven western states to conserve winter range and migratory pathways for ungulates and allocated millions in funding. Montana has received more than \$1.5 million and

used those dollars to continue collaring ungulates, remove fencing, manage weeds, and conserve important parcels of land. FWP released the first SO 3362 Action Plan in 2018 to prioritize work and in 2020 released a strategy formally defining and prioritizing agency efforts related to big game, carnivore and bird movements, commensurate with long-standing efforts by FWP and our partners. FWP is involved with teams of others working on this issue including the Wildlife and Transportation Steering Committee, the WAFWA Wildlife Movement and Migration Working Group and the Migration Coalition. FWP specifically brings to the table a depth of experience working in collaboration with private landowners and state and federal agencies on habitat conservation and now specifically the conservation of wildlife movement and migration.

Sage-Grouse Seasons, Home Ranges and Habitats, What Are They and How Many Are There?**

Trapper Haynam*, Montana State University

Lance McNew, Montana State University - Wildlife Habitat Ecology Lab

Michael Borggreen, Bureau of Land Management

John Carlson, Bureau of Land Management

Abstract: The greater sage-grouse (*Centrocercus urophasianus*) is a gallinaceous bird that has become a focal species in the conservation effort to preserve imperiled sagebrush ecosystems and associated organisms. Each remaining sage-grouse population across the current range-wide distribution occupies unique environments and must cope with novel combinations of stressors making it crucial to identify and understand local wildlife-habitat relationships to which management actions may be tailored. Wildlife-habitat responses are typically inferred from population-level survival or resource selection models without regard for detailed individual- or population-level movement patterns. Improved spatial generality of inferences may be gained by linking habitat response associations with specific behaviors or activity signatures (statistical behaviors) derived from movement data and expert knowledge. Our primary goal was to quantify sage-grouse space- and time-use signals relevant to management and parse variability in these signals into components due to spatial (landscape elements) and temporal (seasonality) characteristics, while accounting for individual-level variation. We attached a 22-g solar powered Global Positioning System (GPS) Platform Transmitting Terminal to 86 female sage-grouse in north-central Montana. We monitored females and analyzed movement behaviors using a combination of field observations, nonlinear-regression movement models, multivariate clustering techniques, and a time-local convex hull approach. Time-local convex hulls can be thought of as many brief-duration home ranges from which time- and space- use metrics can be calculated. We will present results from our north-central Montana sage-grouse movement ecology research including migration patterns, diversity of movement modes, seasonal space- and time-use patterns, and seasonal landscape-element associations.

Anthropogenic Effects on Grouse Detection and Abundance Based Upon Road and Trail Characteristics in Western Montana**

Olivia Jakabosky*, Montana State University - Wildlife Habitat Ecology Lab

Claire Gower, Montana Department of Fish, Wildlife, and Parks

Elizabeth Leipold, Montana State University - Wildlife Habitat Ecology Lab

Lance McNew, Montana State University - Wildlife Habitat Ecology Lab

Abstract: Anthropogenic structures, such as constructed roads and trails, and human use may affect space use, demography, and other wildlife population parameters. Alternately, human infrastructure and activity may result in perceived population responses by influencing the ability of biologists to detect individuals during standard population surveys. The evaluation of spatio-temporal factors correlates in detection probabilities and local abundances, which is necessary for proper population management. To evaluate the effects of human use on mountain grouse populations, we developed and conducted replicated surveys throughout western Montana during 2020. Biologists and volunteers collected count data for dusky, ruffed, and spruce grouse during 582 surveys along 291 survey transects located throughout FWP Regions 1-5. Survey transects occurred along two types of human infrastructure: U.S. Forest Service Trails and unimproved roads close to highway vehicle use during the survey period. As a first step, we compared count data for road and trail transect surveys for each species of grouse. Overall, raw counts of dusky grouse were higher for transects located along trails ($0.59 \pm 1.07\text{SD}$ grouse per transect) than unimproved roads ($0.33 \pm 0.91\text{SD}$). Raw counts of ruffed grouse were similar for transects located along trails ($0.75 \pm 1.42\text{SD}$) and unimproved roads ($0.69 \pm 1.55\text{SD}$). Sample sizes for spruce grouse precluded comparison. In the next phase, we will use hierarchical models to evaluate whether the apparent effect of trail type on raw counts is manifested through effects on local abundance or the probability of detection, and consider the effects of other human-use and habitat characteristics.

