PROCEEDINGS OF THE 13th PRAIRIE CONSERVATION AND ENDANGERED SPECIES CONFERENCE

Prairie Collaboration, Connection, and Conservation (PC3)

Calgary, Alberta
February 21-24, 2023

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Published by:

Prairie Conservation Forum
Lethbridge, Alberta
2024

Edited by:

Cassandra Jokinen

2023 Prairie Conservation & Endangered Species Conference - Alberta Prairie Conservation Forum (albertapcf.org)

Suggested citation:

Jokinen, C. (ed). 2024. *Prairie Collaboration, Connection, and Conservation*. Proceedings of the 13th Prairie Conservation and Endangered Species Conference. February 2024. Calgary, Alberta. Alberta Prairie Conservation Forum, Lethbridge, Alberta.

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Plenary 1: Role of Conservation Breeding and Release of At-Risk Prairie Species – Insights from the Wilder Institute/Calgary Zoo

Lea Randall, Colleen Baird, Graham Dixon-MacCallum, James Glasier, Caitlin Slade, Rebecca Stanton, Kristina Stephens, Darío Fernandez-Bellon, Doug Whiteside, and Patrick Thompson

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The need for action to support the recovery of species at risk is growing and conservation translocations—likely in conjunction with conservation breeding programs—have been identified as a relevant tool in the recovery plans of many Canadian species. The Wilder Institute/Calgary Zoo's team of ecologists, veterinarians, and animal husbandry experts have been working collaboratively for over 20 years on the conservation of at-risk species in the Canadian Prairies. The team's approach involves breeding, maintaining healthy, genetically diverse populations under human care, and the release of animals into their prairie habitats. This is coupled with scientific research to understand the best strategies to support species recovery, continually improve methods, and communicate learnings. This panel will be sharing our team's current efforts on conservation initiatives focused on the Burrowing Owl, Half-moon Hairstreak Butterfly, Greater Sage-Grouse, and Northern Leopard Frog, including progress to date, the essential role of collaborations and partnerships, key research questions and findings, and conservation impacts. This work is done in collaboration with a breadth of partners and often contributes to provincial or national recovery strategies. The team will share how they adapt each conservation program depending on the unique needs of each species. Discussions will include head-starting, wild-to-wild translocations, conservation breeding for release to the wild, soft and hard releases, post-release monitoring, the importance of habitat assessments, and long-term population data. The team will also speak about working to achieve meaningful conservation impact while navigating challenges, so that species at risk have a future on the Canadian Prairies.

Plenary 2: Sand Dune Habitat Restoration and Ord's Kangaroo Rat Recovery

Sandi Robertson

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The Ord's Kangaroo Rat (*Dipodomys ordii*) is an endangered species. Recent population monitoring indicated a significant population decline in Alberta. The sand dunes that kangaroo rats require are contracting because of vegetation encroachment. Several once productive habitats have low populations of kangaroo rats or have become extirpated. The need to restore sand dune habitat was presented to the Department of National Defense at CFB Suffield (DND), and Environment and Climate Change Canada (ECCC). A collaborative plan among Alberta Environment and Protected Areas (AEPA), ECCC, and DND was developed. The plan included using prescribed fires and manual methods to remove stabilizing vegetation and thatch. Prescribed fires were planned and implemented by ECCC staff with collaboration and support from AEPA and DND. Habitat restoration has occurred at three sites. Prescribed fires significantly increased the amount of available habitat for kangaroo rats. Two restored sites were extirpated and repopulated with kangaroo rats through translocation. Habitat restoration and translocations were successful at returning populations of kangaroo rats to restored sand dune habitat.

Plenary 3: Panel Discussion – Canadian and Indigenous Perspectives on Central Grasslands Roadmap

Miles Anderson[1], Christian Artuso[2], Carolyn Callaghan[3], Alvin First Rider[4], Kate Hewitt[5], Cheyenne Ironman[6], Ruiping Lou[7a], Cliff Wallis[7b]

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Following a virtual summit in 2020, an in-person summit in 2022, and the formation of various working groups, the Central Grasslands Roadmap (https://grasslandsroadmap.org) has developed a plan for grassland conservation throughout the Great Plains (available here). The roadmap tries to unite the many networks and interests in the grasslands, and the working groups continue to connect and engage as broad and diverse a community as possible. This panel offers diverse perspectives on the experience of being part of the roadmap and our hopes and plans for the future.

Plenary 4: The Kainai Iinnii Rematriation Project – Restoring the Plains Bison as an Ecological and Cultural Keystone

Justin Bruised Head

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The Kainai Iinnii Rematriation Project (KIRP) is an eco-cultural restoration project that centers around the restoration of the land and culture of the Kainai (Blood) First Nation by reintroducing Plains Bison (*Bison bison bison*) back to the Mixedgrass Prairie pastures on the North End area of the Blood Reserve. Bison have been absent from these lands for ~155 years, and First-Nation-led environmental research is being undertaken to study and better understand how reintroducing Plains Bison can benefit Mixedgrass Prairie ecosystems. Bison are considered both an ecological and cultural keystone for the Blackfoot/Kainai. Bison were essential for our survival and ceremonial practices, and members of the KIRP herd will be harvested and utilized for meat distribution and ceremonial practices for tribal members once carrying capacity is reached. The herd is not being utilized for harvest yet, but some of their parts are still being utilized for ceremonial practice, and their return to the land has already had a profound effect on the community and local ecosystem.

Plenary 5: Ranchers' Panel Discussion – Providing the Necessary Resources to Ranchers to Help Support Prairie Conservation

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Ranching is a key component of prairie conservation that is often undervalued by society. The long-term viability of ranching operations relies on the same healthy grassland ecosystems that support diverse assemblages of species at risk. This relationship establishes ranchers as the stewards of much of the remaining native prairie left in Canada; therefore, to meet any goals pertaining to conserving grasslands and the species at risk that occupy them, it is critical that the ranching industry has an equal seat at the table and is included in the planning, implementation, and evaluation of the process. This panel discussion will provide a first-hand perspective of ranchers from a variety of backgrounds who are operating throughout the western Prairies where the largest tracts of grassland remain intact. Some examples of the discussion topics include the vital role ranchers play in the conservation of prairie and endangered species and how opportunities to work with government and non-profit organizations, as well as the attitude towards the programs they offer, have changed over the years. We will also discuss any barriers in place that prevent ranchers from fully realizing their potential for species at risk and prairie conservation, and how we can move forward as a united front to address these issues. Additional questions from conference attendees related to these subjects can also be submitted prior to the panel discussion for inclusion in the plenary.

SESSION PRESENTATION ABSTRACTS

Prairie Collaboration, Connection, and Conservation – Perspectives of a Grassroots Conservation Organization

Laurie Hamilton

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The Alberta Native Plant Council (ANPC) is a conservation not-for-profit organization that was established in 1988, and since then has maintained a small but mighty membership and group of volunteers. The ANPC has supported conservation in Alberta by filling a niche in land management through creation of science-based best management practices and tools, and implementation of a variety of programs. This presentation seeks to highlight some of ANPC's prairie conservation successes over the years by focusing on one of the great success stories of ANPC, its grant program, which is open to any Albertan with a native plant/habitat conservation project. The grant program provides potential applicants with a framework for: (a) describing how a candidate's project fits within ANPC's mandate, (b) how applications will be assessed, and (c) what the obligations are for successful applicants. This framework provides potential candidates opportunities to: (a) learn about ANPC's mandate, (b) appreciate the professionalism/seriousness with which the process is implemented, and (c) support successful projects after they have been completed. Although this program has been around for decades, recently ANPC has seen more applications than they can accept, which speaks volumes for the success of the program. This presentation will highlight some of the successful grant recipient projects, focusing on those that are in the Prairies, to illustrate the diversity of people and projects that have been supported through this program, and how one program can foster collaboration and connect dissimilar groups of people to achieve a variety of conservation outcomes.

Mistawasis Guardians – Buffalo Trace to Land Water Sky

Digit Guedo[1] and Daniel Sylvestre[2]

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Mistawasis Guardians – Buffalo Trace to Land Water Sky supports revitalizing the spiritual and cultural connection to the buffalo and to the landscape. This initiative will enable youth to observe, experience, and foster the development of buffalo management skills that will benefit conservation herds like the Sturgeon River Plains Bison. The Sturgeon River Plains Bison herd is in peril. Overharvest has caused the population to undergo repeated bottlenecks, degrading genetic health of the herd, and shifting demographics away from natural proportions. As the heard is truly wild and unhandled, free ranging between Prince Albert National Park (PANP), private land, and provincial Crown Land, reducing conflict is difficult if not impossible. The initiative will help develop new ways to deter and address bison conflict that occurs outside of PANP, and encourage respectful, culturally appropriate, and sustainable harvest. Mistawasis Nêhiyawak has a long-term vision to bring buffalo back to their land. By following the Buffalo Trace to Land Water Sky, buffalo stories, knowledge, and experiences will be included in the educational curriculum. Learning in school and on the land will strengthen connectedness on individual and community level, and with our partners, and provide knowledge to bring buffalo back home to Mistawasis. Collaboration and partnerships are important to the success of the initiative, involving Mistawasis Nêhiyawak, Canadian Parks and Wilderness Society, Nature Conservancy of Canada, Prince Albert Model Forest, and Parks Canada.

Shared Legacy: Nature, Culture, and Economy

Norm Gregoire[1] and Christine Chilton[2]

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The Tallgrass Prairie in southeastern Manitoba is one of the rarest ecosystems in North America. It is home to 28 species at risk, including Western Prairie Fringed Orchids, which are found nowhere else in Canada, and Poweshiek Skipperling, a butterfly with a global population of less than one thousand. The Tallgrass Prairie region is also home to a community of people who want to ensure that their lifestyle is here for future generations. Shared Legacy Partnership is a cooperative working group led by the Rural Municipality of Stuartburn and The Nature Conservancy of Canada along with partners Sunrise Corner Economic Development and Province of Manitoba. Under the title "Shared Legacy: Nature, Culture and Economy", the Partnership works with all three facets in mind. The primary focus of Shared Legacy is to alleviate threats for species at risk, improve habitat through effective communication and coordination, and targeted outreach. This is done by building meaningful relationships with local producers, landowners, residents, and Indigenous communities. Equally important, the Shared Legacy Partnership works to instill pride that one of the last and largest remaining areas in Canada with this special nature is in southeastern Manitoba. Members of the Shared Legacy Partnership will present on the importance of collaboration on a working landscape. After years of tensions between the local community and conservation, together we are making a difference by addressing the intersectionality of nature, culture, and economy. This presentation will touch on our approach and lessons learned.

