



2023 Jackson Hole Wildlife
Symposium

Quicktalk Abstracts

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Novel methods to expand the power of camera traps to less identifiable species

Peter Alexander, Craighead Beringia South

Accurate estimates of wildlife abundance are key to effective conservation strategies. Camera trapping, when used with capture-recapture analyses, is a low-cost and accurate tool for estimating population abundance and has emerged as a ‘gold standard’ for monitoring elusive wildlife species. However, this method relies on the ability to individually identify animals in photos (photo-ID) and has generally been restricted to those species with conspicuous flank markings that are readily captured by a conventional camera trap setup. Efforts to extend this method to less distinguishable species have largely focused on two strategies: alternative camera trapping techniques designed to capture less conspicuous features, and computer-assisted image analyses that improve on human ability in performing photo-ID.

Here we present research into both strategies for extending photo-ID to two elusive and non-descript species: Pacific martens (*Martes caurina*) and pumas (*Puma concolor*). We describe a novel camera trapping system we developed that reliably photographs marten’s individually unique chest markings. Initial testing of this system indicated a 40-fold increase in marten detection rate over conventional camera traps, with 76% of detection events successfully capturing a chest image (n=71). We also describe a machine learning model for puma facial recognition. We trained a convolutional neural network with 1,728 puma face images made up of 300 known-identity pumas, taken from zoos and refuges. The model achieved an AUC score of ~0.991 on a test set of 127 face images from 25 unique pumas, and correctly grouped 90.4% of the faces by identity.



PETE ALEXANDER | Research Biologist

Peter joined Beringia in 2008 to work on the Teton Cougar Project and has since earned his Master’s degree in wildlife biology from Utah State University. Peter manages multiple camera trapping studies, and his research focuses on developing noninvasive techniques for studying cougars and other carnivores. He lives with his wife Charlotte and his two young children, Theo and Nellie, with whom he loves to ski and adventure.

For Everything There Was a Season: Spring

Trevor Bloom, The Nature Conservancy, Northern Rockies Conservation Cooperative

Film is a powerful way to share science. Watch modern scientists retrace the footsteps of famous biologist Dr. Frank Craighead, revealing that the seasons are shifting three weeks earlier in the Greater Yellowstone due to warming temperatures. Our seasons are a never-ending cycle. However, climate change is altering seasonal timing in the Greater Yellowstone, with cascading effects on the area's plants and wildlife. Research from the past and present may unlock solutions for the future. We will watch the first, Spring, of four episodes of this docu-series.

To view all four seasons see:

<https://www.youtube.com/playlist?list=PL-o5jtJniubYbjIg8Wq5afSJpMJ-bL7je>

Trevor Bloom | Applied Ecologist



Raised in Teton County, Wyoming, Trevor Bloom wears many hats - he is a Research Associate with Northern Rockies Conservation Cooperative, Applied Ecologist with The Nature Conservancy, and founder of Guides of Jackson Hole. He has broad experiences including research of plants and animals, rigorous field-work across the world, fire ecology, and climate modeling. He currently leads the Wildflower Watch citizen science program for TNC based out of Jackson Hole, Wyoming. He is passionate about science outreach through teaching, writing, and filmmaking. Fun fact, in grad school Trevor was the president of the Student Association for Fire Ecology. When not working, you can find Trevor in the mountains climbing, snowboarding, fishing and exploring

with his partner Julia and dog. Additional collaborators on the film, *For Everything There Was a Season*, I would like to acknowledge include Noah Waldron (Director), Charlie Craighead (writer and cinematographer) and Jeff Hogan (cinematographer).

The Beetles Are Back: Redefining Return Intervals for Mountain Pine Beetle Epidemics in the GYE

Nancy Bockino, Erin Hooten, Erin Shanahan Maria Newcomb, Jesse Logan

Videographer: Colin Wann,

Symposium presenter: Sam Thackeray

Organizations: Northern Rockies Conservation Cooperative, USFS and NPS Partners Grand Teton National Park and the Caribou Targhee National Forest, American Forests and the Grand Teton National Park Foundation

In the last two decades, whitebark pine has experienced severe overstory mortality due to native mountain pine beetle (MPB). The combined effects of MPB, driven by climate change, and damage and mortality from nonnative blister rust and wildfire, were catalysts for its January 2023 listing as threatened under the Endangered Species Act (ESA). MPB-caused mortality of whitebark began in the late 1990s and populations reached epidemic levels in the Greater Yellowstone Ecosystem (GYE) by 2004. Aerial evaluation from the summer of 2009 indicated that 46% of whitebark stands in the GYE had suffered complete canopy loss from MPB and 95% of stands containing whitebark had measurable MPB activity. In October of 2009, an early season cold snap killed some of the developing brood populations of MPB before they were sufficiently cold-hardened. At the same time, substantial losses were documented in large overstory whitebark that had sustained MPB at epidemic levels over almost a decade. This cold event, combined with the decline of host trees by 75% to 85%, dropped MPB populations back to endemic levels in some areas and significantly reduced epidemics in other regions across the GYE. By 2014, MPB activity was at endemic levels in most locations. However, in 2019, Forest Health Protection (FHP) aerial surveys and field crews working in whitebark pine habitat detected another notable increase in MPB activity. Results from 2019 imagery showed MPB damage in 100% of whitebark pine stands in the GYE: 18.4% had low mortality; 49.3% had moderate mortality, and 32.3% had severe mortality. In 2020, ground observations of increasing MPB activity were reported in several areas across the GYE, including the Greys River, Salt River Range, the Wind River Range, the Tetons and sites on the Caribou Targhee (Shanahan, Bockino, Beyer, pers. comm.). By 2021, while not directly observed on permanent monitoring transects established by the Interagency Whitebark Pine Monitoring Program, MPB activity and mortality was becoming alarmingly evident to field crews. In Grand Teton National Park (GTNP) field crews in routine surveys to a subsample of whitebark stands where 333 brood trees were documented in 2021 and 497 in 2022. In 2022, a focused survey was conducted to quantify this potentially emerging MPB epidemic in GTNP's whitebark pine stands which encompasses 20% of the whitebark pine population in GTNP. This effort noted 497 brood trees and of the sampled overstory whitebark, 54% were dead from MPB attack. Among the dead sampled, 35% were recently attacked from 2019-2022. Since 2019, the annual growth in MPB populations has been sustained, spot infestations are coalescing into larger patches and new infested spots are developing in adjacent stands. This situation and trends is the beginning of a second epidemic-level MPB event. This is a grave situation as the loss of any of the few remaining cone bearing whitebark is a significant setback for conservation and restoration.

During the 2004- 2014 epidemic, extensive healthy stands were reduced to critically low numbers of mature, cone

bearing whitebark, but hopefully with a sufficient number of trees remaining to support Clark's nutcracker, its only seed disperser, and whitebark reproduction. However, a second epidemic may result in so few whitebark pine that the delicate and obligate mutualism between the tree and the Clark's Nutcracker could collapse. The prioritization of retaining every possible existing seed tree at all costs is unquestionable. If there is to be hope of conservation of whitebark it is paramount that they be protected, from both fire and MPB. In addition to protecting remaining seed trees, planting rust-resistant seedlings in critical identified habitat is crucial to maintaining reproductive populations of whitebark pine. A combined strategy of planting genetically appropriate seedlings and protecting existing seed trees is key.