Wildagg: An R Package to Simplify Wildlife Aggregation Analyses.

William Janousek*, U.S. Geological Survey;

Tabitha Graves, U.S. Geological Survey

Abstract: The package `wildagg` is an R package designed to estimate, summarize, and visualize wildlife aggregation metrics using location information like GPS collar data. The motivation for the development of this package began with two research efforts studying the aggregation and density of elk on the National Elk Refuge, WY. We applied lessons learned to create a straightforward implementation for users that have a limited level of knowledge of R and related analyses. The package has three primary functions. The first is to calculate daily inter-animal distances for a population of collared individuals, second to estimate the dynamic interaction between pairs of animals based on the proportion of time spent per day within some distance buffer, and third to calculate kernel density estimates across temporal scales. All three of these metrics are useful in determining degrees of animal aggregation or density and

provide a variety of avenues to derive potential mechanisms to explain observed aggregation patterns. The framework we present supports the evaluation of temporally varying management actions that influence aggregation broadly and can be easily implemented to answer questions related to disease transmission, human-wildlife conflict, or inter-species competition.

First Off-host Survey for Winter Ticks (*Dermacentor albipictus*) in the Western United States**

Troy Koser*, Montana State University

Paul Cross, United States Geological Survey

Raina Plowright, Montana State University

Aly Courtemanch, Wyoming Game and Fish Department

Ben Wise, Wyoming Game and Fish Department

Abstract: Shiras moose (*Alces alces shirasi*) hunting success in parts of Wyoming, Idaho, and Montana has declined over the past decade indicating a potential regional population decrease. Several likely contributing factors such as increased road mortality, habitat changes, and predation have been researched, but few studies have investigated the synergistic threat from climate change and parasites. The winter tick (*Dermacentor albipictus*) is a well-known ectoparasite of moose which has caused population declines during epizootic years in the Northeast and Midwest, but little is known about winter tick infestation impacts on Shiras moose and which environmental variables may drive epizootics in the Rocky Mountain West. In this study we conduct the first survey for the environmentally vulnerable off-host stages of winter ticks in Shiras moose habitat in Jackson Hole, Wyoming. Our objectives were to 1) verify the efficacy of known winter tick survey techniques in the West, 2) record the questing window for host-seeking larvae, and 3) identify potential environmental correlates with winter tick distribution, abundance, and activation. Winter ticks were first detected on September 21st and remained active until survey efforts halted on November 24th. Of the more than 7,000 ticks collected, 67% came from grasses or forbs, 19.4% from non-willow shrubs, and 13.6% from willow. Larvae were found questing on vegetation protruding from deep snowpack in temperatures as low as 5° C. Data on questing window and microclimate thresholds can be used to model winter tick epizootics in the future under different climate scenarios while habitat associations can be used by moose managers to target conservation interventions.

Bull Elk Survival, Vulnerability, and Antler Size in a Transboundary Elk Population**

Hans Martin*, Wildlife Biology Program, W.A. Franke College of Forestry and Conservation, University of Montana

Evelyn Merrill, University of Montana, W.A. Franke College of Forestry and Conservation