It Takes a Village: The Value of Partnerships in a Successful Butterfly Conservation Program

Laura Burns

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Assiniboine Park Zoo's grassland butterfly conservation program rears and releases two endangered Skipper Butterfly species to conserve their remnant populations in Manitoba. The Poweshiek Skipperling (*Oarisma poweshiek*) and Dakota Skipper (*Hesperia dacotae*) are both highly specialized prairie species that have been experiencing dramatic population declines across their respective ranges. An international effort to save these species is underway and the Zoo joined this dedicated group of Canadian and international partners in 2016. The rearing program has shown major successes in the past seven years; in the summer of 2022, we released the largest cohort of Poweshiek Skipperling back into the wild to date. As the program has grown, several major partners within this group have been instrumental in supporting the successes of the Zoo's program, including critical land management, research, conservation planning, horticulture, community outreach and engagement, field support, permitting, funding, and infrastructure. Additionally, our ex-situ work provides unique opportunities for our partners to enhance their own organizational objectives. We have begun to apply the successes developed through our Poweshiek program and these partnerships towards Dakota Skipper recovery efforts, including the very first release of zoo-reared Dakota Skipper in Canada this past summer. In this presentation, we will provide an overview of the successes and challenges of these rearing and release programs and showcase the partners working together to reverse the decline of these two imperiled butterfly species.

Working Together to Restore Matsiyíkkapisaa/Northern Leopard Frog at Paahtómahksikimi

Kimberly Pearson[1] and Alvin First Rider[2]

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Amphibians are the most at-risk vertebrate taxa on a global scale. The Northern Leopard Frog, Western Boreal/Prairie population, is a SARA species of special concern and Alberta designates the species as Threatened. Significant declines occurred in southern Alberta through the 1970s, with disease and drought likely factors. With no observations of Northern Leopard Frogs in the area since 1980, a comprehensive 2003 survey of historic and potential habitats at Paahtómahksikimi/Waterton Lakes National Park resulted in no observations. An initial 2007-2010 reintroduction effort was unsuccessful. A second egg mass translocation effort in 2015-2016 resulted in successful restoration of Matsiyíkaapisaa/Northern Leopard Frog within a portion of the Waterton River drainage. Since 2018, collaborative monitoring has been underway by Waterton Lakes National Park and Blood Tribe Lands Department. Together, we are working to further restore Matsiyíkkapisaa within the Belly River drainage, which includes lands managed by the Blood Tribe and Parks Canada. We are also working together to monitor a recently identified population on the Blood Reserve. Our hope is that the frogs, which hold important cultural and ecological roles, will be restored to robust, connected, and resilient populations that withstand future stressors such as climate change. Through our diverse ways of knowing, we will share perspectives on returning a small but significant part of the ecosystem and learnings from our collaborative work. This is a good news story that shows promise within the trend of amphibian declines.

Burrowing Owl Head-Starting in Alberta: 2016-2022

Graham Dixon-MacCallum

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Burrowing Owls (*Athene cunicularia*) are threatened or at-risk throughout much of their distribution in western North America. Sharpest declines have been observed in the breeding populations of the Northern Great Plains, and in Canada they are listed as Endangered. For Canada's Burrowing Owl populations, the two most limiting life stages are the half-year periods from egg to post-fledging juvenile and juvenile to first-year adult. To test if the population bottleneck during this second stage could be circumvented, a head-starting project was initiated in 2016 by the Wilder Institute/Calgary Zoo in collaboration with the Canadian Wildlife Service and Alberta Environment and Parks. Burrowing Owl nests were located using call-playback surveys each spring and youngest brood members were taken from their nests into human care 20 to 35 days after they hatched. These owlets were held over winter until being soft-released the following spring as adults. Between 2016 and 2022, 94 owlets were taken into human care and 93 owls were released: 42 as male-female pairs and 9 as lone females. These released owls produced a total of 37 successful nests, from which 195 owlets were fledged. To date, one head-started owl returned from migration to breed for a second time in the year following release; a minimum of 12 (6%) of the offspring produced by head-started owls are known to have migrated and returned to our study area. Currently, there are 26 owls in human care scheduled for release in 2023 as 13 male-female pairs.

Conservation Actions for Burrowing Owls in the Canadian Prairies

Geoff Holroyd and Helen Trefry

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In Canada, the Burrowing Owl is Endangered under the Species at Risk Act. The number of breeding pairs declined 90% during the 1990s despite voluntary protection of over 37,000 ha of the species habitat on private grasslands. Low recruitment exacerbates the Burrowing Owl's decline in response to habitat loss; typically, only 3-4 young fledge from the average clutch size of nine eggs. Food supplementation experiments indicated that the wild food supply was inadequate for this species to reach its reproductive potential in some years. Migration and dispersal are important ecological processes and understanding them is a requirement for species conservation efforts. Studies of movements of Burrowing Owls using banding, VHF telemetry, stable isotopes, geolocators, and satellite transmitters demonstrate that annual dispersal is a second factor driving the Owl's decline in Canada. Supplemental feeding at nests in Grassland National Park has helped increased the recruitment of fledglings in a cost-effective way. This talk summarizes 30 years of research into the population dynamics, breeding biology, migration, and dispersal of this species in Canada, Texas, and Mexico and suggests considering supplemental feeding of nests to be incorporated in recovery action plans and further research at the larger landscape scale, alongside protection of critical habitat. Greater international cooperation and direct conservation actions on the ground are needed to achieve recovery of this species across the northern Great Plains.

A Multi-Partner Collaboration in Conserving Alberta's At-Risk Greater Sage-Grouse Population

Mecah Klem, Eric Spilker, and Joel Nicholson

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Greater sage-grouse (*Centrocercus urophasianus*) is an iconic sagebrush steppe species that is experiencing population declines across its North American range. Alberta sage-grouse are particularly at risk with fewer than 100 individuals remaining. The Alberta government continues to put considerable resources into species recovery. Conservation actions include habitat restoration, land acquisition, oil and gas reclamation, translocations, and captive breeding. Habitat acquisition of native grassland and marginal annual cropland in critical habitat is being pursued by collaborators, with subsequent restoration including the seeding of silver sagebrush. Oil and gas reclamation is occurring at an unprecedented rate and is being prioritized in sage-grouse habitat to maximize benefits to the species. Translocations of wild sage-grouse from Montana to Alberta have been undertaken in an effort to augment the dwindling population. Success of the birds is monitored by using GPS satellite transmitters. Captive rearing and release of sage-grouse is being done through a partnership led by the Calgary Zoo. Landowner and leaseholder cooperation is key in facilitating predator subsidy removal (i.e., structure removal), building wildlife-friendly fencing, and implementing MultiSAR habitat conservation strategies. Much of this work benefits other prairie wildlife. The sage-grouse recovery program in Alberta is an example of multiple agencies, stakeholders, and partners working towards a common goal. Through these connections, we are hopeful that sage-grouse in Alberta will recover and persist into the future.

Save the Last Dance – Ten Years of Greater Sage-Grouse Recovery in Grasslands National Park

Stefano Liccioli

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Grasslands National Park (GNP) protects the last two active leks of Greater Sage-Grouse (GRSG) in Saskatchewan, approximately 50% of the Canadian GRSG population. Since 2016, the GNP SAR Action Plan has provided strategic direction for species recovery. Sub-optimal GRSG habitat was enhanced through planting of Silver Sagebrush and seeding of native forbs. An experimental program is assessing the feasibility of converting hayfields into suitable sagebrush habitat. On a larger scale, beneficial cattle grazing has been used to optimize GRSG nesting and brood-rearing habitat. A new grassbanking program is leveraging access to grazing and haying land within GNP in return of conservation actions outside the park. Ongoing research is investigating the response of sagebrush to prescribe fire in potential synergy with grazing and habitat enhancement. An integrated approach to restore critical habitat is removing anthropogenic infrastructures that negatively impact individual survival and recruitment. Ongoing monitoring and research have helped develop effective perch deterrents. A field experiment helped estimate the potential role of GRSG nest predators, providing further support to the removal of anthropogenic infrastructures. A captive breeding and augmentation program led by the Calgary Zoo has been operational since 2018. Despite recovery efforts, the GRSG population in GNP has not increased since 2014. In particular, the West Block population appears to be isolated and at imminent risk of extirpation. Moving forward, identified priorities include the reactivation of inactive leks, improving habitat quality and connectivity at the landscape scale, assessing the feasibility of wild hen translocations, and investigating the ecology of GRSG predators to inform habitat management.

Locating Important Bat Habitat in Saskatchewan

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With the confirmation of white-nose syndrome (WNS) in Saskatchewan in 2022—caused by *Pseudogymnoascus destructans* (Pd)—there is an increased need to identify, understand, and conserve bat habitat in the west. This three-year collaborative project aims to conduct surveys to identify bat hibernacula, swarming sites, and maternity roosts in grassland, parkland, and boreal portions of Saskatchewan. This study will establish a foundation for long-term monitoring and will inform conservation and recovery efforts for bats in the province. This project targets two species at risk: Little Brown Myotis (Endangered) and Northern Myotis (Endangered). The project activities will target these species at risk by conducting surveys using acoustic monitoring, mist-netting, and radio-tracking. We will aim to identify and describe the biophysical attributes of hibernacula, maternity roosts, and the surrounding landscape. This study will also explore the connection between habitat quality and bat health. Health assessments will include evaluation of pregnancy and lactation status, overall condition, and wing damage index to monitor potential impacts of WNS, as well as evaluation of skin swabs and guano samples to assess Pd/WNS distribution and spread. We will engage local communities and Indigenous groups. We will connect with the public through a citizen science program to increase awareness of bats, enhance our likelihood of identifying these habitats, and work towards shared stewardship of them. We will also coordinate with bat conservation efforts in neighboring jurisdictions, as well as national and international groups working on WNS impacts to bat populations and habitats.

Using Decision Analysis for Conservation Planning: A Conservation Translocation Case Study

Laura Keating and Lea Randall

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Decision analysis is a tool that is increasingly being used for conservation planning. In this talk, we will explore how the Wilder Institute/Calgary Zoo and the Idaho Department of Fish and Game recently used decision analysis to determine the feasibility of a conservation translocation for Northern Leopard Frogs. The Idaho Department of Fish and Game wanted to gain insight into the likelihood of success of reintroducing Northern Leopard Frogs to northern Idaho to achieve local recovery of the species, given that they are currently extirpated from the region. This was a collaborative effort that involved stakeholders from government, Indigenous groups, academia, land management agencies, and conservation organizations. We found that this process was an effective way to integrate multiple perspectives from diverse stakeholders and resulted in a clear and transparent feasibility assessment that will be useful for decisions regarding Northern Leopard Frog reintroduction. We also found the sensitivity analysis to be particularly helpful for understanding which factors had the greatest influence on a successful reintroduction. Methods employed here can be more broadly applied to conservation efforts for species across the Canadian Prairies.