Link to short film:

<https://www.creativeascentsfilms.com/Whitebark-Pine-in-the-Tetons-and-GYE/JHWS-2023/n-wBc5Lg/i-pLkh3Xm/A>

Nancy Bockino | Research Associate



Nancy Bockino grew up in the mountains of Idaho, Montana and Washington. Nancy moved to Jackson Hole in 2000 and fell in love with the mountains, whitebark pine trees and the local community. For the past 23 years she has been a passionate conservationist, advocate, and voice for whitebark pine restoration as the project lead at Northern Rockies Conservation Cooperative and Grand Teton Park. She is also a full time ski and mountain guide for Exum Mountain Guides. When she's not leading climbers up the Grand Teton or skiers through the snowy whitebark forests, she can be found visiting and caring for the whitebark throughout the Greater Yellowstone Ecosystem.

Nancy spends nearly every single day in the mountains and for this is very grateful.

Colin Wann | Videographer



Raised in the foothills of the Rockies, on the Front Range of Colorado, Colin spent his childhood outside and grew up exploring the landscapes of the Western U.S. and beyond. Photographing, writing about and illustrating the details of these places, people and experiences has always been a part of his explorations. Producing science communication content for NRCC is right at the confluence of his passions and continues to be both a perfect fit and challenge.

Sam Thackeray | Symposium Presenter



Sam was raised in the mountains of Central Idaho. He spent most of his youth exploring the rivers and mountains near his hometown and falling in love with snowboarding. This eventually led him to a career as a Splitboard and River Guide, taking him on a decade-long journey across the Western U.S. and abroad. He briefly landed in Jackson where he befriended Nancy Bockino who showed him the magic of the Whitebark Pine ecosystem. He quickly took the opportunity to join the team in the effort to preserve the Whitebark Pine in the GYE. He now resides in Park City, UT with his partner Whitney and continues to chase powder and whitewater across the world. When not engaged in these activities he can be found rock climbing, trail running, attempting to play guitar, or reading a book.

Cross-sectoral collaboration for conservation planning

Evelyn Brister

A *Watershed Moment: The American West in the Age of Limits* is a forthcoming collection of essays on land use and land management policy in the Intermountain West, co-edited by myself, Robert Frodeman, and Luther Propst. The goal of the volume is to bring together researchers and practitioners to identify land policy issues and solutions with a focus on the importance of addressing gaps between sectors, academic disciplines, agencies, and communities. The volume recognizes that the complexity of natural and social systems means that in order to minimize unforeseen consequences and difficult trade-offs, it is important to take a holistic approach to managing these systems.

Some of the chapters in this volume address wildlife management. They examine collaborations between ranchers and academic researchers to support beaver rewilding and stream restoration in Idaho; legal innovations and conservation initiatives to preserve elk and mule deer winter ranges and migration paths in Wyoming; efforts to minimize bear-human conflicts in Colorado; and fisheries management on the Snake River.

I argue that what ties these issues and approaches together and distinguishes them from other approaches is that the participants in this book project have built collaborative networks, made effective use of data and wildlife monitoring, designed processes for civic engagement, and created pragmatic solutions. I distill the lessons learned as: 1) acknowledging limits and responsibility; 2) committing to community relationships, including wildlife-human relationships; and 3) designing practical solutions that build from where we are to a future that preserves wildlife populations in the northern Rockies.



Evelyn Brister | Professor of Philosophy, Rochester Institute of Technology

Evelyn Brister is a Professor of Philosophy at Rochester Institute of Technology and is a faculty affiliate in the Department of Public Policy and the Environmental Science program. Her research focuses on public engagement, interdisciplinary scientific collaboration, and innovative approaches in conservation.

Teton County Wildlife Feeding and Bear Resistant Standards: An Update on Compliance

Presenter: Chris Colligan

Co-authors: Tanya Anderson, Town of Jackson Ecosystem Stewardship Administrator; Chris Neubecker, Teton County Planning Department; Kole Stewart, Bear Wise Jackson Hole

Teton County has had Land Development Regulations (LDRs) in place requiring bear-resistant trash containers and restricting bird feeders in specific conflict priority areas, since July 1, 2009. In April 2022, the Teton County Board of County Commissioners approved an update to Section 5.1.3, Wild Animal Feeding, of the LDRs, expanding the regulations to require IGBC-certified bear-resistant trash containers countywide. Modifications were also made that prohibited the feeding of all wildlife and required that bird feeders be unavailable to wildlife at all times of the year. Additionally, regulations were expanded concerning ornamental non-native fruit bearing trees, requiring that fruit on existing trees be harvested or fenced and that new trees shall not be planted (unless for harvest of food). In October 2022, the Town of Jackson updated their wildlife feeding ordinance and added a requirement for bear-resistant trash containers within a designated Bear Conflict Zone which can be expanded over time.

Town and County staff have been working on various outreach and education campaigns, surveying compliance, and coordinating with trash hauling companies, and Bear Wise Jackson Hole (Bear Wise Jackson Hole is a partnership between Wyoming Game & Fish Department, Bridger-Teton National Forest, Grand Teton National Park, and the Jackson Hole Wildlife Foundation.)

The purpose of the County LDRs and Town ordinances on wildlife feeding and bear resistant standards is to implement the community's ecosystem stewardship common values, as outlined in our Teton County Comprehensive Plan. Specifically, the plan recognizes that "the prevalence of wildlife that is central to our ecological, social, and economic character requires an intact ecosystem that supports all native species," and asks to limit human and wildlife conflicts. This presentation will report on the state of compliance with these regulations, efforts to improve compliance, and discuss future needs.

Chris Colligan | Teton County Public Works



Chris Colligan works as a Project Manager for Teton County Public Works. Previously, Chris worked as the Wildlife Program Coordinator for Greater Yellowstone Coalition from 2008-2021. Prior to the Greater Yellowstone Coalition, Colligan worked for Wyoming Game and Fish as a Brucellosis Information and Education Specialist in Jackson from 2004-2008. Chris brings his experience working for agencies and NGOs on challenging wildlife management issues to the County, with a focus on water quality, wildlife crossings, and natural resource issues.

The Mountain Neighbor Handbook: A Local's Guide to Stewardship in the Tetons

The Mountain Neighbor Handbook is a publication of Teton Conservation District in partnership with the Jackson Hole Land Trust, Teton County, and the Town of Jackson.

Presenter: Liz Collins

In Jackson Hole, Wyoming, a heart-wrenching tragedy occurs almost every winter as moose break through thin ice above an aerator and drown in backyard ponds. The distress intensifies when calf moose are involved, leading to hysteria, regret, and blame. The Wyoming Game & Fish Department occasionally intervenes, but the emotional scars linger for homeowners, witnesses, and the distressed moose.

This incident highlights the delicate balance between conservation and development in Teton County, as some argue that preserving natural resources is being outpaced by growth. Drowning moose are not the only challenge we face. The struggle encompasses wildlife conflicts, invasive species, stormwater runoff, and energy consumption, compounded by increased pressures during the pandemic from new residents and higher public land visitation.

In response to these complex issues, *The Mountain Neighbor Handbook: A Local's Guide to Stewardship in the Tetons*, offers hope. This comprehensive 52-page booklet empowers readers to become stewards of this wild place, particularly on private land. Covering topics from wildlife habitat, invasive species, wildfires, energy, and waste, the handbook serves as a compass for residents.

The handbook's aesthetic, positive and action-oriented approach has resonated well with readers. Available in both print and digital formats, its reception has been overwhelming. Teton Conservation District distributed almost 4,000 print copies, and the digital version garnered over 4,100 views, reflecting the community's thirst for knowledge and stewardship.