Mark Hebblewhite, University of Montana, Biological Sciences Program

Abstract: Migration is a behavioral strategy used to access resources or avoid predation in spatially and temporally heterogeneous landscapes. On the eastern slopes of the Rocky Mountains, elk migrate to higher elevation summer ranges to access higher forage quality and avoid predation risk. Thus, the decision to migrate has both individual and population level consequences. Antler growth and development is driven primarily by age and forage quality. Thus, if migratory animals can gain access to higher quality forage and avoid predation, migratory males will have higher fitness than residents. However, migration often results in transboundary populations being exposed to different levels of harvest as they move across the landscape. Our goal was to investigate these potential drivers of male elk survival and antler size in a transboundary, partially migratory population in a multi-carnivore system. We collared 75 bull elk in 2018-2020 for a total of 105 elk-years ($x=35$ collars/year). Male elk survival and antler size was largely a function of age. Human harvested was the primary cause of mortality ($n=33$) with wolf predation having little effect on survival ($n=2$). Antler-point-restrictions resulted in low yearly survival rates for male elk over 4 years of age ($S=0.42$). While migration itself did not enhance antler size or survival, we found a negative effect of increasing forage biomass (and hence decreasing forage quality) on antler size. These advancements will help managers to understand how vulnerability to natural and human predation risk affects male elk age structure and antler size.

Evaluation of Herbicide Treatments in a Large Oligotrophic Lake to Reduce Aquatic Invasive Species**

Ian McRyehew*, Salish Kootenai College

Abstract: The goal of our research is to develop a herbicide prescription to reduce the abundance of flowering rush (*Butomus umbellatus*), and stop the advancement of infestation downstream into the Columbia River Basin. Flowering rush is an invasive aquatic plant introduced to North America from Eurasia, and was observed in Montana, on the northwest shore of Flathead Lake in 1964. Since then, flowering rush has become well established in Flathead Lake and spread downstream through the Selish, Ksanka, Qlipse (SKQ) Dam to the lower Flathead River and Clark Fork Rivers, and has established in Lake Pend Oreille; furthermore, moving into Washington and Oregon to the McNary Dam region. Environmental impacts of flowering rush include threats to native fisheries that have considerable cultural importance to the indigenous people of the region. Habitat changes from open water system to closed water system favor invasive species of fish. The alterations to the food web affect macro

invertebrates and algae production. In addition to native plants and animals, flowering rush invasions impact property values and recreation, degrade water quality, increase sedimentation, and reduce irrigation water delivery capacity. Two aquatic herbicides, Imazapyr (Habitat®) and Imazomox (Clearcast®), have been applied to bare ground in mid-April, annually, approximately three weeks before inundation. Sprout counts and rhizome weights have been collected in 2017, 2018, and 2019, and compared with existing data for their efficacy. Results have shown that sequential application of aquatic herbicides is an effective means to reduce and deplete the rhizome of flowering rush.

Montana's Integrated Monitoring in Bird Conservation Regions Program (IMBCR)- Monitoring for Management and Conservation

Christian Meny*, Intermountain Bird Observatory- Boise State University

Jay Carlisle, Intermountain Bird Observatory- Boise State University

Matthew McLaren, Bird Conservancy of the Rockies

Abstract: Conservation partners have conducted landbird monitoring across Montana, under the Integrated Monitoring in Bird Conservation Regions (IMBCR) program, since 2009. Today, the IMBCR program represents the most rigorous breeding landbird monitoring program in the US. IMBCR is made possible via a broad partnership of multiple government and non-government agencies from the Great Plains to the Intermountain West. The sampling framework allows for inference about avian populations at multiple scales, from a National Forest or Bureau of Land Management field office, up to the state and even ecoregion level. The state of Montana is stratified into over thirty different management areas based on partners' needs and interests. Each year, landbird density and occupancy estimates are produced for individual management areas, which are combined to produce regional estimates. Bayesian analyses provide robust estimates of population trend over time and a new online tool will provide habitat-specific population estimates for each management area. Managers can use these baseline estimates and habitat-specific information for project-level planning and environmental assessments. The IMBCR program provides context for targeted effectiveness monitoring in project areas to evaluate impacts of land-use change or conservation actions. We highlight several case studies from the Intermountain West, where short-term monitoring efforts leverage the long-term data from IMBCR to evaluate avian response to land management practices.