Habitat Suitability and Reintroduction Site Selection Criteria for the Northern Leopard Frog (*Lithobates pipiens*)

Rebecca Stanton

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There currently exists only a single extant population of Northern Leopard Frogs in British Columbia (BC), and past reintroduction attempts have met with limited success. As a result, the BC Northern Leopard Frog Recovery Team initiated a search for a new reintroduction site in 2021 through the development of quantitative assessment tools. This involved establishment of a Habitat Suitability Index (HSI) model and a Site Selection Criteria table based upon the unique habitat requirements of the Northern Leopard Frog in BC. The HSI model spatially filtered for suitable habitat within the historical range based on attributes such as elevation, number of waterbodies, solar exposure, road density, etc. Any potentially suitable locations detected by the HSI were further filtered during a preliminary desktop assessment whereby clearly unsuitable sites (e.g., located in heavily forested areas or with significant barriers between habitat types) were eliminated. Concurrently with the HSI, a Site Selection Criteria table was developed. Use of this table involves scoring each site for numerous habitat attributes important for the Northern Leopard Frog in the overarching categories of breeding habitat, foraging habitat, overwintering habitat, connectivity, and land-use/other. On-the-ground field visits were completed at any suitable sites in spring, summer, and fall to collect the relevant data to allow for scoring of each site in the Site Selection Criteria table. We found these methods to be an effective way to quantitatively compare and select a new reintroduction site.

Adaptation and Rollout of the Habitat and Biodiversity Assessment Tool Across Canada

Heather Peat Hamm, François Blouin, and Cedric MacLeod

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The Habitat and Biodiversity Assessment Tool (HBAT) was originally built as an add-on to the biodiversity chapter of the Alberta Environmental Farm Program under Species at Risk Partnerships on Agricultural Lands program funding. The online HBAT integrates species evidence data with information from the interested landowner about habitat on a selected parcel of land to determine the most suitable stewardship opportunities that could be applied. The focus is to present options that improve habitat and survival of species at risk and other species that may benefit from small changes on the land or modifications of agricultural practices. The tool creates a customizable report of suggested stewardship opportunities, a list of likely species that could be supported on the site, and links to additional resources to support implementation and awareness. Under the Canada Nature Fund, the Canadian Forage and Grassland Association (CFGA) was granted the mandate to adapt the tool for the agricultural sector in other Canadian provinces. The process involves extensive collaborative efforts to adapt the tool, acquire the necessary data for each province, and include stewardship opportunities appropriate to the agricultural practices in each province. CFGA will be launching HBAT for several provinces this winter: Saskatchewan, Manitoba, Nova Scotia, New Brunswick, Ontario, and a regional subset of British Columbia. The steps involved in this collaboration, the connections developed through CFGA's communications team working on knowledge transformation and transfer, and stewardship opportunities for conservation this HBAT tool will provide are outlined.

A New Approach to Assessing and Managing Multiple Species at Risk

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Saskatchewan Prairie Conservation Action Plan has worked towards the development of a new approach to multi-species at risk habitat management since 2016. High quality habitat attributes and environmental benefit indices were defined for 12 individual prairie species at risk based on literature and expert knowledge. A Species-Habitat Network approach was then used to explicitly link multiple species and habitat resources, estimate the importance of particular species or specific habitat in a given landscape, and quantify the properties of habitat networks. Species habitat requirements are linked to Saskatchewan's existing prairie ecosite land classification system that is already in use as the basis of land management. This approach has been designed for agricultural and conservation land managers who may have the opportunity to aid in the conservation of species at risk on the land under their control. An assessment process is currently being piloted. The goal of this new tool is to help manage synergies and conflicts between habitat requirements of different imperiled species, and to provide land managers with information that can be used to improve or maximize habitat quality for multiple species at risk.

Species at Risk – Accelerating Collaboration

Tom Hilditch

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The 2023 gathering of the Prairie Conservation and Endangered Species Conference comes at a moment of heightened awareness and urgency. The twin crises of climate change and biodiversity loss have opened an opportunity to accelerate positive outcomes on the ground related to collaboration, connection, and conservation. We are being challenged like never before to share and accelerate the implementation of our best species at risk conservation and recovery ideas. This presentation will look at global initiatives and highlight those on the leading edge. Being most familiar with Ontario's species at risk legislation, policies, and programs, this presentation will offer insights into what is working well and what is less promising in the province. There has never been a time when returning and restoring our connection to the land and its resources and species has been this important. One of the most promising areas of collaboration is harnessing the skills, ideas, and resources across the public, private, and civil sectors. Examples of inspiring models of conservation across sectors will be shared in this presentation.

Recovery Strategies for Industrial Development in Native Prairie – the Dry Mixedgrass

Jane Lancaster

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Intact native grasslands are declining and becoming increasingly fragmented. The Recovery Strategies for Industrial Development in Native Grasslands project is a multi-stakeholder initiative to assess existing industry revegetation efforts, to provide guidance to minimize future industry impacts, and to promote effective reclamation/restoration of past and future disturbances in native grasslands. Standard grassland assessment tools (i.e., soils and landscape mapping (AGRASID and GVI); Alberta's range plant community guides, and range health assessment) are applied to understand restoration risks of developing or decommissioning a project area. Recovery strategies and target seed mixes are linked to range-plant communities and reclamation issues present in each of southern Alberta's Prairie, Parkland, and Montane Grassland communities. Current information is provided on minimizing disturbance, reclamation planning, construction, adaptive management, and monitoring. While we know restoration is a very long-term objective, building the concepts of succession, rebuilding diversity, function, and a sustainable path towards recovery into reclamation planning will optimize outcomes. There are four manuals designed for each of southern Alberta's natural subregions that support native grasslands. They are accessible on the Grassland Restoration Forum website (https://grasslandrestorationforum.ca/recovery-strategies-for-native-grassland/). The 2023 update to the manual for the Dry Mixedgrass reflects regulatory guidance developed in the past 10 years, use of newer mitigations like matting, and the experiences of reclamation practitioners working to meet the standards of the 2010 Reclamation Criteria for Wellsites and Associated Facilities for Native Grasslands.

Can Removing Topsoil Help with Restoration of Forests and Native Grasslands: An Exploration on a Novel Approach to Ecological Restoration

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After 15 years of reclaiming land across Alberta, two of my favorite and most successful forested projects stand out amongst the others for a common reason—no topsoil. In 2021, I heard a researcher speak about restoring native grasslands in Australia by scraping and removing topsoil. In 2020, I heard a researcher speak about the success of seedling growth in subsoil piles versus topsoil piles. My practical experience has taught me that the number one constraint when trying to grow native plants is competition from the non-native species. These observations have led me to this question: can removing topsoil help with restoration of forests and native grasslands? The purpose of this presentation is to encourage connection and collaboration to explore this approach. The presentation will include photographic examples of projects that demonstrate success and references to research that supports this novel approach. The demand for ecological restoration is accelerating around the world as people try to address the issues of biodiversity loss and climate change by restoring ecosystems. Restoration of forests and native grasslands are crucial to those efforts, and practitioners need to connect and collaborate to improve successful outcomes and shorten timelines. We need more research and documented experience before we can responsibly recommend topsoil removal as a practice or for policy consideration.

Collaborations: Working Together to Increase the Availability of Diverse Native Seed Species and Local Genetics for Restoration on the Manitoba Mixedgrass Prairie

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There is a need to restore prairie in ecologically sensitive areas of western Manitoba. A prairie restoration that successfully establishes functioning habitat for species at risk is most likely to succeed when the seed mix is comprised of a diverse set of grass and forb species that are native, locally sourced, and genetically adapted to the site being restored. Generally, wildflower seed of any kind—let alone local seed that reflects a diversity of species—has simply not been available to purchase on the scale that is needed for large restorations. Nature Conservancy Canada, Manitoba Region and Skinner Native Seeds have been finding novel ways to collaborate with each other, local landowners, and land managers to collect and produce the seed necessary for a joint restoration project and increase the availability of a diversity of grass and wildflower species with suitable genetics for other projects in the surrounding area. Keys to this process are: (1) finding suitable seed sources and (2) learning how to increase this seed quantity. We are having success in both areas.

Developing a Collaborative Framework for a National Native Seed Strategy

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Native plant seed is required for almost every ecological restoration project on land, and specifically prairie conservation. There is a need for locally produced and ecologically appropriate prairie seed that supplies the needs of restoration and reclamation projects. As the scale of restoration projects increases, so does the need for ecologically appropriate native seed. Most notably, federal investment of several billion dollars into nature-based climate solutions has generated unmet demand for native plant seeds. In some provinces and regions, local native seed is not easy to come by. Where will this quantity of seed come from, how do we gather and grow it ethically, and what are the co-benefits of focusing on seeds, specifically?

Many local and national jurisdictions have developed native seed strategies that are already accelerating the supply of native seeds for the UN Decade on Ecosystem Restoration. The Canadian Wildlife Federation, with support from Environment and Climate Change Canada, is undertaking a national outreach initiative to frame the development of a collaborative National Native Seed Strategy in Canada. This process includes engagement with those involved in the native seed economy, including Indigenous communities and groups, restoration and reclamation practitioners, native plant producers, and others.

Why Ecological Restoration Projects Fail: How Teamwork, Connection, and Collaboration Lead to Success

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Ecological restoration is a multi-disciplinary practice and requires years of collective knowledge, energy, and perseverance to succeed. Rarely does one person have all the skills, time, or endurance to successfully lead or complete a restoration project. That means it is a team sport, and a winning team needs strong players in key positions, not just one hero. It is inevitable that any landscape-scale restoration project will draw attention from different interest groups. That is where engagement, communication, and partnerships are needed to connect, collaborate, and attempt to bridge those interests. This presentation looks at what team positions are key to success and how each position needs collaboration and connection to succeed. Leadership, management, technical expertise, and quality are the positions that Chris will discuss. He draws on his 15 years of reclamation project experience to share examples, both successes and failures, that highlight how each position was a factor. Chris will also discuss how connection and collaboration are essential to each individual position and the whole team.

Extreme Weather Reduces Reproductive Output of Grassland Songbirds, including Several Species at Risk

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In addition to changes in average temperatures, many climate change scenarios predict there will be an increase in both the intensity and frequency of extreme weather events in Prairie Canada. These extreme weather events may cause complete nest failures due to flooding and hail or may impact reproductive success indirectly via short-term reductions in food availability. We examined how grassland songbird daily nest survival (i.e., probability at least one young survived between nest visits) varied in response to precipitation, temperature, and the type of grassland used for nesting. Our analyses included 2,316 nests of seven species and over 10,000 nest visits over 11 years of field work in the Mixed and Moist Mixed Grassland ecoregions of Saskatchewan, Canada. Nest survival of Savannah Sparrow (*Passerculus sandwichensis*), Sprague's Pipit (*Anthus spragueii*), Baird's Sparrow (*Ammodramus bairdii*), and Vesper Sparrow (*Pooecetes gramineus*) declined with greater amounts of precipitation between nest visits. Daily nest survival of one species (Chestnut-collared Longspur, *Calcarius ornatus*) increased in response to increasing levels of precipitation. Furthermore, daily nest survival for many species was highest at moderate temperatures and declined at both hot and cold extremes. Given ongoing population declines of grassland songbirds in Canada, increases in the frequency and intensity of extreme weather events may exacerbate population declines and present new management challenges for these species.