The Mountain Neighbor Handbook symbolizes collective action to safeguard the remote and spectacular wilderness of which Teton County is a part. As Jackson Hole continues to grow, we must equip ourselves to face future challenges, preserving this wild place for generations to come. How we disseminate information on best stewardship practices matters and is of growing urgency and importance.

Liz Collins | Grants & Communications Specialist, Teton Conservation District



Liz Collins is the Grants and Communications Specialist at Teton Conservation District. She administers natural resource conservation grants, coordinates education and outreach, and creates content that grows Teton Conservation District's community presence. Prior to joining the District, Liz worked in the education and conservation fields. Liz holds a Bachelor of Science degree in Biology from the University of Missouri with a focus in science communication.

Wildlife for All Seeks Wildlife Management Reform in Wyoming

Kristin Combs, Wyoming Wildlife Advocates and JH Bear Solutions

Co-authors Kevin Bixby and Michelle Lute, Wildlife for All

In the midst of the sixth mass extinction event and loss of biodiversity, wildlife governance in our nation is undemocratic, in crisis, doesn't reflect the values of American society, and actively works against coexistence. Most Americans do not hunt or fish yet are largely excluded from making decisions about wildlife. Wildlife management as it stands today is a system by hunters for hunters, not for biodiversity or holistic ecosystem stewardship. Because the current system of state wildlife management is outdated, entrenched and has been captured by consumptive users, it is a barrier to the type of conservation urgently needed to protect biodiversity in the U.S. or the Greater Yellowstone Ecosystem (GYE). The states surrounding the GYE employ wildlife management policies that primarily are driven by raising surplus animals for hunting purposes. Wildlife for All (WFA) is working to reform wildlife management at the state and national level and includes more than 65 organizations in 30 states cooperating to create a new paradigm of wildlife management. Some goals of WFA are reforming state wildlife management laws, abolishing or reforming state Commissions that govern wildlife management, and securing non-hunting related funding for wildlife management.

Wyoming Wildlife Advocates is a member of WFA and is actively working to evaluate current wildlife management in Wyoming and offer a different view of what wildlife management could be if the current system was reformed. Unless wildlife management in the states of Wyoming, Idaho and Montana is drastically overhauled to work toward ecosystem stewardship and also be more democratic to represent a more mutualistic-leaning and diverse public, the GYE is doomed to be subjected to the worst conditions of climate change and biodiversity loss in the decades ahead. As advocates for all wildlife, including large carnivores, ungulates, and keystone species like prairie dogs, we envision a Wyoming where wildlife management is democratic, just, compassionate, and focused on protecting wild species and ecosystems.

Kristin Combs | Executive Director, Wyoming Wildlife Advocates and JH Bear Solutions



With many years of non-profit administration experience, working in private and public science education, and advocating for science-based wildlife management, Kristin has spent most of her professional career making science more accessible to everyone. She has mentored youth, young adults, and professionals alike. As a volunteer for the Teton Wildlife Rehabilitation Center and a life-long advocate for animals, compassion and a love for all creatures are central to her personal credo. Born and raised in the Midwest, she, her husband, and their pup have been happy to claim the Greater Yellowstone Ecosystem as their home for two decades. They welcomed a teenaged daughter and teenaged son from Colombia to their family in September 2022.

A Climate Action Roadmap for Jackson Hole, Wyoming

Reade Dornan, Sandy Shuptrine

Jackson Hole Climate Action Collection

A Climate Action Roadmap for Jackson Hole, Wyoming (Roadmap) is a relatively concise overview of our pathway towards achieving community goals as expressed in a 2020 Town of Jackson sustainability resolution and the Jackson/Teton County Comprehensive Land Use Plan. Its purpose is to familiarize residents, businesses, visitors and government officials with past and potential current actions to address the health of the GYE ecosystem as called for in the Comprehensive Plan. The Roadmap includes suggestions for moving forward to equitably co-exist with nature, especially the variety of wildlife species found in the GYE, by considering the systems of transportation, energy use, energy supply, water, vegetation and waste in the GYE landscape. It can serve as a springboard for minimization and mitigation of human-caused climate disruption. The Roadmap is intended to support local decision makers' actions and to spur public attention to achieving a goal of net co2 neutrality by 2030, using 2006 as a base from which to measure progress. The Roadmap highlights potential actions to diminish our impact on ourselves and wild neighbors, of co2 and methane build-up in the atmosphere, and encourages broader human participation for initiating meaningful responses to the climate dilemma created. It is acknowledged to be (only) a primer for repairing damage, providing hope and guidance.

The bottom line: take heart and review our collective behaviors and regulations, looking for ways we can help the situation depending on our circle of influence, willingness, collaboration, and action. Scientists tell us we have until 2030 to make a meaningful difference.



Reade Dornan

30 yr. English professor at Michigan State Univ. New Teton County School District Board member. Co-founder Jackson Hole Climate Action Collective (JHCAC). Member of Dornan family, early settlers in Moose, WY.



Sandy Shuptrine

Former biology instructor, early childhood educator and Teton County activist inspired by teachings of the Craigheads, Muries, Susan Clark and others. JHCAC board member/volunteer. Served 12 yrs. as county commissioner and 8 yrs. with the Teton Conservation District.

Large Carnivore Fund's approach for protecting large carnivore species in Montana, specifically our work with the state wildlife agency

Helena Edelson

Large Carnivore Fund, a 501c3 nonprofit, was created to strategically focus on helping protect large carnivores within the Greater Yellowstone Ecosystem and beyond. This quick talk will touch on the challenges which led to our founding, a result of many lessons previously learned during public hearings, meetings with members of Montana Fish and Wildlife Commission, the Department's biologists and regional supervisors, being boots on the ground with several nonprofits, and understanding the landscape involved. Then explain the Large Carnivore Fund's approach taken with the Commission, the creation and application of The Large Carnivore Advisory Working Group.

Helena Edelson | Founder & CEO, Large Carnivore Fund



Helena is founder and CEO of Large Carnivore Fund, based in Gardiner, MT and Jackson, WY. She studied wolves in Alaska during graduate school before spending twenty years as a software engineer in Silicon Valley. After retiring, she returned to graduate school to study snow leopards and climate change in Central Asia. COVID lockdown led to a pivot, and she moved to the Yellowstone area to help large carnivore species and observe them on a daily basis. She collaborates with nonprofits, hunters, ranchers, wildlife managers, biologists and others, and testifies at hearings, seeking common ground for sustainable protections of species and habitat.

A new research program to address zoonotic tick-borne disease knowledge gaps in Wyoming

Presenter: Mikenna Smith, Co-author: Kelsey Mitchell

When one thinks of human-wildlife coexistence in the GYE, the first things that often come to mind are bear and human conflicts, vehicle collisions with deer and moose, etc. But what about the smaller, less “desirable” wildlife in our backyards and recreation sites, like ticks, mosquitoes, and rodents that are part of disease transmission cycles?

In other areas of the country where Lyme disease is rampant, research has revealed that wildlife habitat fragmentation and the loss of wildlife diversity have exacerbated this zoonotic disease cycle tremendously, with an estimated 476,000 cases occurring each year. Luckily, there is no evidence of Lyme disease in Wyoming. But, by comparison, we know very little about the zoonotic tick-borne diseases documented in the GYE, such as Colorado Tick Fever Virus, Tularemia, Rocky Mountain Spotted Fever, and Q Fever.