Evaluation of Iridium-transmitted GPS Telemetry Data for Use in Assessments of Wildlife Space Use

Charlotte Milling*, Ohio State University

Shane McKenzie, Ohio State University

Stanley Gehrt, Ohio State University

Abstract: Remote transmission of GPS data from free-ranging animals provides insurance against data loss and near real-time knowledge of animal location. Miniaturization of batteries and processors have made this technology accessible for smaller-bodied animals, which behave and use space differently than larger-bodied animals. This feature of small animals could result in biased transmitted datasets which could propagate to the inferences we draw from movement behavior for management and conservation. Using free-ranging animals and stationary trials, we investigated the quality of data transmitted via the Iridium network relative to the stored-on-board (SOB) dataset and determined whether inferences regarding behavior and space use are dependent on the quantity of data recovered. We also determined whether Iridium transmission rates were collar-specific and therefore repeatable. We deployed Lotek Litetrack-150 collars on 10 free-ranging raccoons in Manitoba, Canada in spring and summer 2019 and conducted stationary trials outside Chicago, IL in spring 2020. We found no difference in precision (DOP) or quality of data (3D locations), estimated size of the home range, or habitat use ratios between the SOB and Iridium-transmitted datasets. However, only home range sizes estimated using an autocorrelated kernel density estimate were consistent across all data recovery levels. Transmission rates during the stationary field trials were variable and not a repeatable element of our collars. This work highlights the necessity of pre-deployment evaluation and error calibration of collars, as well as the importance of using analytical methods that account for the autocorrelated nature of clustered, Iridium-transmitted data in wildlife studies.

The Emerging Conflict of Common Ravens Roosting on Transmission Line Towers

Marco Restani*, NorthWestern Energy

James Lueck, NorthWestern Energy

Abstract: Bird interactions with power lines can cause faults, which are a disruption of electrical service. Faults of unknown origin on 500kV transmission lines in central Montana, which are integral to the Northwest US power grid, became an operational concern during winter 2016–2017. In 2017 we found tower insulators heavily contaminated with bird droppings and discovered a large nocturnal roost of common ravens (*Corvus corax*). We summarized fault data from the Energy Management System and raven abundance data from the Billings Christmas Bird Count to assess the potential impact of raven roosts on the transmission lines. We also conducted counts at seven roosts during winter 2019–2020. We found a positive relationship between the number of faults reported and raven abundance from 2005–2020. The three largest roosts peaked at 1,000–1,500 ravens on single evenings. The number of faults during

winter 2019–2020 decreased after installation of silicon-coated insulators and perch deterrents, and the periodic washing of insulators. Raven populations have increased significantly throughout their range and may cause similar conflicts for other electric utilities on large transmission lines. Long-term management of ravens will need to integrate approaches at both local and landscape scales.

Sampling for Rocky Mountain Tailed Frogs in Overwhich Creek Post Rotenone Treatment

Torrey Ritter*, Montana Fish, Wildlife and Parks

Lauri Hanauska-Brown, Montana Fish, Wildlife and Parks

Bryce Maxell, Montana Natural Heritage Program

Abstract: Rocky Mountain Tailed Frogs (*Ascaphus montanus*) are widely distributed and relatively common west of the Continental Divide in small, high elevation streams with cobble substrates. Montana Fish Wildlife and Parks (MFWP) used the piscicide Rotenone to remove non-native Yellowstone cutthroat trout from the headwaters of Overwhich Creek in the Bitterroot Mountains near Lost Trail Pass in 2017, 2018, and 2019. Pre-treatment surveys for amphibians were not conducted in 2017 and 2018, but fisheries biologists anecdotally reported large numbers of Rocky Mountain Tailed Frog larvae dying during treatments, and that the number of tailed frogs appeared to decline after the first two treatments. Prior to the 2019 treatment, an MFWP and Montana Natural Heritage Program crew used kicknet surveys to sample twenty-three 10-meter stream reaches in the treatment area to document the number and age distribution of tailed frog adults, juveniles, and larval classes. This survey found all age classes distributed throughout the treatment area associated with cobble substrates, but densities appeared to be greatly reduced from those reported by fisheries biologists prior to the 2017 treatment. A caged study that measured survival of all age classes during the treatment indicated high mortality rates, but some larvae did survive. A 2020 repeat kicknet survey also showed all age classes to be widespread in the treatment area. Several more years of survey are needed to document recovery post-treatment in Overwhich Creek and more thorough pre- and post-treatment surveys are needed in other streams slated for Rotenone treatment where tailed frogs are present.