Connecting the Dots between Grassland Birds, Insects, and Vegetation – The Silver Sage Research Project

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The Silver Sage Conservation Site is a 2,400-acre property in southeast Alberta purchased in 2010; since then, over half of the site has been restored from cropland to native grassland. This has provided an excellent opportunity to monitor changes in wildlife populations, vegetation, and range health as the reseeded native grass establishes. Wildlife monitoring has consisted of five-minute, 100-metre radius point counts and notable species observed include Chestnut-collared and Thick-billed Longspurs, Baird's and Grasshopper Sparrows, and Sprague's Pipit. Vegetation monitoring includes provincially standardized plant community and range health assessments and measures of vegetation structure, such as litter mass, visual obstruction, and percentage of ground cover types. Vegetation is an important component of habitat that influences nesting, prey accessibility, and the ability for birds to hide from predators. In 2019, insect sampling was also added to the list of monitoring activities and carried out in partnership with Dr. Dan Johnson from the University of Lethbridge. Grasshopper composition, age, and density data were sampled using sweep-net surveys once a month in addition to pitfall traps collected every two weeks to sample the ground-dwelling invertebrate community. Insects and other invertebrates are a primary food source for the nestlings of most grassland songbird species. Insects also contribute to important ecosystem services, such as pollination, pest control, decomposition, and nutrient cycling. Our objective was to determine whether insect composition, vegetation structure, or a bit of both plays a larger role influencing where grassland birds ultimately decide to establish nesting territories.

Grazing Impacts on Grassland Insect Communities

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Cattle grazing is a disturbance in a disturbance adapted ecosystem—grasslands. Like all disturbances, grazing sets off a cascade of biophysical and ecological processes that change an ecosystem's trajectory but does not necessarily do harm. At the largest spatial and temporal scales, grazing affects regional soil processes and at the smallest scale, grazing influences individual plant and patch structure. One of the least studied, but perhaps most profound, grazing effects is on insect communities. While we know relatively little about grassland insect ecology, we recognize that insects respond to grass structure and species composition, both of which can be changed through grazing. We explored decades old (1960s and '70s), recent (2000s), and current insect community structure and diversity relative to grazing or grazing exclusion to help explore the role that grazing has on faunal biodiversity. Insect communities change in both abundance and composition in response to vegetation density and structure; however, scale and annual variation in weather (rainfall timing/intensity) interact strongly with grazing effects. Continual monitoring of these interactions is key to establishing beneficial management practices for the conservation of rangeland biodiversity. We will discuss early results of grazing on insect communities.

Spatiotemporal Interactions of a Grassland Community in Southern Alberta

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Life history strategies are driven by two factors: (1) acquisition of resources required for fitness and (2) enhanced survival by avoiding predation. While intra-specific competition is important, in multi-species systems the role of inter-specific competition in response to potential predation should not be overlooked. Niche partitioning refers to the natural selection process which drives individual species into different patterns of resource use or different niches to allow coexistence and reduce direct competition. Niche partitioning can occur along a continuum and include resource partitioning (selection for different food or prey items), temporal partitioning (difference in peek activity patterns on a dial or seasonal basis), and spatial partitioning (selection for different areas for foraging or hunting). Using images captured with camera traps, we explore the spatiotemporal behavioral adaptations of a grassland community to reduce potential inter-specific competition. First, we explore the daily and monthly activity patterns of four ungulates, a lagomorph, and a carnivore to see which species have the greatest and least overlap in their activity patterns. Lastly, we explore if the different species avoid inter-specific competition/predation by spatially segregating themselves throughout our study area. Understanding niche portioning between the six focal species will allow for greater insight into how the grassland community coexists.

Estimating Grassland Bird Densities in Grasslands National Park to Inform Prescribed Fire and Grazing Management Decision Making

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Grassland bird species that depend on native grasslands have experienced dramatic declines. Land management practices are often misaligned with creating optimal breeding habitat for grassland birds. Grassland birds evolved in landscapes that experience frequent and variable levels of disturbance through processes like fire and grazing, creating a mosaic of habitats with diverse vegetation structure. Our vision is to estimate the densities of different grassland bird species at risk through space and time in Grasslands National Park and to inform habitat management programs (i.e., prescribed fire and grazing) while monitoring progress toward population recovery objectives. We performed 106 and 112 point count surveys at 25 monitoring sites in 2021 and 2022, respectively. In 2022, we also measured vegetation structure (i.e., percentage of litter and bare ground, and visual obstruction) at the point count locations. There were relationships with at least one measured vegetation structure variable for six out of the seven grassland bird species we focused on. Percentage of litter was highly variable at monitoring sites, while percentage of bare ground and visual obstruction were less variable. Our internal qualitative assessment of the distribution of grazing intensity poorly predicted measured vegetation structure variables at monitoring sites. Grassland bird communities in Grasslands National Park are highly variable in space and time and require detailed park-level data on vegetation structure to estimate species densities across the park. Our next steps are to continue our annual monitoring and use remotely sensed vegetation structure data to estimate species densities across the park.

Securing a Home for Bats in the Milk River Watershed

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The Milk River Watershed is home to eight of Alberta's nine native bat species, one of which, *Myotis lucifugus*, is listed as an endangered species federally and provincially within Alberta. Despite their notable ecological importance, minimal research has been conducted to document the distribution and abundance of these species, with significant knowledge gaps regarding their activity on private lands. For this reason, this project focused on monitoring bat species, whilst also providing habitat enhancements to landowners through bat house distribution and bat condo installation within the Milk River Watershed. Through collaboration with 40 landowners within the watershed, passive acoustic monitoring was conducted on private lands to create an inventory of bat species groups. A total of 13,945 call files with identifiable bat recordings were collected during the 2022 field season, with a vast majority derived from the Myotis 40k species group. Call files from this work have been submitted to Alberta eBat under the North American Bat Monitoring Program (NABat) to contribute to a range-wide monitoring program to assess population distributions and trends across the continent. Ultimately, landowners that participated in this project were provided with a better understanding of species diversity on their lands and informed on best management practices to become better stewards for bats. Through the connection with landowners, this multifaceted conservation project built a foundation for present and future monitoring for bats within Southern Alberta. This data will be invaluable in monitoring bat populations in the face of current threats, including White Nose Syndrome.

Operation Grassland Community (OGC): Restoring a Legacy of Conservation

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Operation Grassland Community (OGC) has partnered with ranchers in the grasslands since the early 90s to promote voluntary stewardship practices benefiting both ecosystems and ranching economics. OGC's outreach and Habitat Enhancement Projects (HEPs) promote conservation by targeting four focal species: Burrowing Owl, Ferruginous Hawk, Loggerhead Shrike, and Sprague's Pipit. The 2021/22 season saw some challenges with the pandemic, but OGC was able to facilitate three new HEPs with both existing and new members for which monitoring began in spring 2022. One of our HEPs involved collaborating with SALTS (Southern Alberta Land Trust Society), bridging our common conservation goals through financial assistance on a rest-rotation grazing system and off-site waterer. In 2022/23, OGC established five additional HEPs by doubling our investment in habitat stewardship. These projects include off-site waterers (one fixed, one portable-solar), electric fencing for high-impact, low-duration grazing, and other grazing systems, and will provide further species at risk monitoring opportunities in the coming years. Our annual Burrowing Owl survey (initiated in 1990) was completed last year, and the 2022 combined Burrowing Owl/Loggerhead Shrike survey is in progress and will be finalized in the coming months. OGC is also excited by the possibility of spending time with students at Irvine School in Alberta who partake in the "Agricultural Discovery Center" which provides hands-on ranching and agricultural experience. OGC plans to connect with these students by providing examples of practical land stewardship that we have successfully applied, thereby aiding to recruit the next generation of land stewards.

A Living Lab for the Prairie Ecoregions

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Agriculture and Agri-food Canada's Living Labs initiative aims to identify and increase adoption of climate-friendly agricultural practices using a producer-centred, collaborative approach. Living Lab - Central Prairies (2022-2027) encompasses the Prairies ecozone in Saskatchewan and southeast Alberta, and involves a large network of agricultural land managers, researchers, and other experts forming partnerships to quantify and communicate about locally appropriate beneficial management practices (BMPs). The project, led by the South of the Divide Conservation Action Program, Inc. is focused on real-world approaches to grazing, grassland, and cropland management with potential to provide a wide range of benefits, from carbon sequestration to biodiversity conservation. Participating producers will implement practices that help them avoid conversion of native and naturalized areas, manage grazing impacts in native and tame grasslands, restore and rejuvenate perennial plant communities, and plant diverse polycultures for livestock grazing in cropland. Researchers will monitor effects of management on soil carbon, forage quantity and quality, forage and range condition, animal performance, greenhouse gas emissions, water, wildlife habitat, biodiversity, and economic and social parameters. Together, stakeholders will interpret findings and formulate practical recommendations for how to achieve agri-environmental benefits in the Prairie ecoregions. The project will promote and track producer adoption and attitudes about BMPs and will establish new connections and opportunities for sharing experiences and resources. This ambitious project offers a new model for improving understanding of the value of Prairie ecosystems and the lessons they hold for beneficial land management throughout the region.

Climate Change Perceptions and Associated Characteristics in Prairie Agricultural Producers

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Climate change (CC) poses a threat to agricultural sustainability, which is important as agriculture is a major driver of the economy. To implement adaptation/mitigation practices producers should accept CC as fact; however, denial is prevalent in the Prairies. This study provided a snapshot of CC views and examined influences on denial in producers. To assess whether personal characteristics influence changes in CC understanding and perception following an information video, participants were randomized to an experimental (n = 79) or control (n = 84) condition. Participants watched a video produced by the Water Security Agency. Measures of understanding, perception, and personal characteristics were assessed before and after the video for the experimental group. The control group viewed the video after the final questionnaire. Results indicated more denial in prairie producers than other Canadian samples. Lower formal education, identifying as male, conservative political affiliation, low trust in science, and low mental flexibility were associated with less concern. Viewing the video increased CC perception in the experimental group and protected against a history effect that decreased climate knowledge in the control group. Change in knowledge was predicted by baseline knowledge, with lower baseline scores associated with more improvement. Change in perception was predicted by trust in climate science and baseline perception. Higher baseline score for trust predicted greater change following the video, indicating trust is needed to change perspective when CC information is received. This study showed CC understanding and perception can be improved in producers with low baseline scores, with an information video initiating change.