To address these scientific knowledge gaps, Teton County Weed & Pest District is in the process of initiating a new program to survey and research ticks and zoonotic tick-borne diseases endemic to Teton County, as well as non-native ticks moving into the state and new and emerging tick-borne diseases that may impact human and animal health. This program will center on Teton County as ground zero, with partnerships forming throughout Wyoming for more widespread data collection. This program will focus on tick surveillance throughout the county, pathogen testing in-house at our lab in Jackson, and community outreach and education. It is our goal to better understand the ecological interactions of ticks with their environment and wildlife hosts, determine their infection rates at a fine geographic resolution, and engage the public through citizen science collaborations. We have already conducted some preliminary work this year and hope to launch our new research and citizen science program in the spring of 2024.



Mikenna Smith | Entomologist, Teton County Weed and Pest

Mikenna has been with TCWP since 2018. Prior to joining TCWP, she worked as a research assistant. She has a Master of Science in Entomology from the University of Florida, a Master of Science in Agricultural Sciences from Hohenheim University in Germany, and a Bachelor of Science in Environmental Science and Biology from Westminster College in Utah. Mikenna is passionate about disease ecology, particularly tick and mosquito-borne disease systems in the Rocky Mountains, insect toxicology and insecticide resistance, invasion ecology, and classical biological control.



Kelsey Mitchell | Biology, Teton County Weed and Pest District

Kelsey has been with TCWP since February 2023. Prior to joining TCWP, she worked as a research associate in both academia and the biotechnology industry, as well as a science educator. Kelsey has a Master of Science in Applied Biology and a Bachelor of Science in Biology, both earned at Salisbury University in Maryland. Kelsey is passionate about behavioral ecology, evolutionary biology, genetics, and science communication.

Prioritizing Fish Passage Barriers on the North Zone of the Bridger Teton National Forest

Author: Sawyer Finley, Presenter: Leslie Steen

Organization: Trout Unlimited

Partners: Bridger-Teton National Forest, Coombs Outdoors

Road-stream crossing infrastructure frequently serve as barriers to fish passage and affect the overall habitat connectivity of river networks (Bourne et al., 2011; Briggs & Galarowicz, 2013). Fish passage barriers restricts a fish population's effective range, reduce genetic diversity, and limited reproduction and recruitment in significant spawning tributaries (O'Hanley et al., 2013). In the Snake River drainage, the combination of un-regulated tributaries and lack of large-scale damming allows for native Snake River Cutthroat Trout (*Oncorhynchus clarkii behnkei*) to utilize a majority of the river network. However, it is unknown the extent to which road-related barriers such as culverts fragment the river network and reduce movement capacity within the drainage. A large portion of the headwaters of the Snake River flows through the Bridger-Teton National Forest (BTNF) which offers roughly 1,000 miles of navigable roads. Previous efforts to inventory and prioritize fish-passage barriers on the BTNF have occurred opportunistically on the South Zone, or multiple decades ago on the North Zone. Trout Unlimited, in partnership with the BTNF, has initiated a project to identify, assess, and prioritize fish-passage barriers for removal to better understand trout dispersal ability in the Snake River Headwaters. Over the course of the 2023 field season, we identified 408 potential barriers using a road-stream intersect using GIS. 113 of these identified barriers were evaluated using the Southeast Aquatic Resources Partnership (SARP) barrier assessment protocol to quantify barrier severity. Within the three major drainages sampled (Buffalo Fork, Gros Ventre, and Hoback), severe barriers to fish passage were identified resulting from culverts that were undersized, perched, or served as velocity barriers. Currently, work is being done to integrate trout presence-absence and range wide genetic data to further inform prioritization outcomes and management decisions.

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- O'Hanley, J.R., Wright, J., Diebel, M., Fedora, M.A., and Soucy, C.L. 2013. Restoring stream habitat connectivity: A proposed method for prioritizing the removal of resident fish passage barriers. *Journal of Environmental Management* 125: 19-27.

Sawyer Finley | Project Manager, Trout Unlimited

Sawyer is originally from Fort Collins, Colorado. He received a Masters from Idaho State University in Freshwater Ecology and is the Snake River Headwaters Project Manager for Trout Unlimited. In his free time he enjoys fly fishing, skiing, and reading.



The American West in the Age of Limits

Presenter: Robert Frodeman

In *The American West: the Invention of a Myth* (2001) David Hamilton Murdoch describes the rise of the frontier saga as a response to the trauma of the Civil War and the massive social changes that occurred in its aftermath. It is also true, however, that the origins of the frontier myth stretch back to the discovery of the ‘New World’. Ignoring the presence of Indigenous Peoples, the seemingly boundless resources of the Americas meant that Euro-American society could be constructed on the basis of endless opportunity. The frontier would function as an escape valve where people could pursue their private sense of good fortune irrespective of the needs of others.

This era is coming to an end. The American West today offers a particularly vivid sense of how both ecological and cultural limits are changing the basis of American society. *A Watershed Moment: Facing Limits Across the American West* (Robert Frodeman, Evelyn Brister, and Luther Propst, editors, forthcoming 2024) examines these challenges and the policies that communities can adopt to live well within limits. Essays by leaders in land use planning and wildfire, wildlife, and tourism management demonstrate the connections between land use policy and cultural values. Additional essays by historians, anthropologists, and sociologists investigate the cultural and political traditions that affect community decision-making in the face of limits.

This volume integrates practical approaches to land use, land management, and planning with a rich philosophical perspective on justice, quality of life, and sustainability in the American West. This quick talk will outline the underlying assumptions and policy goals of this volume.

Robert Frodeman | Independent Researcher/Fulbright Fellow, University of Turku, Finland



Robert Frodeman writes on environmental philosophy and public policy, science and technology policy, and the future of the university. Founding director of the Center for the Study of Interdisciplinarity at the University of North Texas, he also held academic positions at the University of Colorado and the Colorado School of Mines and has consulted for universities and science agencies worldwide. The author or editor of 15 books and 150 articles, Frodeman is now an independent writer based in Wyoming.

Sustaining the Working Lands of the Greater Yellowstone Ecosystem

Shaleas Harrison, Wyoming Resource Coordinator, Western Landowners Alliance

As development pressures rise, landowners throughout the GYE face a daunting task of keeping working lands economically viable and intact. Private lands comprise about 30% (6 million acres) of the GYE¹. Private lands not only contain important wildlife habitat, biodiversity, and sustain local economies, but they are also the lands most at risk. In the US, an estimated 14 million acres of rangeland, including sagebrush ecosystems, were lost between 1983 and 2017². The U.S. lost 1.9 million acres of farmlands in 2022, with a quarter of that just in Wyoming³. In the GYE and beyond, conservation in the 21st century will inevitably be focused on the remaining private and working lands where economic forces are a central consideration. Developing value systems for the ecosystem services provided by working lands can help landowners keep these lands whole and healthy for the benefit of people and wildlife.

Policies relevant to private land conservation are taking shape within obscure sections of the Farm Bill, and are currently being “piloted” on the ground in Wyoming. This collection of tools and resources is being deployed through the USDA/Wyoming Big Game Conservation Partnership, and aims to support working lands, conserve wildlife habitat, and maintain migration corridors. Western Landowners Alliance (WLA) plans to share these developing tools and policies, particularly habitat leasing, and the role that ecosystem service markets will play in conservation.

How can agencies and the public better recognize and value ecosystem services provided by working lands? What tools will need to be tweaked and further crafted to prevent fragmentation and loss of connected landscapes? Our quick talk will explore these ideas and share the importance of including landowners as true partners in the quest to save the remaining at-risk lands of the GYE.

Western Landowners Alliance advances policies and practices that sustain working lands, connected landscapes and native species.