Sex-based Differences in Disease Transmission May Affect Management Efficacy of Chronic Wasting Disease**

Will Rogers*, Montana State University

Paul Cross, United States Geological Survey

Ellen Brandell, University of Wisconsin-Madison

Abstract: Chronic wasting disease (CWD), a pathogenic prion affecting Cervidae, has repeatedly been observed at higher prevalence among males than female deer. This sex bias is potentially

due to differences in susceptibility or transmission, but the underlying mechanism may not be discernable from prevalence data alone. We used an age- and sex-structured simulation model to explore harvest-based management of CWD under three different transmission scenarios that all generated higher male prevalence: (1) increased male susceptibility, (2) high male-to-male transmission, or (3) high female-to-male transmission. Heavily male-biased harvests were typically able to control CWD epidemics and maintain host population sizes under high male-to-male transmission and high male susceptibility scenarios. However, male-biased harvests were ineffective under high female-to-male transmission and female-biased harvests were required to limit disease transmission but resulted in low population sizes. Higher disease prevalence in a sex or age group may be due to higher exposure or susceptibility but does not necessarily indicate if that group also is responsible for more disease transmission. We showed that multiple processes can result in the pattern of higher male prevalence, but that population-level management interventions need to focus on those groups responsible for disease transmission not just those that are most exposed. Disclaimer: This will be presentation from a draft manuscript. Its content is deliberative and predecisional, so it must not be disclosed or released by reviewers. Because the manuscript has not yet been approved for publication by the U.S. Geological Survey (USGS), it does not represent any official USGS finding or policy.

Suitable Spiny Softshell Turtle (*Apalone spinifera*) Nesting/Basking Habitat Availability in Dammed and Undammed River Systems**

Larissa Saarel*, Rocky Mountain College

Abstract: Riverine turtles are highly adapted to habitats created by the dynamic nature of free-flowing rivers. Dam-regulated flows may decrease suitable habitat for many species, such as the spiny softshell turtle (*Apalone spinifera*). We examined nesting habitat (sand and gravel bar) availability and the reproductive potential of spiny softshell turtles in the dammed, Bighorn River and undammed, Yellowstone River. As a preliminary test, we used ArcGIS and publicly available NAIP data to classify and analyze suitable spiny softshell turtle habitat on 20-mile stretches of both rivers near their confluence. We determined the population demographic structure from 485 turtles captured during six years of surveys. Our goal was to assess whether nesting habitat availability correlated with the population demographic data. Overall, adult spiny softshell turtles appear healthy and of similar sizes on both rivers, yet there is a concerning lack of recruitment and abundance on the Bighorn River. We found significant differences in several metrics of nesting habitat availability between the Yellowstone and Bighorn rivers. On the Bighorn River, limited nesting habitat correlated with very low numbers of juveniles, recently recruited size classes, and males. Through a better understanding of the effects of dams on spiny softshell turtle population persistence, changes in management can be explored to enhance riverine turtle conservation and other species with similar life-history strategies.

Tipping the Scales for Conservation: Leveraging USDA Farm Bill Funding to Conserve Grassland Habitat and Build Working Partnerships

Taylor Scherr*, Bird Conservancy of the Rockies

Abstract: North American grasslands have and continue to decline at an alarming rate, with a conversion rate of 1.2 million acres of land per year. Coinciding with this extreme loss of habitat, grassland birds have been identified as one of the fastest declining avian suites, with a 53% reduction in population since the 1970's. Most grasslands, meanwhile, remain under private ownership making the conservation of private lands through partnerships with agricultural producers ever more critical. In July 2020, Bird Conservancy of the Rockies, in partnership with the Natural Resource Conservation Service and Montana FWP, developed a Targeted Implementation Plan (TIP) in Dawson County under the USDA Farm Bill. This program leverages federal funds to assist producers in restoring cropland back to perennial cover for wildlife, while also developing fencing and water infrastructure for livestock to allow these restored grasslands to be productive grazing lands for producers. During the 2021 application period, the program received five applications resulting in approximately 1,300 acres planned for restoration back to grass. Plans are set to be ranked in March, and pending funding, will be implemented beginning as soon as spring of 2021. Building off the momentum of this TIP, a questionnaire to gauge interest in a second funding pool was sent to producers in another part of Dawson County in winter 2020, with a goal of creating more grassland connectivity. Producers demonstrated a positive response to the questionnaire, resulting in the ongoing development of another proposal to restore grasslands in the northern portion of Dawson.