Supporting Beef Producers and Grassland Conservation

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The Manitoba Habitat Heritage Corporation (MHHC) has partnered with the Manitoba Beef Producers (MBP) to deliver grassland, stewardship-based initiatives to conserve and enhance Manitoba's remaining grasslands and support local cattle producers. This partnership started in 2017 as a pilot project in the southwest region of Manitoba with a focus on the most intact and at-risk native grasslands. MBP and MHHC started with an annual delivery goal of $250,000 from the Species at Risk Partnerships on Agricultural Lands (SARPAL) Funding, an Environment and Climate Change Canada initiative. Through various partnerships the program has grown to $1.1 million. The increased funding is now delivered across southern Manitoba in the Aspen Parkland ecoregion by eight habitat conservation specialists. Our Grassland Stewardship program offers incentives to landowners that are conserving and enhancing grasslands by way of cattle production. The program offers financial assistance to install new fencing, water systems, shrub control, and other management practices to offset improvement costs. Both MHHC and MBP view this program as a positive way to support the Beef Industry in Manitoba, with a soft approach to conserving the native landscape to support the grassland birds and species at risk that depend on those habitats.

Are Golden Eagles in Saskatchewan's Mixedgrass Prairie Faring Better than Ever?

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Golden Eagles have been banded in five of Canada's ten provinces and all three territories, beginning in 1958. In the Mixedgrass ecoregion in southwestern Saskatchewan, 66% of nests raised an average of 1.5 young to near fledging during 43 years of C. Stuart Houston's study. This level of success was similar in the western U.S. This consistency over so many years is remarkable in comparison to other raptors and biodiversity that declined in the region. The eagles' varied prey included terrestrial and aquatic herbivores, omnivores, and carnivores, alive or dead. This food breadth allowed eagles to shift prey responding to changes in availability. The late 20th Century may have been unusually positive for eagles. Juxtaposing the eagles' ecology with archeological studies and early-explorer reports allows several conclusions. For example, while bison disappeared, cattle now provide a level of substitution, particularly for scavenging, also throughout the year. When bison and fire shaped the grasslands, shrubs and trees were reportedly scarce with limited browsing opportunity for deer and rabbits. Today, in contrast, trees and shrubs are available throughout. Waterfowl and deer apparently followed the plow and increased to unprecedented numbers. Similarly, roadkill and hunter crippling losses allow ample scavenging, albeit with the added danger of lead poisoning. Despite a positive recent past, the eagles' future remains uncertain. Historic evidence may not allow us to speculate about the possible transformations from climate change, disease, and adverse human impacts occurring now and into the future.

Growth and Development of an Endangered Prairie Butterfly

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Climate change is predicted to have profound effects on insect populations as global temperatures rise. Species with narrow habitat and climate tolerances are especially at risk. The Poweshiek Skipperling, *Oarisma poweshiek* (Parker) (Hesperiidae), is an endangered butterfly endemic to Tallgrass Prairie in Manitoba and Michigan. It has experienced steep population declines in recent decades. Due to difficulty locating larvae in-situ, key aspects of Poweshiek biology are poorly understood. An ex-situ population of *O. poweshiek* managed by Assiniboine Park Zoo in Winnipeg, Manitoba is being studied to fill these knowledge gaps. Against expectations, the ex-situ larvae overwinter in the fourth instar. If diapause is stage-specific for this species, as is the case for many insects, then accelerated development due to climate change may result in overwintering mortality. For the ex-situ program to be successful, captive-reared *O. poweshiek* adults must be released during the same two-week period that wild individuals are active. Accurately predicting this narrow window of time requires knowledge of the degree days needed by *O. poweshiek* to complete their development. I will estimate degree day requirements and model developmental threshold. These results will provide insight into how this species may respond to climate change, as well as help inform ex-situ husbandry decisions to improve conservation management of this endangered butterfly.

Cooperating for Conservation: The Role of Conservation Easements on the Canadian Prairies

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Conservation easements (CE) are a legal policy tool intended to ensure conservation of wildlife habitat on private land. The prairie provinces of Manitoba, Saskatchewan, and Alberta each have their own CE legislation dating to the 1990s. This research focuses on how and why that legislation was developed. Using legislative records and interviews, I examine which actors and policies influenced CEs on the Prairies. I discuss trends and expand the analysis to include the frequency of influential actors and geographic developments as CE policy migrated across Canada in the span of roughly 10 years. Building on this historical background to CEs, I use the Waldron Ranch Grazing Cooperative in Alberta as a present-day case study to highlight the success and challenges of CEs. Given that CEs are one of the most important tools Canada has for promoting private land conservation, it is necessary for the conservation community to understand the historical development of the tool as well as the future possibilities.

Integrating Social and Natural Science for Purple Martin Conservation

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Most successes in wildlife conservation require joint efforts from many disciplines. Despite steady population declines over the last 50 years across North America, Purple Martins have increased in Alberta and Saskatchewan. The eastern subspecies of martins is unique by being dependent on nest boxes provided by humans. The goal of this presentation is to demonstrate the value of an interdisciplinary approach to bird conservation, based on the Purple Martin in Camrose, Alberta. Led by the Camrose Wildlife Stewardship Society, the population increase (eight pairs in 2003 to 133 pairs in 2022) required community-based research in the social and natural sciences. On the social science front, we learned that landlords are motivated to build and monitor martin nest boxes for egoistic and altruistic reasons. In response, we offered programs that helped meet these motivations, including an annual festival, landlord mentorship, and community engagement activities. Economically, the one-day festival attracts about 95 people per year, each of whom spends about $80 in the community. By partnering with other wildlife groups and engaging local citizen scientists, Camrose developed strong support for ongoing Purple Martin conservation. On the natural science front, we conducted an annual census to track population trends. We studied migration (with unique stopover and non-breeding tendencies) and dispersal patterns (with high site fidelity) and determined which nest box and stewardship characteristics were favored by martins. Linking social and natural science results helped design and implement a conservation program for a declining species before reaching Endangered status.

Biophysical Assessment of a Unique Alberta Habitat and the Application to Environmentally Significant Areas

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In 2019, a unique and non-typical Balsam Poplar / Red Osier Dogwood plant community was observed in a slot canyon located within the western portion of Writing-on-Stone Provincial Park (WOSPP), within the Dry Mixedgrass Natural Subregion (NSR). This rare habitat has not been identified in Alberta as an Environmentally Significant Area (ESA). Habitats with this plant community are common in the moister and cooler NSRs at least 125 km away, including Foothills Parkland, Montane, Central Parkland, and Dry Mixedwood. Between May and July of 2022, we conducted detailed biophysical assessments, including site characteristics, plant identification, plant cover and density, riparian health, soil, geology and groundwater observations, and the presence of wildlife. Our observations confirm this location is a unique and important habitat, unlike others in the surrounding climatic area, and should be considered an ESA. The use of ESAs began in the 1980s, when descriptions of important habitats were documented and provided as tools for land-use and watershed planning. The ESA database was greatly improved in 2009 with the incorporation of GIS. A more rigorous and criteria-based system was introduced in 2014. Learnings from detailed habitat assessments at this site and several other southern Alberta ESAs will be presented to identify gaps in the current system and elucidate ideas for further improvement. Enhanced ESA descriptions and classification will potentially provide an improved tool and a better understanding of the role of the physical environment concerning the occurrence of important flora and/or fauna.

Precision Conservation in Prairie Landscapes: Win-Win for Biodiversity and Crop Yield

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Precision monitors that link GPS to crop yield are available widely on harvesting equipment in the Canadian Prairies. Although intended for agricultural management, these data can also be used to support conservation objectives. Here I discuss my lab's ongoing application of these data to understand the delivery of ecosystem services to crops, and to identify parts of crop fields that are currently farmed at a loss. For example, I report our findings on "haloes" of higher yield surrounding semi-natural habitat elements such as wetlands and shelterbelts, and how the availability of this habitat near fields is correlated with higher yields across entire fields. Critically, our data show that these elements have a small but measurable effect on crop yield, and therefore already contribute to farmer livelihoods. Restoration and conservation of these habitats, then, may be a "win" for farmers, but also a "win" for biodiversity. These elements are also scarce islands of habitat that my team has previously shown to support more than 300 species of wild bees and other beneficial insects. I conclude by presenting our Prairie Precision Sustainability Network which applies precision yield data to identify new opportunities to create habitat from low profitability cropland across Alberta and Saskatchewan.

Canadian Prairie Wetlands and Bumblebee Communities

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To conserve biodiversity in the Canadian Prairies, understanding how organisms interact with the agroecosystems embedded in the region is crucial. Natural and semi-natural land are targets for conservation because they act as an oasis in an otherwise disturbed landscape. In the Canadian Prairies, there is a particular effort to conserve pothole wetlands, which are both relatively undisturbed and harbor higher plant diversity than the crop fields surrounding them. While these wetlands are important sites for migratory birds, there is a growing body of research on invertebrates in these areas. Using bumblebees as a sample community, we studied their interactions with cropland and wetland over time. While wetlands do not affect the richness and diversity of bumblebee communities, they do affect the abundance of the five most commonly found bumblebees. We found a positive effect of wetland area percentage on four of the five species studied and four species were significantly affected by the interaction between time and crop area. This suggests that bumblebees are generally affected by the presence of wetlands, while any benefit from crop area is likely being mediated by seasonal trends. This conforms with previous research on how bees interact with agricultural landscapes – they forage in cropland during a bloom period, and otherwise utilize the more temporally distributed floral resources of wetlands and other non-crop areas; however, further research is needed to understand how bumblebees are utilizing these wetlands.

Habitat Diversity Effects on Bee Diversity and Abundance in Southern Manitoba

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Natural areas in Manitoba could be providing habitat, resources, and refuge to endangered native bees, such as *Epeoloides pilosulus* (Apidae) and the Rusty-patched Bumble Bee (*Bombus affinus*) (Apidae). The true extent of bee diversity and abundance in Manitoba is currently unknown, resulting in the potential for species extinctions due to habitat loss in key natural areas. The conversion of Manitoban natural areas to cropland has greatly reduced the range of native ecosystems, resulting in losses in habitat and species diversity and abundance in southern Manitoba. To quantify the natural area diversity, edge density, patch density, and patch richness were extracted from the Annual Crop Inventory for Agriculture and Agri-food Canada. Areas with low natural area diversity, like croplands, are showing issues with maintaining high levels of native bee diversity. Whereas semi-natural areas, areas with high edge density, are hosting a significantly higher amount of diversity compared to agricultural areas. Natural areas appear to be hosting entirely different bee species communities depending on ecoregion. The differences between agricultural sites and semi-natural sites emphasize the need for collaboration between stakeholders and conservationists to identify a way to enhance the landscape diversity to support diverse and abundant bee communities.