¹ Robert Bonnie. (2022, May 22nd). The Importance of Working Lands to Yellowstone in the 21st Century. (Keynote Speaker). Yellowstone National Park 150th Symposium, Cody, WY.

² 2017 National Resources Inventory Summary Report (USDA 2020).

³ USDA Farms and Land in Farms. (2022). Retrieved from: <https://downloads.usda.library.cornell.edu/usda-esmis/files/5712m6524/bk129p580/2z10z2698/fnlo0223.pdf>

Shaleas Harrison | Wyoming Resources Coordinator



Shaleas Harrison's ancestors began irrigating in the Bighorn Basin of Wyoming over six generations ago. She still helps out at the family farm during the summertime, setting tubes, pulling weeds, and operating equipment. She understands well the struggles and rewards people encounter when their livelihoods depend upon the land. Shaleas comes to WLA with six-plus years of conservation non-profit experience in Wyoming, implementing stewardship projects with landowners and agencies, conserving connected landscapes, and influencing policy. At WLA, she uses her passion for conservation and agriculture to sustain working lands by improving the policies and practices that increase land stewardship.

Wildlife Research from Carcass: The Afterlives of Animal Bodies

Kristen Hugo, MIT Press

One of the chapters of my upcoming book, *Carcass: The Afterlives of Animal Bodies*, focuses on wildlife, featuring the wild animals of Wyoming.

In this presentation, I'll present some animal remains I have studied, including last winter's significant death rate of deer and pronghorns, animals caught in fences, etc. Animals in the GYE face a number of pressures, some acceptable and some not so much. Predation, hunting, poaching, inability to migrate, getting trapped, disease, cold, and competition are all worth studying. We can better understand those pressures--and potentially reduce some of them--if we study the bodies.

Carcasses are critical for understanding live animals, and for continuing the circle of life by providing food and nutrients to people, other animals, plants, and the soil. The book should be available in spring of 2025, to be published by MIT Press.



Kristen Hugo | MIT Press

Kristin Hugo is a science journalist with a focus on biology, nature, animals, and bones. Kristin's current main project is writing the book *Carcass: The Afterlives of Animal Bodies*, which MIT Press will publish in 2025. After earning a BA in Journalism from CSU Northridge and an MS in Science Journalism from Boston University, Kristin worked as a science writer for National Geographic, PBS Newshour, Newsweek, Bay Nature Magazine, and more. Kristin also has experience in multimedia, social media, photo, video, and illustration. Her bone-themed TikTok account, @RollBones, has nearly 200,000 followers. She lives in Kemmerer, Wyoming.

Sagebrush and Whitebark Pine Habitat Restoration in Grand Teton National Park

Laura Jones, National Parks Service

Sagebrush and whitebark pine ecosystems are incredibly important for plant diversity, wildlife habitat, and watershed function. Conservation of these ecosystems represent collaborative efforts beyond park boundaries. Grand Teton National Park has a goal to restore 4,500 acres of non-native hayfields back to sagebrush to provide year-round forage and shelter for an abundance of wildlife, including the greater sage-grouse. Project sites lie within elk, moose, pronghorn and mule deer migration corridors. Grand Teton has seeded 1,450 acres to date, recently focusing on increasing forb and shrub representation through additional seed collection, new seed increase fields, and a seed cooler purchase to protect the investment in seed. Grand Teton is part of a larger National Seed Strategy to increase the availability of local ecotypes appropriate for restoration—an effort that is anticipated to work across boundaries and to include non-federal partners. The Park will continue implementing restoration through large-scale drill seeding and planting for shrub species not easily established from seed.

Whitebark pine has declined by 51% range wide due to mountain pine beetle, white pine blister rust, altered fire regimes, and climate change leading to being listed as Threatened this year. For over 20 years, Grand Teton's whitebark pine program has been part of a highly coordinated Greater Yellowstone Ecosystem conservation effort to identify and protect rust resistant trees from beetle attack, collect cones, pollen, and scion from them, and monitor stand condition. Seeds across this region are part of one seed zone and are shared among land management units. Grand Teton began restoration efforts this year, direct seeding 1,334 seed caches and ordering 4,000 seedlings to be grown for planting in 2025. Aside from a pilot project ten years ago, this marks the beginning of restoration in the Park, which will continue for several years.



Laura Jones | Vegetation Ecologist

Laura Jones has been leading the Vegetation Ecology and Management Branch at Grand Teton National Park for the last four years. She has also served at Colorado National Monument, Yosemite National Park, and Boulder County Open Space with an emphasis on resource management, science, and planning and ecological restoration. She received her Master of Science in Biology studying estuarine restoration at the University of Southern Maine.

Transformative Conservation and Collaboration: Teton Creek Corridor Collaborative's Approach to Environmental Impact in the Greater Yellowstone Ecosystem

Amy King, LegacyWorks Group

The Teton Creek Corridor Collaborative, a partnership of local nonprofits, presents an innovative approach to conservation and community impact in the Greater Yellowstone Ecosystem. Our project, situated in the heart of Teton Valley, Idaho, focuses on the restoration and stewardship of the Teton Creek Corridor, fostering coexistence between human populations, wildlife, and the environment.

Our success stems from combining the strengths of various partner organizations. Over nearly a decade, the Teton Regional Land Trust, Valley Advocates for Responsible Development, Friends of the Teton River, and Teton Valley Trails and Pathways have collaborated to breathe life into this evolving community asset. Our interdisciplinary strategy includes trail connectivity and recreation opportunities, conservation of critical habitats and agricultural lands, enhancement of wildlife habitat, flood mitigation and stream habitat improvements and fostering responsible and sustainable development. This collaborative model has led to transformative outcomes and innovative conservation practices that couldn't be achieved by one organization alone.

By highlighting the Teton Creek Corridor Collaborative's achievements, challenges, and lessons learned, we aim to inspire others to adopt similar collaborative approaches in their conservation endeavors. Our work aligns with the symposium's focus on innovative conservation and socio-ecological issues, showcasing a model that ensures an optimistic future for all in the Greater Yellowstone Ecosystem.

We're excited to share how collaborative efforts can reshape the landscape of conservation, leading to a balance between the needs of wildlife, the environment, and our communities.

Amy King | LegacyWorks Group



Amy King, Project Director at LegacyWorks Group in the Tetons, brings a diverse background in agriculture, ecology, engineering, social entrepreneurship, and product design to her work. With a Master's in Civil and Environmental Engineering focused on sustainable design and renewable energy from Stanford University, along with a Bachelor's in Earth Systems emphasizing human impact on ecosystems, Amy's academic journey is underscored by practical experience. Raised on a cattle ranch in northern New Mexico's high desert, she developed a deep understanding of the interplay between nature and human activities, driving her commitment to collaborative problem-solving. Based in Jackson, Wyoming, Amy draws inspiration from her surroundings and community, all while working to enhance the relationship between nature and humanity.

Teton County Wildlife Crossings: Design Plans for Future Projects

Presenter: Julia Kintsch, ECO-resolutions

Co-authors: Chris Colligan, Teton County Public Works; Mila Dunbar-Irwin, Jorgensen Engineering; Megan Smith, EcoConnect Consulting LLC

More than 300 large animals are hit and killed annually on roads within Teton County. Collisions with large wildlife like moose are especially dangerous and costly, averaging over \$30,000 per collision, and are a threat to human safety. Natural resources and wildlife are stated in the Teton County/Jackson Comprehensive Land Use Plan as some of the most important values for Teton County residents, and also benefit the local economy. Wildlife crossings and wildlife funnel fencing that are carefully planned for specific locations, reduce wildlife-vehicle collisions by up to 80%.