Invasive Annual Grass Management Successes: A Wildlife, Pollinator, and Wildfire Perspective

Derek Sebastian*, Bayer

Steve Saunders, Bayer

Abstract: Invasive winter annual grasses (WAGs) such as cheatgrass, medusahead, and ventenata continue to negatively impact Montana Rangeland. Impacts include displacement of species diversity, displacement of critical wildlife and pollinator habitat, and a drastic increase in fine fuels associated with wildfire. Since beginning in 2015 in collaboration with all the major Universities in the west including Montana State University, over 100 research trials and operational treatments have been implemented with a new WAG tool, Rejuvra. Rejuvra is a new mode of action to land managers that provides multiple years of WAG control with a single application. This allows for the depletion of the WAG soil seed bank, ultimately increasing our restoration success. One concern of land managers, ecologists, and wildlife biologists is the ever-increasing threat of WAGs, the possible permanent displacement of these in-tact ecosystems, and wildfire risk. Several research sites have included lowland, foothills and mountains properties that provide critical overwintering habitat for mule deer, elk, and other wildlife, and treated areas have provided the opportunity to answer several research questions

of interest to land managers. Our research has shown that mule deer browse for seven different shrub species and forb forage dramatically increased where cheatgrass was controlled. Invasive WAG treated sites have also resulted in an increase in pollinator habitat and visitation, and fine-fuel loads are greatly reduced. These results reinforce the findings of field managers, that cheatgrass and other invasive WAGs pose a significant threat to the habitat and population of browse and pollinator species in the west.

A Multi-Model Approach to Estimating Wolf Abundance in Montana

Sarah Sells*, Montana Cooperative Wildlife Research Unit;

Michael Mitchell, U.S. Geological Survey, Montana Cooperative Wildlife Research Unit

Kevin Podruzny, Montana Fish, Wildlife and Parks

Josh Nowak, Wildlife Solutions, LLC

Justin Gude, Montana Fish, Wildlife and Parks

Robert Inman, Montana Fish, Wildlife and Parks

Abstract: Estimating wolf (*Canis lupus*) abundance is a key component of wolf management in Montana. We developed a multi-model approach to estimate wolf abundance. Our approach eliminates the need for intensive field-based monitoring and introduces biological models of wolf behavior. An occupancy model first estimates annual wolf distribution, based on environmental covariates and wolf observations reported by hunters. A mechanistic territory model predicts territory sizes using simple behavioral rules and limited data for prey resources, terrain ruggedness, and human density. Together, these models predict the number of packs in a given area. Finally, a pack size model demonstrates that pack sizes are generally negatively related to terrain ruggedness, local mortalities, and intensity of harvest management. Total abundance estimates are derived by combining the predicted number of packs and pack sizes. We applied the models to estimate wolf abundance for 2007 – 2019. The population was estimated to have been smallest in 2007, with 91 packs (95% CI = 76 – 107) and 650 wolves (95% CI = 547 – 771). A peak appears in 2011, with a high of 187 packs (95% CI = 170 – 206) and 1254 wolves (95% CI = 1136 – 1383). This coincided with the first years of harvest management, after which the population declined by 7.8% in total abundance between 2011 and 2019. From 2016 – 2019, the population appears to have become somewhat stabilized with an average of 190 packs and 1136 wolves per year, even with an estimated annual harvest rate of >20% in this period.