Landscape-Level Effects of Agricultural Intensity in the Saskatchewan Prairies on Diet Source, Condition, and Post-Fledging Success of Juvenile Barn and Tree Swallows

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It is still unclear how landscape changes caused by the intensification of agriculture have affected breeding aerial insectivores, and specifically nestling quality and other key demographic drivers. Tree Swallows (*Tachycineta bicolor*) and Barn Swallows (*Hirundo rustica*) are two sympatric species of aerial insectivores that breed in Saskatchewan agroecosystems. In 2020 and 2021, we used stable isotope (δ2H) analyses of feathers as intrinsic markers of nestling diet source (terrestrial versus aquatic-emergent prey) to investigate whether the intensity of agriculture was associated with parental selection of prey source. We tested for differences in body condition and growth of nestlings across a gradient of agricultural intensity and used Motus telemetry to estimate post-fledging survival. Barn Swallows opportunistically used aquatic aerial prey resources to provision nestlings, whereas Tree Swallows specialized in aquatic-emergent prey, regardless of the immediate availability (< 500 m) of this resource. For Barn Swallows, row-crop cover had negative effects on condition, while for Tree Swallows condition was related to open water extent. Tree Swallow fledglings moved away from their natal colonies three days after leaving the nest, and with evidence, they used habitats like wetlands and marshes, while Barn Swallow fledglings stayed four days longer in their colonies. We found that only seven days after fledging, mortality of Tree and Barn Swallows averaged 40%, but the factors that contribute to these rates are still unclear. This research contributes to the growing evidence that conservation of wetlands within the agricultural landscape may mitigate the negative effects of agriculture for some breeding aerial insectivores.

GPS Tracking and Fecal DNA Analysis Reveal the Importance of Prairie Wetlands for Multiple Species in a Declining Avian Guild

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Birds that catch insects while in flight, known as aerial insectivores, have declined sharply over the last 50 years. The causes of aerial insectivore declines are incompletely understood but are hypothesized to relate to large-scale changes in their insect prey, which may be partly driven by the increasing intensity of North American agricultural practices. To investigate whether aerial insectivore feeding ecology is affected by agricultural intensity, we studied the foraging and diet of two aerial insectivore species with contrasting foraging ecologies, Barn Swallows (*Hirundo rustica*) and Tree Swallows (*Tachycineta bicolor*), across a gradient of agricultural intensity in central Saskatchewan, Canada. Data from GPS tags demonstrated that both Barn and Tree Swallows selectively foraged in wetland habitats and avoided cropped habitat. Both species of swallows also avoided croplands more strongly in highly intensive landscapes. Fecal DNA indicated that diet composition was similar between Barn and Tree Swallows, with both species frequently consuming emergent aquatic insects. Additionally, wetland area was a better predictor of diet composition than cropland area for both species of swallow. Collectively, these results confirm that agricultural intensity, and especially wetland presence, affects where swallows forage and which insects they exploit. Given that wetlands continue to be drained and degraded in the Canadian Prairies, these findings underscore the need for more comprehensive wetland protection policies to conserve the foraging habitats and insects that are important to prairie aerial insectivores.

Piloting a Results-Based Landowner Incentive Program to Further Conservation of Tallgrass Prairie in Manitoba

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In Canada, less than 1% of Tallgrass Prairie remains, making it one of the rarest and most endangered ecosystems in the world. As such, additional and innovative approaches to conserving the remaining prairie need to be explored. Funded under Environment and Climate Change Canada's Community Nominated Priority Places for Species at Risk, the Nature Conservancy of Canada (NCC) is piloting a results-based conservation incentive program, the Stewardship Credit Pilot Program (SCPP). Located in southeastern Manitoba, where the largest remaining patch of Tallgrass Prairie persists, this program involves residents of the community in the conservation of prairie biodiversity and species at risk by incentivizing beneficial management practices on their land using a shared knowledge approach. The program is currently in its second year of implementation with nine participants, influencing a total of 95 ha. As one of the first results-based incentive programs in Canada, our goal is to assess whether this approach can be an effective conservation tool socially, ecologically, and economically for this region. This presentation reports on the successes, challenges, and opportunities of SCPP to date.

Rangeland Management Plans Improving on Native Rangeland Conservation

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Productive rangelands are becoming increasingly more important to producers as land values continue to rise across southwestern Manitoba; however, native rangelands are often considered unproductive from a forage perspective, increasing vulnerability to modification or loss. Rangeland Management Plans (RMP) are a tool used by Manitoba Habitat Heritage Corporation to collaborate with producers to conserve native grasslands while addressing productivity issues. Key attributes of rangelands are assessed as indicators of health, which reflects plant diversity and abundance, moisture retention, nutrient cycling, and habitat structure. The results of the rangeland health assessment are summarized in the RMP and provide direction on beneficial grazing practices that can be implemented to address forage productivity. In addition to productivity, the RMP also provides input on grazing practices that ensure climate change resiliency and habitat features important to grassland species at risk. The development of RMP has expanded the understanding of attributes that influence the overall sustainability of native rangelands. Grazing season (i.e., grazing too early or too late) can compromise plant diversity and reduce the presence of warm season (C4) grasses, decreasing grazing potential. The timing of tillering or regrowth of grasses increases plant abundance and rangeland productivity influenced by sustainable grazing practices. Most producers are managing a combination of native and non-native rangelands that require different grazing considerations. Developing the knowledge of attributes that influence overall forage productivity allows producers to implement beneficial grazing practices that address the issues, while also reversing the perception that native rangelands are unproductive.

Engaging Ranchers in Effective Conservation Actions in Southwest Saskatchewan

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Ranchers play a key role in protecting and restoring critical grassland habitats in southwest Saskatchewan, where most native prairie lands are managed for cattle producers. The South of the Divide Conservation Action Program (SODCAP) Inc., in collaboration with other environmental NGOs, government agencies, and industry, have been delivering a variety of stewardship programs to producers and First Nation communities over the last eight years. In this presentation, I will discuss the most common challenges we face in engaging producers and land managers in effective conservation actions, and the ways we overcome those challenges. SODCAP's programming focuses on the retention, restoration, and proper management of native grasslands to provide ecosystem services, including habitat for species at risk. In this context, we develop Conservation Agreements (CAs) with producers who own or manage important and critical habitats. CAs are long-term, legally binding documents that contemplate payments to the producers based on the cost of implementing recovery strategies in accordance with Federal and Provincial Action Plans. Each CA includes a site-specific management plan containing activities that are potentially destructive to the habitat and will be avoided, and a list of management activities intended to improve and retain the condition of the habitat. We believe that success lies in developing programs cooperatively, making habitat management for species at risk an important priority while also ensuring economic sustainability on the landscape.

Implementing Habitat Management Plans on Native Grasslands in Southwest Saskatchewan

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Many agri-environmental programs provide incentives that compensate for a percentage of infrastructure purchased by the producer. There are generally no environmental outcomes measured or even identified. These are typically farm income support payments with no contracts with producers. Ongoing management costs to implement conservation measures are rarely acknowledged or compensated for. The Saskatchewan Stock Growers Foundation (SSGF) and its partners including the South of the Divide Conservation Action Program (SODCAP) Inc. have taken a different approach. Conservation agreements to manage native grassland habitat for wildlife and species at risk with measurable targets are being implemented with interested producers. These targets include a range of items including plant litter, reduced density of invasive species, robust sagebrush, improved connectivity, and unrestricted migration patterns. These agreements are legally binding, usually 10 to 15 years in length, and are not tied to the land title. They must contribute to ranch viability as well as producing environmental outcomes. They all include habitat assessment, list destructive activities that the producer agrees to avoid, and conservation measures designed to achieve specific habitat targets. The costs are itemized and estimated over the term of the agreement and include compensation not only for infrastructure but also for management and inconvenience costs. Producers receive funding to implement the plan and SSGF and SODCAP are committed to monitoring and providing technical assistance to promote adaptive management. In the last two years, 23 agreements have been negotiated impacting over 200,000 ac of native grassland habitat. Specific examples will be presented at the PCESC.

Term Conservation Easements: Ranching for the Future

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Conservation easements are proven ways to protect ecologically sensitive lands and species at risk. Native grasslands are one of the most threatened ecosystems in the world, with only a fraction remaining and the threat of conversion to annual cropping increasing every year. These lands are typically managed by multigeneration ranches and some private landowners. What happens when these ranchers don't want to risk restricting the next generation for what they can do with that land but wish to conserve their grasslands and protect them from future cultivation? The Saskatchewan Stock Growers Foundation is the first to offer Term Conservation Easements where landowners have the option to put land under easement for a specific term and still allow for flexibility in the future. The longer a rancher is willing to put land under easement, the higher the financial compensation we can offer, and it can be layered into a multi-species focused habitat management agreement. Using grazing management strategies ranchers can continue their lifestyle to create habitat for species at risk such as Greater Sage-Grouse or manage invasive plant and weed species. All easements are monitored at least once a year to collect data on birds and insects, carbon sequestration, and range health. We work with various organizations and academia to analyze the data and provide landowners with information about their land. We understand that to protect our grasslands, we need to collaborate and work with ranchers while giving them the technical and financial support to carry on their way of life.

Prairies on Fire: Prescribed Fire Exchanges as a Collaborative Tool

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Prescribed fire exchanges are a tried-and-true route to increasing capacity for the use of prescribed fire as a conservation management tool. It is widely recognized that years of suppressing natural fires have led to a loss of grassland ecosystems, a loss of suitable habitat, a decrease in plant and animal biodiversity, and a buildup of fuel that leads to uncontrollable wildfires. That said, in Canada, access to training and knowledge sharing surrounding the safe use of fire has been largely limited to public agencies, leading many practitioners to use fire without training or excluding them altogether. Prescribed fire exchanges increase access to classroom and in-field training for all user groups, facilitate networks of fire practitioners working together, and help share current and existing fire science through a centralized, accessible platform. In this presentation, Dinyar Minocher, coordinator of the Canadian Prairies Prescribed Fire Exchange, will speak to the successes of the American model and the journey of expanding this network northward, establishing the first prescribed fire exchange in Canada. This collaborative effort has already led to the development of an introductory course (offered openly through the University of Saskatchewan) and has helped new and seasoned partners burn across the three Canadian Prairie Provinces. By safely maintaining natural ecosystem drivers, we are able to contribute towards healthy and productive prairies, which in turn provide food, habitat, and countless other benefits to us and those with whom we share this planet.