To address these concerns Teton County adopted the Teton County Wildlife Crossings Master Plan in 2018. To date, wildlife crossing design and construction in Teton County has been initiated through opportunities on highway reconstruction projects led by the Wyoming Department of Transportation (WYDOT). In 2022, Teton County contracted with Jorgensen Engineering and their subconsultants to begin the development of engineering design plans for specific locations called out in the Master Plan (US HWY 26/89/191 - Camp Creek area, North US HWY 89/191 - between the USFWS Fish Hatchery and Town of Jackson, and Wyoming Highway 22 - West side of Teton Pass). This planning process has incorporated state and federal agency objectives and concerns and involved local stakeholders in siting and design. This presentation will preview the locations and design concepts for these three priority areas.



Julia Kintsch | ECO-resolutions founder

Julia Kintsch is the founder of ECO-resolutions and a certified Senior Ecologist with over 18 years' experience in landscape connectivity and transportation ecology. Julia works to create practical and effective solutions for addressing wildlife-highway conflict and she has been involved in the planning, design, and research of numerous mitigation projects. Her efforts have advanced the science and practice of transportation ecology and spurred collaborative partnerships at the local, state, and regional levels.

Teton County Human-Wildlife Coexistence Monitoring Report 2022-23

Presenter: Kevin Krasnow, Conservation Director, Jackson Hole Conservation Alliance

Co-authors: Grant Gallaher, Chelsea Carson (The Nature Conservancy)

Human-wildlife coexistence is at the core of the ecosystem, economy, and social dynamics of Teton County, Wyoming. To make informed decisions concerning human-wildlife coexistence, it is important to establish metrics to track our challenges, successes, and opportunities over time. Although many organizations collect data on singular aspects of human-wildlife coexistence, our community lacks a centralized resource to holistically evaluate community-level coexistence. The 2022-23 Teton County Wildlife Coexistence Monitoring Report addresses this gap by compiling 20 metrics of human-wildlife coexistence. Metrics were determined through engagement of 40+ stakeholders, including land managers, elected officials, conservation professionals, scientists, and long-time residents, among others and represent a starting point for monitoring and stewarding the incredible natural capital of this area.

The Teton County Wildlife Coexistence Monitoring Report is divided into three chapters. Chapter 1 presents metrics related to Land Use, including Habitat Protection and Threats and Landscape Permeability. Chapter 2 focuses on Human-Wildlife Interactions from Bear Feeding/Conflict and Recreation. Finally, Chapter 3 highlights the Human Dimensions of Coexistence, evaluating Strategies, Monitoring, and Funding as well as Stakeholder Perspectives.

This report is intended to inform and advance ecosystem stewardship, monitoring, and conservation action in Teton County. By establishing this baseline, future monitoring, research, dialogue and action can be targeted toward root challenges, evolving opportunities, and a united community vision of wildlife-human coexistence in Teton County.

This presentation will introduce the audience to the report, reflect on what the data means for our community, and then solicit feedback about what is missing and how data like this can / should be used to further coexistence efforts.



Kevin Krasnow | Jackson Hole Conservation Alliance

Kevin is an ecologist and educator seeking to find sustainable solutions to pressing environmental problems and to educate the next generation of environmental stewards. His [research](#) focuses on understanding fire ecology, global change, ecosystem resilience, and effective science education. For the past decade, Kevin has been the research director at the Teton Science Schools in Jackson, Wyoming, where he taught graduate level ecology courses and directed ecological and educational research. In January, Kevin started as the Conservation Director at the JH Conservation Alliance.

Western Toads and their dam problems in Grand Teton National Park

Debra Patla, Northern Rockies Conservation Cooperative

Jackson Lake dam and its management for human uses far downriver in Idaho present barriers for conserving natural ecosystem processes in the Jackson Hole portion of Greater Yellowstone. Local and government concerns about native fish survival, human recreation, and scenic values (such as the famed Oxbow Bend) are escalating as climate changes and irrigation needs have led to extreme fluctuations in Jackson Lake reservoir levels and Snake River flows. Western Toads are also affected by dam management decisions, probably more so than other local amphibians, due to their habitat preferences. Above the dam, toad reproduction and survival depend on reservoir levels and the timing of drawdowns; both a completely full and a half-empty lake in summer can prevent successful toad breeding and recruitment in otherwise suitable bays. On the Snake River below the dam, rapid changes of river flow can flush out or strand toad eggs and tadpoles in side channels. Here I present case studies of two amphibian breeding areas that have been monitored since 2016, one located above the dam in a bay on the east side of Jackson Lake, and one in side channels along the Snake River above the Buffalo Fork confluence. Toads have multiple adaptations to cope with annual environmental variability, but these observations suggest that human-caused changes are presenting increased habitat challenges for successful toad reproduction and population persistence. As Snake River and reservoir management discussions intensify and confront multiple, complex historical and economic drivers, it is important to seek solutions that consider not only fish populations and water-sports recreation, but also toads and other wildlife not yet at the table to thrive in this vital area of the GYE.

Debra Patla | Biologist



Debra Patla has conducted research and monitoring of amphibians in the GYE since 1993, working with Dr. Charles Peterson of Idaho State University, the multi-partner Greater Yellowstone Amphibian and Wetland Monitoring program in Yellowstone and Grand Teton national parks, and on the National Elk Refuge. She continues to monitor amphibians at multiple long-term study sites in the GYE. Living first in Teton Valley and then Buffalo Valley for the past nearly 4 decades, she is grateful every day for the strenuous efforts of fellow-conservationists, past and present, to protect this treasured place and its biodiversity.

Trumpeter Swan Restoration in the Green River Basin, Wyoming: 2002-2021

Susan Patla, Northern Rockies Conservation Cooperative

Trumpeter Swans (*Cygnus buccinator*) were nearly extinct by the early 1900's, decimated by market and subsistence hunting across its historic range in North America. Conservation efforts starting in the 1920's in the Greater Yellowstone area (GYA) saved the species from vanishing. It is now considered secure in North America, but ironically, the small historic breeding population in the GYA remains vulnerable. In Wyoming it is designated a species of conservation concern. Prior to range expansion efforts, distribution of this species in Wyoming was limited to the Snake River drainage. Wyoming Game and Fish Department biologists identified the Green River basin as a potential expansion area for both nesting and wintering swans in the 1980s and developed a range expansion plan. Releases of wild swans first and then captive-reared birds began in the early 1990's in the Pinedale area and at Seedskaadee National Wildlife Refuge. Releases ceased after 2002 when the expansion project goal of establishing 10 nesting pairs was accomplished. Swan numbers increased rapidly in the Green River drainage over the following 13 years: the number of adult and subadult swans (excluding cygnets or young of the year) grew from 33 in 2003 to a peak of 149 in 2016. Swan numbers after 2016 began to decline annually, dropping to a low of 68 in 2021. In 2022, the population rebounded slightly to 102. The number of nesting pairs has remained fairly constant since 2015 but decreases in nest site productivity and number of non-breeding birds have been documented. What the long-term carrying capacity will be remains a question. Active management including protection and restoration of shallow-water wetland habitat will likely be needed to maintain a stable swan population in Wyoming and the GYA in the face of on-going regional climate change and human population growth.