Enhancing Reasoning and Judgment to Improve Research, Management and Implementation

Christian Smith*, Wildlife Management Institute

Daniel Decker, Cornell University

William Siemer, Cornell University

Shawn Riley, Michigan State University

Ann Forstchen, Florida Fish and Wildlife Conservation Commission

Michael Schiavone, Department of Environmental Conservation

Patrick Lederle, North Central Section of TWS

Emily Pomeranz, Michigan Department of Natural Resources

Meghan Baumer, Cornell University

Abstract: Designing research and interpreting findings requires sound reasoning. Implementing results through management requires good judgment. Enhancing the intersection of research, management, and implementation requires wildlife professionals to improve reasoning and judgement skills. Our team conducted a study to identify the essential habits of mind and practices associated with the reasoning and judgement of a sample of peer-selected, highly effective wildlife professionals. Their habits and practices fall into five broad categories: being critically inquisitive and continuously learning; using multi-level, integrative systems thinking; apply self-discipline; taking a balanced approach; and employing emotional intelligence in interactions with others. Based on these findings, we developed a series of practical tools individuals can use to assess the degree to which their habits and practices align with those of highly effective wildlife professionals and develop professional development plans to improve their performance. The tools are available for use at no cost on the Association of Fish and Wildlife Agencies' Management Assistance Team (MAT) website. MAT staff can provide assistance with use of the tools as well as creation and implementation of professional development plans.

Assessing the Presence and Impacts of White-nose Syndrome on Montana's Bat Populations through Disease Surveillance and Long-term Acoustic Monitoring

Kristina Smucker*, Montana Fish, Wildlife and Parks

Emily AlMBERG, Montana Fish, Wildlife and Parks

Kathi Irvine, US Geological Survey;

Lauri Hanauska-Brown, Montana Fish, Wildlife and Parks

Dan Bachen, Montana Natural Heritage Program

Abstract: White-nose Syndrome (WNS) is a disease that is devastating bat populations in the eastern US. It is caused by the fungus *Pseudogymnoascus destructans* (Pd), which colonizes the bat's skin during hibernation. In 2019, Montana Fish, Wildlife and Parks (MFWP) designed a plan to address the question of how the invasion and spread of WNS might affect the occupancy and activity (as an index of abundance) of bats across Montana. This project involves (1) surveillance for Pd and WNS and (2) long-term acoustic monitoring, compatible with the

North American Bat Program. Understanding the distribution and impacts of WNS on Montana's bat populations will directly inform decisions about how aggressively Montana pursues bat management and conservation strategies—whether it be treatments specific to WNS, ecological approaches towards bolstering the health of our existing populations to improve their survival in the face of WNS, additional public outreach and education, or how we structure management to conserve habitat and mitigate other sources of mortality such as that from wind development. In 2020, the fungus that causes WNS was detected in eastern Montana and the first year of acoustic monitoring was completed with the placement of detectors at 87 sites across the state. Preliminary results indicate success of our methods and the need for continued effort. MFWP is looking for partners and volunteers to assist with the collection of bat guano at spring roost sites for disease surveillance in April and May as well as help with acoustic monitoring in June and July.

IMBCR Improves Assessment Accuracy of Habitat Treatment Effects on Songbird Communities through Capacity to Address Imperfect Detection

Hannah Specht*, University of Montana

Joshua J. Millspaugh, University of Montana

Justin Gude, Montana Fish, Wildlife and Parks

Lauri Hanauska-Brown, Montana Fish, Wildlife and Parks

Allison Begley, Montana Fish, Wildlife and Parks

Kristina Smucker, Montana Fish, Wildlife and Parks

Abstract: The small spatial scales and broad objectives of many habitat treatments warrant use of community metrics such as species richness, rank and dispersion to assess outcomes. Assessment of songbird communities, often a focus of monitoring due to broad knowledge of species-habitat relationships and established monitoring strategies, can be hampered by imperfect detection of species occurrence and relative abundance. We sought to understand whether and how adopting the protocol of a broader bird monitoring program, IMBCR (Integrated Monitoring of Bird Conservation Regions), could aid in addressing the effects of imperfect detection on the accuracy of different of community metrics. We addressed these questions using analysis of IMBCR data across six common land use types in Montana, and across a range of spatial scales representing the variety of sizes of habitat treatments commonly implemented. We found that leveraging the state-wide IMBCR monitoring dataset significantly improved the accuracy of community assessment by allowing us to correct for imperfect detection (otherwise impossible) at moderate to larger spatial scales. Additionally, we found that community dynamics at small spatial scales were sufficiently variable that correction for imperfect detection was less effective than increasing the spatial scale in improving assessment accuracy. The effect of imperfect detection of species on the accuracy of community metrics is best addressed through adjustments to survey protocol, and we provide insight in into how this differs across communities.