Integrating Prescribed Fire and Targeted Grazing to Enhance Species at Risk Habitat in an Urban/Semiurban Landscape

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Our Canadian Grasslands evolved under the three main ecological drivers of climate (i.e., floods, droughts, temperature extremes), grazing, and fire. With the removal of any of these ecological drivers from the system, our native grasslands and associated wildlife habitats are impacted. Meewasin Valley Authority in Saskatoon, SK is using prescribed fire and targeted grazing to enhance grassland habitat for species at risk. Integrating these techniques help reduce shrub and tree invasion and non-native grass species into grasslands to enhance grassland bird habitat (e.g., Sprague's Pipit and Bobolink) and reduce vegetative cover on stabilized sand dune for dune dependent species (e.g., Smooth Goosefoot and Gibson's Big Tiger Sand Beetle). This presentation will discuss how fire and grazing can be integrated to enhance species at risk habitat in an urban/semi-urban landscape context.

Burning the Prairie: A Systematic Analysis of the Grassland Productivity and Diversity Response to Fire

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Fire is a key driver of ecosystem structure, function, and stability in grasslands; however, due to years of suppression, fire deficit in the Prairies results in excessive fuel buildups and an increase in the frequency and severity of wildfires. While there is a growing interest in reintroducing fire in the northern Prairies, understanding the ecological response of fire is key to anticipating small- and large-scale effects on grasslands. Many individual studies have examined prescribed fire and wildfire effects on forage production and diversity in the grasslands of the western Great Plains; however, there have been no quantitative reviews or systematic analyses of these studies. This is an important gap, as a systematic understanding of fire effects is critical to justify the use of prescribed fires and determine the appropriate fire return intervals. In this session we will discuss the meta-analysis results of the impacts of fire on grassland diversity and productivity. Specifically, we will address the value of fire in maintaining the ecological integrity of grassland habitat. Finally, we will highlight other outcomes of this meta-analysis project, including the curated bibliography of grassland fire research that will be valuable for future studies on this topic.

Building Capacity for Species at Risk Conservation Efforts and Facilitating the Continuation of Cultural Knowledge Gathered from the Land Through Youth/Elder Connections in Piikani Nation

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Piikani Nation, one of the four nations within the Blackfoot Confederacy, has a unique and strong culture with direct connections to the land. Facilitating knowledge sharing between youth and Elders is a priority for many communities, including Piikani Nation. Efforts to share the importance of land-based learning are on the rise. A collaborative project led by Piikani Nation Lands Department and Waterton Lakes National Park has been a highlight within the community of Piikani and Parks Canada since 2021. The project is aimed at building capacity for terrestrial species at risk conservation efforts and facilitating cultural knowledge sharing gathered from the land through youth-Elder connections. The project is funded by Environment and Climate Change Canada and Parks Canada's Nature Legacy program, and supports activities such as Piikani Youth Field Days, Elder interviews, species at risk conservation, inventory and mapping, and a culturally significant plant guide relevant to Piikani Nation knowledge and stories. Through this project, 150 Piikani youth have experienced learning on the land from Blackfoot and western ways of knowing both within Piikani Nation and at Paahtomahksikimi (Waterton Lakes National Park). This meaningful work demonstrates the outcomes possible through building reciprocal connections and collaborations.

The "Eyes on iNaturalist" Program in Prince Albert National Park

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Conservation organizations and land managers are constantly seeking information to inform decision making, but often struggle with the technical expertise, data management, and staff time required to maintain quality data. Additionally, staff are often faced with competing conservation, administrative, and operational priorities. Prince Albert National Park implemented the “Eyes on iNaturalist” program in 2021 with the objectives of increasing the collection of useful ecological information, minimizing data management, and engaging staff from all functions within Parks Canada. Through this program, staff are guided through enrollment and use of the iNaturalist platform and are encouraged to collect incidental observations of organisms they notice in the park during their regular duties. In two years, 32 staff members have accumulated almost 3000 observations of more than 790 species. Information collected has led to the detection and control of newly observed invasive plant species, prompted academic research connections, provided information used in species at risk planning, and greatly increased the understanding of park biodiversity. Participants in the program reported increased knowledge and appreciation of the site in which they work, as well as satisfaction derived from contributing to the collection of important data. Engaging employees within an organization is a worthwhile and productive endeavor, and iNaturalist is an excellent tool for this purpose due to its robust quality control, data management features, and ease of use.

A Partner and Community-First Approach to the Development of the Southwest Manitoba Priority Place Integrated Conservation Implementation Plan

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This presentation will outline a partner and community-first approach to the development of the Southwest Manitoba Priority Place (formerly called the Mixedgrass Prairie Priority Place) Integrated Conservation Implementation Plan (ICIP), including the lessons learned to date. The planning is focused on partnership building, shared investment, socio-economic, and cultural considerations. In 2018 the federal, provincial, and territorial governments agreed to the implementation of the Pan-Canadian Approach to Transforming Species at Risk Conservation in Canada, which aims to transform species at risk (SAR) and biodiversity conservation from a single-species approach to one that focuses on multiple species and ecosystems using a more targeted and collaborative process. This has resulted in focused conservation efforts within Priority Places – distinct areas with significant biodiversity, high concentrations of SAR, and opportunities to cooperatively advance achievable conservation efforts. Each Priority Place is developing an ICIP using the Open Standards for the Practice of Conservation. Environment and Climate Change Canada has partnered with The Nature Conservancy of Canada to co-lead the development of the ICIP for the Southwest Manitoba Priority Place. We established a diverse project team to play a central role in the plan development and delivery. A critical component of the process includes involving Indigenous, agricultural, conservation, community, industry, and government partners from the beginning. Furthermore, it incorporates public opinion and market research to gauge resident and landowner perspectives. The goal is to create a framework to facilitate coordinated and collaborative on-the-ground conservation actions that benefit both SAR and socio-economic interests.

Parks Canada Leadership in Multi-Species Action Planning and Implementation: Collaboration, Connection, and Conservation for Prairie Species at Risk

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Action plans are required for all species at risk with a federal recovery strategy posted on the Species at Risk Public Registry. Taking an ecosystem approach, Parks Canada has developed multi-species action plans for numerous parks across Canada. This approach coordinates recovery planning efforts across a suite of species of conservation concern, prioritizing resources for those where Parks Canada can make significant contributions to recovery and incorporate themes to align with Canada's Nature Legacy priorities: landscape-scale conservation and ecological connectivity, climate-smart conservation, Indigenous conservation leadership, and adaptive management frameworks. To illustrate our modernized approach, actions on the ground from three national parks in the Prairie region are showcased. Grasslands National Park is restoring critical habitat quality and connectivity for Greater Sage-Grouse, using an integrated delivery approach to remove or mitigate anthropogenic structures at a landscape scale and help maximize survival and recruitment of Greater Sage-Grouse in Saskatchewan. Waterton Lakes National Park (WLNP) is a key supporter of Blackfoot leadership of Plains Bison restoration, including the Iinnii Initiative and the Kainai Iinnii Rematriation (on the nearby Blood Reserve). Blackfoot community members have been engaged in the return and management of the WLNP bison herd since 2021. Prince Albert National Park held multiple engagement sessions with Indigenous communities to include them in their action planning process. Resulting actions include working with Indigenous Elders to monitor culturally significant plant species and incorporate these species into grassland restoration projects. Overall, these projects demonstrate collaboration, connection, and conservation across the Canadian Prairies.

Understanding Woody Plant Encroachment in the Prairie Grasslands using Remote Sensing

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Grassland ecosystems, an important part of terrestrial ecosystems, provide varieties of landscape functions and ecosystem services, especially for species at risk. Woody plant encroachment (WPE), the expansion of woody vegetation in grassland, has been reported to appear in grassland ecosystems worldwide and is exacerbated by climate change and human activities. As a factor in grassland degradation in arid, semi-arid, and sub-humid climates, WPE alters the biotic and abiotic conditions of the environment and has negative effects on species habitats; therefore, understanding the drivers, impacts, and trends of WPE is critical, but difficult to conduct because of the complexity. Remote sensing (RS) technologies provide opportunities for researchers to quantify the distribution of WPE and gain a better understanding of the drivers and impacts of WPE at different temporal and spatial scales. Although some remote sensing studies have focused on detecting WPE and calculating the woody plant cover in grassland, it is still challenging to detect WPE at early stages due to similarities with herbaceous vegetation. Soubry and Guo's field-based hyperspectral measurements results indicated the earliest shrub encroachment can be identified when the cover reaches between 10% and 25% but found it difficult to have good separation in mixed shrub pixels using Landsat 8 and Sentinel-2 data; therefore, we are aiming to understand WPE for better managing grassland ecosystems and enhancing species at risk habitat conservation with a multisensory remote sensing approach.

Collaborative Native Grassland Mapping in Saskatchewan using Google Earth Engine

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Accurate mapping of native grassland is crucial for the development of policies and tools to address grassland conversion and landscape fragmentation and to target conservation and restoration actions. The Prairie Landscape Inventory project (PLI) aims to map the Saskatchewan Prairie Ecozone's native and tame grassland land covers using freely available remotely sensed imagery at 10-metre resolution. In 2021 and 2022, the project focused on landcover mapping for the Moist Mixed ecoregion. Our objectives were to: (1) collect a comprehensive and updated ground-truthing land cover data set, (2) examine if the addition of multidate radar data improves the classification of grassland land cover categories from other land cover types, and (3) produce an updated grassland inventory for the ecoregion. Through collaboration across provincial government and different organizations with a similar goal and volunteer support, and with funding from different sources, 2,539 roadside surveys in five land cover categories were conducted. The ESRI Survey 123 app was used to collect data in 2020 and 2021. Using the Google Earth Engine platform for remotely sensed data acquisition and analyses in the Moist Mixed Grassland ecoregion, 607,786 ha (8.9%) of native grassland were mapped with 61.7% accuracy and 959,913 ha (14.2%) of tame grassland were mapped with 66.9% accuracy, identifying cropland as the dominant land cover type accounting for 60.7%. The plan for the PLI project is to finalize the Aspen Parkland and Cypress Uplands ecoregions by 2023 to create a land cover map for the full Prairie Ecozone in Saskatchewan.

Designing and Implementing Successful Targeted Grazing Projects in Western Canada

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Municipalities, conservation organizations, and private land managers in urban and rural settings are turning to the use of targeted grazing as an ecologically friendly tool to control weeds and invasive agronomic vegetation to assist in the recovery of ecosystem function. Targeted or prescriptive grazing can be defined as the use of a specified kind of livestock at a determined season, duration, and intensity to accomplish defined vegetation and landscape goals. It is an increasingly popular tool in western Canada, and easily accessible information to guide the successful implementation of targeted grazing projects in western Canadian grassland and forested ecosystems is limited. The Grassland Restoration Forum partnered with Alberta Ecotrust and the Kainai First Nation to help address this gap in knowledge and training. Building on a previous project supported by the Nature Conservancy of Canada and the Ranchers Stewardship Alliance Inc., this new partnership involved the development of a guide to aid the design of project specific grazing prescriptions, and field-based training workshops to assist in successfully monitoring targeted grazing projects.