Susan Patla | Biologist



Susan Patla retired from the Wyoming Game and Fish Department in October 2018 after working as a nongame biologist in the Jackson/Pinedale Region for 20 years. Her work focused on species of conservation concern including the Trumpeter Swan, and she was for many years the chair of the Greater Yellowstone Trumpeter Swan Working Group. She received a MS degree from Idaho State University, Pocatello (Nesting Ecology of the Northern Goshawk in the Greater Yellowstone Area) and a BA from University of Michigan, Ann Arbor. She remains a research associate with the Northern Rockies Conservation Cooperative and has served as a board member of the Raynes Wildlife Fund since its inception. Watching and trying

to understand birds remains her main passion and pastime.

Wolves, Rewilding, and Fear: Lessons from Evolutionary History for Coexisting with Predators Today

Joanna E. Lambert, PhD

As with all vertebrate species, humans are adapted to either fight, flee, or freeze upon confronting potentially life-threatening stimuli such as predators. Yet, throughout most of our 300,000+ year evolutionary history we lived in landscapes with large-bodied apex carnivorans, and existing in a constant state of fear is not only emotionally costly and physiologically expensive but also incapacitating and maladaptive. Coexistence was thus facilitated through habituation to sharing landscapes with predators as well as specialized knowledge (e.g., tools, dogs, shared information) for how to live with such wildlife. At issue today is that over much of the planet, particularly in regions of western Europe and the United States, apex predators such as gray wolves and brown bear were nearly completely extirpated -- with a loss of these animals came a loss of habituation, the knowledge required to coexist with them, and a concomitantly reduced tolerance to their presence. In this talk, I describe how humans coexist(ed) in landscapes with Carnivora in deep time (Pleistocene), recent history (Holocene), and now (the Anthropocene). I evaluate how fear can lead to reduced tolerance in regions where apex predators are returning because of conservation successes (e.g., Endangered Species Act, rewilding campaigns). I use the Colorado wolf restoration campaign as a case study and argue that insights from our evolutionary past and the neurobiology of fear can provide tenets for rewilding and coexistence that rest on a deep understanding of the significance of learning and habituation.

Joanna Lambert | Professor, University of Colorado

Departments of Environmental Studies and Ecology & Evolutionary Biology



Joanna Lambert, PhD, is a scientist and tenured professor of wildlife ecology and conservation biology at the University of Colorado – Boulder, where she serves as Director of the American Canid Project and the Principal Investigator in the Wild Animals and Humans Laboratory. Joanna’s work and travel have now taken her to all 7 continents, but a major focus of her research has been on equatorial Africa where she studies endangered primates such as chimpanzees and the American West where she studies carnivores. She has published several books and hundreds of peer-reviewed articles on her research and serves as editor for several international science journals. For her efforts she has been elected as a Fellow in the American Association for the Advancement of Science as well as a Fellow in the Linnaean Society of London – the institution where Charles Darwin first presented his theory of evolution. In addition to being a field scientist and educator, Joanna is also a conservation practitioner and activist. In this capacity she serves as a member of the International Union for the Conservation of Nature’s Species Survival Commission, as an advisor to the United Nations Environmental Program, and sits on the Board of Directors for the Rocky Mountain Wolf Project. In her spare time, Joanna spends as much time as she can off-grid in wild and rugged places, preferably on a horse and with her dogs, striving for optimism and solutions in a challenging world. See more about her work at: www.joannalambert.com

Amphibians and Wetlands of the Greater Yellowstone Ecosystem Photo Exhibit

Charles R. Peterson, Debra Patla, Andrew Ray, and Ben LaFrance.

The goal of this photo exhibit is to develop public appreciation for the diversity and ecological importance of amphibians in the Greater Yellowstone Ecosystem (GYE) and to raise awareness of the threats to amphibian populations and their habitats (e.g., climate change, habitat modification/fragmentation, disease, and introduced species). Photographs have the capacity to stimulate interest, curiosity, and concern among people of all ages for these seldom-seen animals and their habitats. The exhibit includes nine 24” wide panoramas of wetland landscapes with 4” x 6” portrait photos of the species known to breed there. The panoramas include different wetland types (marshes, ponds, lagoon, lakes, and river channels) from Yellowstone and Grand Teton national parks and southeastern Idaho. The exhibit also includes 8” x 12” prints of the adults of the 8 amphibian species occurring in the Greater Yellowstone Ecosystem (Western Tiger Salamander, Western Toad, Boreal Chorus Frog, American Bullfrog, Northern Leopard Frog, Columbia Spotted Frog, Plains Spadefoot, and Great Basin Spadefoot). This exhibit is made possible through funding from the Meg & Bert Raynes Wildlife Fund and is part of the Idaho Museum of Natural History's traveling exhibit program. Targeted venues include museums, libraries, and nature and visitor centers in Wyoming, Idaho, and Montana.

Charles Peterson | Emeritus Professor



Charles Peterson is an Emeritus Professor in the Department of Biological Sciences at Idaho State University, the Affiliate Curator of Herpetology for the Idaho Museum of Natural History, a Research Associate of the Northern Rockies Conservation Cooperative, and the 2023 Artist in Residence for the Sagebrush Steppe Land Trust.

Debra Patla | Research Associate



Debra Patla is a Research Associate of the Northern Rockies Conservation Cooperative and the former Field Coordinator for the Greater Yellowstone Amphibian and Wetland Monitoring program in Yellowstone and Grand Teton national parks, a collaborative project under the National Park Service Inventory and Monitoring Division. She continues to monitor amphibians at long-term study sites in the GYE.



Andrew Ray | Wetlands Ecologist

Andrew Ray is a wetlands ecologist with the National Park Service's Inventory and Monitoring Division. He formerly co-coordinated the NPS's Cooperative Amphibian Monitoring Project in Yellowstone and Grand Teton national parks and currently coordinates monitoring activities for the Southern Plains Inventory and Monitoring Network. He also participates in collaborative amphibian inventory and monitoring work in parks across the Southwest.



Ben LaFrance | Biologist

Ben LaFrance is a Biologist / Physical Scientist for the Greater Yellowstone Network within the Inventory and Monitoring Division of the National Park Service. After working with Andrew Ray for a few years, Ben now coordinates the amphibian, wetland, and water quality monitoring projects for the Greater Yellowstone Network.

Cry Wolf Project: Bioacoustics, Artificial Intelligence and Co-Existence

Dr. Jeff Reed

Artificial Intelligence technologies are increasingly finding application among biologists and conservationists, particularly in the realm of wildlife monitoring, and to a lesser extent, conservation strategies. In the northern region of the Greater Yellowstone Ecosystem, both within and beyond the park's boundaries, several groups are harnessing AI to gain deeper insights into the communication, movement, populations, and behaviors of wolves, along with other species, including humans.

This presentation will delve into the initial outcomes of a unique study involving 24x7x365 recording of wolf vocalizations in the northern range. Furthermore, we will explore the advantages and hurdles associated with leveraging AI technology for noble purposes, acknowledging that perspectives may differ on its potential consequences.

We will specifically examine how the synergy between AI-equipped camera traps and acoustic recorders serves as a minimally invasive, cost-effective resource, facilitating:

- (a) The collection and analysis of extensive landscape datasets for scientific research.
- (b) The identification of wildlife presence, enabling the monitoring of population distributions.
- (c) Early alerts to landowners about potential conflicts between carnivores and livestock.
- (d) The monitoring of landscape degradation and restoration due to development.
- (e) An exploration of the potential negative implications of AI usage.

Most importantly, this presentation offers a delightful opportunity to engage with the captivating world of non-invasive, up-close-and-personal wolf vocalizations, adding a touch of enjoyment to our exploration.