Long-term Assessment of the Change in Attitudes Towards and Knowledge of Black-Footed Ferrets and Black-Tailed Prairie Dogs in Montana**

Keifer Titus*, Clemson University

David Jachowski, Clemson University

Abstract: The human component in endangered species conservation has the potential to significantly limit the ability to achieve recovery of these species globally. Across the Great Plains there have been significant declines in several grassland obligate species, including black-tailed prairie dogs (*Cynomys ludovicianus*) and the Critically Endangered black-footed ferret (*Mustela nigripes*). Social surveys conducted in Montana, USA 27 years ago immediately prior to the reintroduction of black-footed ferrets described widely differing attitudes and knowledge among different stakeholder groups - with most local and state residents being opposed to conservation and recovery of this keystone species and endangered carnivore. We conducted a mail survey replicating the methods of a 1993 study to assess current attitudes and knowledge towards prairie dogs and black-footed ferrets among five stakeholder groups (local and statewide ranchers, urban and local residents, and members of conservation organizations). Our results demonstrate that despite concerted outreach efforts and a general rise in knowledge about black-footed ferrets and prairie dogs across stakeholder groups, similar differences in attitudes persisted among stakeholder groups over time, where local stakeholders adjacent to recovery sites maintained most negative attitudes. We also observed that local stakeholders demonstrated a significantly shorter (< 10 years) threshold for giving up on restoring an endangered species should recovery goals not be met. Given the reliance on local public support for conserving these species, and other endangered species globally, our findings highlight the importance of continually reassessing stakeholder attitudes and knowledge over time to identify future opportunities and hurdles to endangered species

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

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

STANDING COMMITTEES 2021-2022

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 (Andrew Jakes, 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 (To-be-determined, 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 (To-be-determined, 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 (To-be-determined, mttws.treasurer@gmail.com)

EDUCATION AND INFORMATION

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

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

RESOLUTIONS AND PUBLIC STATEMENTS

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

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

CONSERVATION AFFAIRS

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

Committee Co-Chairs: Steve Gniadek grayjaybro@yahoo.com
Past MT TWS President (mttws.pastpres@gmail.com)

SCHOLARSHIPS

Each year the Chapter President will appoint a three-member selection committee to consist of one wildlife instructor from the University of Montana, one from Montana State University, and a member-at large from the Chapter membership. The committee will select all scholarship recipients. The committee chairmanship will alternate every other year between the two universities.

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

AWARDS

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

YEARLY AWARDS NOMINATIONS

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

1. The ***Distinguished Service Award*** is presented annually for cumulative, past, current and/or continuing achievements in wildlife conservation.
2. The ***Biologist of the Year Award*** is presented annually for significant achievements in wildlife conservation anytime during the five years immediately preceding the award presentation.
3. The ***Bob Watts Communication Award*** is presented for significant communication in media such as professional publications, popular wildlife articles, books, movies or videos that have a relatively wide audience.
4. The ***Wildlife Conservation Award*** is given to an individual or non-governmental organization for past, present or ongoing efforts that enhance wildlife conservation in Montana.
5. The ***Rising Professional Award*** (new in 2020) recognizes emerging professionals and rising leaders in the wildlife field who are drivers of professional progress in Montana.

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



AD HOC COMMITTEES

GRANTS

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

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

EFFECTS ON RECREATION

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

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

SPECIES OF CONCERN

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

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

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

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

MEMBERSHIP IN THE MONTANA CHAPTER OF THE WILDLIFE SOCIETY

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

Membership Benefits

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

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

Information Updates

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

Peer Network

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

Continuing Education

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

Professional Growth

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

Becoming a Montana Chapter Member

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



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