Dr Jeff Reed was born and raised in the Greater Yellowstone Ecosystem in southwest Montana and owns



Reedfly Farm in Paradise Valley, Montana. With a PhD focused on linguistics, he spent 30 years in the technology industry, working on software and hardware solutions for enterprises, including artificial intelligence solutions for Microsoft, Google and Amazon. He now builds AI-infused camera and acoustic technology used by biologists, conservationists, and private landowners for both conservation monitoring, security, and co-existence objectives. He focuses much of his free time interacting with wildlife, working on his paleo-skills, researching animal communication via computational linguistics, and living as part of nature. He is an executive committee member of the Upper Yellowstone Watershed Group (www.upperyellowstone.org) and Wild Livelihoods (www.wildlivelihoods.com), promoting the co-existence of people and wildlife...though he considers people wildlife

too!

From science to conservation action: an example using mule deer

Justin Schwabedissen, Sarah Dewey, Grand Teton National Park; Rob Cavallaro, Idaho Department of Fish and Game; Josh Rydalch, Idaho Department of Fish and Game; Tamara Sperber, Teton Regional Land Trust

The Greater Yellowstone Ecosystem (GYE) hosts several of the longest, fully intact ungulate migrations remaining in the continental United States. Mule deer (*Odocoileus hemionus*) that summer in Grand Teton National Park (GTNP), Wyoming migrate to winter ranges throughout the GYE using numerous migratory routes. While the endpoint is often a seasonal range on protected lands, these migrations frequently cross other jurisdictional boundaries, including large tracts of private or multiple-use lands, with varying levels of protection. Efforts to sustain migratory mule deer populations in the park depend on working across large, varied landscapes in partnership with a diversity of stakeholders, including private landowners and local communities.

One migration route mule deer utilize connects summer ranges in GTNP with winter ranges to the west in an agricultural landscape along the Teton River Canyon, Idaho, where development pressures are increasing. In a complex working landscape, such as eastern Idaho, it can be challenging to identify which conservation actions to pursue. Prioritization tools can help organizations make informed decisions about where to focus conservation efforts that maximize the impact of limited resources. Using data from 22 GPS-collared mule deer combined with landscape characteristics within the Teton River Canyon area, we developed an ecologically-based model to estimate the conservation value of private land parcels for migratory mule deer. We present the model framework and discuss its application for conserving sustainable mule deer populations in our project area.



Justin Schwabedissen | Bear Biologist

Justin Schwabedissen is the Bear Biologist in Grand Teton National Park. Prior to leading the park's bear program, he worked on a diversity of wildlife projects in the Greater Yellowstone Ecosystem, including avian monitoring, mule deer migration, prey selection by wolves, and the human-wildlife interface. Justin holds a BS in Wildlife Resources from the University of Idaho and is completing a MS in Wildlife Biology at Utah State University.

Sarah Dewey | Wildlife Biologist



Sarah Dewey is a wildlife biologist in Grand Teton National Park. She leads the park's ungulate program, and has worked on a range of wildlife projects during her time in the park. Some of her work has included investigations of mule deer migration, bighorn sheep ecology and genetics, wolf predation patterns and social dynamics, and wildlife-vehicle collisions. Prior to working at Grand Teton, Sarah worked for the Forest Service monitoring forest raptors, conducting surveys for lynx and wolverine, and preparing biological assessments and evaluations. Sarah is a graduate of Colby College in

Maine and holds an MS in Wildlife Biology from Colorado State University.

Using Science and Partnerships to Conserve Key Habitats and Ecological Functions in the Teton River Canyon System

Author: Tamara Sperber, Teton Regional Land Trust

Co-Authors: Rob Cavallaro and Josh Rydalch, Idaho Department of Fish and Game, Sarah Dewey and Justin Schwabedissen, Grand Teton National Park

Teton Regional Land Trust, Idaho Department of Fish and Game, Grand Teton National Park, The Conservation Fund, and the Bureau of Land Management are using science and partnerships to preserve and enhance key habitats and ecological functions of the Teton River Canyon system in eastern Idaho. The Teton River Canyon system, rich in fish and wildlife habitat resources, is a focal area for conservation in Idaho and plays a crucial role in the survival and long-term viability of species such as mule deer. Our partnership is using mule deer as a conservation target due to their flagship species status, general inability to adapt to habitat loss, large landscape needs, and strong dependence on the Teton River Canyon system for transitional and winter range. We are utilizing a mule deer-based private land conservation prioritization model, developed by Grand Teton National Park with the help of Idaho Department of Fish and Game, to help guide strategic acquisition of land and permanent conservation easements and to prioritize habitat restoration. Our goal is to work with willing landowners to maintain the open agricultural landscape and interconnected, high-quality habitat of this system on conserved private and public lands based on science and our conservation partnership experience and success from elsewhere in the region. We'll present on conservation accomplishments and opportunities.

Tanya Sperber | Conservation Director, Teton Regional Land Trust



As Teton Regional Land Trust's Conservation Director, Tamara oversees the Land Trust's conservation program including conservation easement acquisition and stewardship, fee-owned lands acquisition and management, habitat restoration and conservation planning. Tamara started working at the Land Trust in 2006 after spending 4 years in the Central Valley of California completing large-scale riparian restoration. Tamara received her undergraduate degree in Ecology from Idaho State University and her Master's degree in Land Rehabilitation from Montana State University.

What we learn from Raptor Rehabilitation

Meghan Warren, Sheena Patel

At Teton Raptor Center, we admit over 170 injured, ill, and orphaned raptors and corvids into our rehabilitation program from all over Wyoming and Idaho annually. These birds come in with broken wings, head trauma, or illness. Our goal is to get the birds back to the wild where they can continue fulfilling their role in the ecosystem. Many birds (around 30%) that are admitted are euthanized within 24 hours because their injuries are not treatable. Treating and feeding raptors is time and resource-intensive. So why do we do it? Every animal that comes into rehab adds to the body of information about the health of wildlife. From twine entanglement, to lead poisoning and hot spots for vehicle collisions, raptor patients can give us a picture of what is impacting wild birds in the state. Rehab is not just about rescue, rehab, and release; it is also about research. The lessons we learn from the birds we admit into our rehab are incorporated into our education and research programs so that we can prevent these instances of human-wildlife conflict in the first place.



Meghan Warren

Meghan grew up in Sedona, Arizona, but spent every summer in Pinedale, WY where her parents and grandfather ran Skinner Brothers Wilderness School. There she spent the summers camping, riding horses, fishing, and hiking. Growing up in two incredibly beautiful places gave Meghan a lifelong interest in conservation. She started at TRC as a volunteer in 2010, then completed TRC's internship in 2011 before being hired on as a full-time staff member. Meghan now directs all avian care at Teton Raptor Center. Meghan graduated from Willamette University in 2011 with a bachelor's degree in Biology and took a year away from TRC to complete her master's in

Conservation Medicine at Tufts University Cummings School of Veterinary Medicine in 2019.

Sheena Patel | Associate Avian Care Director



Sheena has worked with both captive and wild raptors since 2015 in wildlife rehabilitation, field research, and education positions before joining the team at Teton Raptor Center in 2017. She received her bachelor's in Biology in 2015 from Longwood University and her master's in Wildlife Conservation & Biology from the University of Maine in 2021. Working with birds has taken her all over the country to different wildlife rehabilitation centers before she eventually landed here in Wyoming at Teton Raptor Center. Sheena is

thrilled to be a part of the organization and to be able to specialize in raptor and corvid rehabilitation in Jackson Hole.