Reverse Auction to Restore Native Prairie Grasslands in Saskatchewan

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Saskatchewan Stock Growers Foundation (SSGF) has been awarded $2 million from Environment and Climate Canada to be used for a reverse auction to restore native grassland. In the reverse auction, SSGF will advertise that we are looking for landowners who want to convert previously cultivated land to perennial native grass. Interested landowners will submit bids, with the amount of money they would want to be paid to convert their land. Bids will then be adjusted by an Environmental Benefits Index, which scores each bid on its potential to meet specific project goals. Specific goals of this project are to provide and improve habitat for species at risk that rely on grassland habitat and increase carbon sequestration. The successful bids will be the projects that provide the most ecological benefit for the lowest amount of conservation dollars. Producers must agree to maintain the land as native grass for a period of no less than 30 years, which makes this a long-term and valuable conservation project. The reverse auction is a relatively new approach to allocating conservation dollars, and research has found it to be more efficient than fixed price payment programs. SSGF will be working with many partners to complete this project, including University of Alberta, University of Saskatchewan, Canadian Wildlife Federation, Green Analytics, South of the Divide Conservation Action Program Inc., and the Saskatchewan Stock Growers Association. Additional funding is also coming from the Weston Family Foundation and National Fish and Wildlife Foundation.

POSTER PRESENTATION ABSTRACTS

Breeding Native Plants for Forage and Reclamation: Challenges and Prospects

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The availability of adapted native plant seed stock is a major limitation for land managers looking to preserve, enhance, and diversify landscapes. Working with native plants poses several additional challenges from seed production and quality, and establishment and persistence of stands, to regional adaptation within a shifting climate. Plant breeding can play a role in the preservation of native plant genetic resources and the maintenance of biodiversity in agro-ecosystems. Not all seed sources are created equal and genetic diversity can be leveraged to improve populations and improve outcomes. Classical plant breeding and emerging techniques in the areas of high-throughput omics are being applied to the diverse challenges of working with native plant seed. The purpose of this presentation is to discuss current research into the breeding of native plants (grasses, forbs, and shrubs) for forage and reclamation end-uses coming out of Agriculture and Agri-Food Canada's Swift Current Research and Development Centre based in Swift Current, Saskatchewan. Technical, genetic, and ecological considerations for the development of native plant seed stock are discussed.

Stewards of Saskatchewan: Three Decades of Engagement, Partnerships, and Conservation of Species at Risk Habitat in Saskatchewan

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Nature Saskatchewan's Stewards of Saskatchewan (SOS) programs have been engaging and partnering with land stewards in voluntary stewardship since 1987, benefitting species at risk (SAR) and rare plants, as well as other flora and fauna that share those habitats, across southern and central Saskatchewan. Through voluntary stewardship agreements, stewards agree not to cultivate species at risk and rare plant habitat including tame or native prairie, shelterbelts, and/or shorelines and to not knowingly destroy nesting sites. Stewards also agree to annually report the number of SAR on their land and any land-use changes. The occurrence information, along with rare plant search and monitoring data collected by staff, is shared with the Saskatchewan Conservation Data Centre and federal Recovery Teams to contribute to SAR statuses/listings, recovery strategies, and action plans. The SOS programs work with just over 1,000 stewards conserving approximately 925,000 ac of habitat and 147 mi of shoreline for many SAR and rare plants. Recently, since focus began on habitat for the threatened Sprague's Pipit in 2010-2011, the programs have been working with 39 participants to conserve just over 113,000 ac of federally designated Critical Habitat for Sprague's Pipit at 964 sites across southern Saskatchewan. The SOS programs also partner with stewards to complete Habitat Enhancement projects including native seeding, wildlife-friendly fencing, and alternative water developments. Additionally, stewards are provided with educational resources including site-specific SAR Beneficial Management plans to help them make informed decisions for their operation as well as the SAR who call their land home.

Examining Changes in Prairie Shorebird Populations in Relation to Climate and Lake Habitat Characteristics

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Many shorebird populations are in steep decline, threatened by climate change, human disturbance, and habitat alteration. Shorebirds migrate thousands of kilometers from their wintering grounds to breeding grounds and often rely on a restricted set of high-quality staging sites to rest and refuel. Shorebirds migrating through the interior of North America rely opportunistically on saline wetlands and lakes as stopovers, but the Prairie region has historically received less study than coastal stopover sites. Wet-dry cycles in the interior Prairie Pothole region (PPR) can drastically affect the availability of wetland habitat and the characteristics of saline lakes. Climate change is expected to lead to drier conditions in the PPR, impacting the availability of shorebird habitat in this region. This project aims to assess spatial and temporal changes in shorebird populations by revisiting lakes in Saskatchewan with historically high shorebird numbers but that have not been surveyed since the 1990s. The specific objectives of this project are to: (1) understand changes in shorebird populations by comparing current and historic counts, (2) evaluate changes in populations in relation to wet-dry cycles and surrounding land-use to understand effects on shorebird habitat suitability, and (3) determine current shorebird abundances in Saskatchewan lakes to see if they meet thresholds for potential nomination under the Western Hemispheric Shorebird Reserve Network. With shorebird populations declining globally, this project will provide critical information about how climate and land-use change in the Prairies alters lake habitats that are critical staging areas for migrating shorebirds.

Birds Canada's Grassland Conservation Program

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Populations of grassland birds are declining primarily due to loss of natural perennial cover to cultivation for annual crops. Declines in grassland birds will continue if conversion of grass to crop continues, and if existing rangelands are not managed with biodiversity-friendly practices. Birds Canada's Grassland Conservation Program aims to help address the issue of declining grassland birds. To this, we produced a "Grassland Conservation Incentives Guide" and a "Climate and Biodiversity Friendly Production Practices Resource Guide" to help producers find information on various programs that are meant to incentivize conservation and highlight production practices that co-benefit livestock production and biodiversity. In 2021, we began a multi-year project with the Saskatchewan Stock Growers Foundation, South of the Divide Conservation Program Inc., and other environmental non-governmental organizations and universities to measure biodiversity that is supported by grassland production systems managed for livestock (cattle) production. We anticipate the results of this Weston Family Prairie Grassland Initiative research collaboration to help accelerate the implementation of sustainable practices that will help stabilize populations of grassland birds. As part of our effort to conserve native grasslands and prairie endemic birds, Birds Canada is collaborating with Canadian Wildlife Service personnel to develop a Bird Friendliness Index (BFI) that can be adopted by Prairie Canada with the aim to further incentivize conservation outcomes. We anticipate the BFI being an outcome-based metric that will serve as a biodiversity indicator useful to individual producers, production supply chains, and regulatory agencies.

Celebrating 12 Years of Land Conservation Partnerships in Southeastern Alberta

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Alberta Conservation Association's Land Management Program secures and conserves significant natural habitat in perpetuity to benefit our valued wildlife and fish resources and provide Alberta's outdoor enthusiasts with year-round, sustainable recreational opportunities. We maximize the impact and efficiency of our work through collaborative partnerships with government (municipal, provincial, and federal), other conservation groups, private companies, producers, and other conservation-minded individuals. Between 2010 and 2022, Alberta Conservation Association (ACA) worked with 15 partners to purchase 12 separate land parcels, securing over 6,000 ac of wildlife habitat in southeastern Alberta with an estimated value of over $6.8 million. These sites encompass over 3,000 ac of native grassland and riparian communities, providing habitat for at least 35 observed species considered At Risk in Alberta and increasing connectivity to a network of privately protected and Crown land in the region. Since purchase, ACA and partners have completed many habitat enhancement projects on these sites, including 1,370 ac of native grass and shrub plantings, over 160 ac of wetland restoration, and 42 km of fence modifications. ACA also works with local producers to use livestock grazing at ecologically sustainable stocking rates, maintaining the vigour, integrity, and long-term health of the plant communities.

MULTISAR: A Multi-Species Habitat Stewardship Project

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The MULTISAR project is a process for multi-species conservation at the landscape level. It is a collaborative effort between nongovernment, government, and landholders, which is succeeding because of the cooperative teamwork of all partners. The collaboration demonstrates a special open-minded attitude that goes beyond commitment and pride in any one organization and is indicative of a desire in our society for multi-species and landscape-level conservation. The South Saskatchewan and Milk River Watersheds were chosen as the project areas as they support a high number of species at risk in Alberta. Over the past 20 years the project has been developing habitat conservation strategies and collaborating with the ranching community on habitat enhancements to benefit species at risk and the ranching operations who manage over 700,000 ac of habitat. Habitat conservation strategies are ranch level plans that identify beneficial management practices and habitat improvement recommendations that can also benefit ranching operations. Recommendations are identified by landowners, biologists, and agrologists using local knowledge and by completing in-depth range and riparian health assessments as well as wildlife inventories. MULTISAR's partnership includes Alberta Conservation Association, Alberta Environment and Protected Areas, Prairie Conservation Forum, and Cows and Fish. Advisory members include Canadian Cattle Association, Alberta Beef Producers, and Canadian Roundtable for Sustainable Beef with long-term funding support by Environment and Climate Change Canada.

Combatting Fragmentation with Collaboration

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A landscape-based, ecosystem level approach is necessary to address Mixedgrass Prairie habitat loss and degradation. It is essential that native prairie land managers work together to combat fragmentation. Scale is often the limiting factor as very few individuals or organizations have large enough continuous tracts of land to independently maintain ecosystem function. Effective collaboration among land managers to implement conservation at a landscape level is often hindered by the following: (1) prohibitive costs of conservation actions, (2) risk associated with attempting experimental methods, and (3) underdeveloped relationships and confidence with conservation and government agencies. Grasslands National Park (GNP) is working to remove these barriers by lowering the cost and risk of implementing conservation actions through access to additional forage at a reduced rate (i.e., grassbanking) and experimenting with new technology and methods to improve efficacy. A key factor is that GNP is committed to working with other land managers through mutual collaboration, rather than a top-down approach, to pursue grassbank grazing agreements and achieve mutual understanding and shared goals. We hope that collaboration facilitated by GNP's grassbank program will yield innovative conservation methods that illustrate improved efficacy and ultimately result in a greater adoption of such practices, thereby reducing habitat fragmentation by connecting GNP's 76,000 ha of native grassland to native grassland stewarded by ranchers, provincial counterparts, and grazing corporations, resulting in an area of native prairie more than twice that size.

Using Citizen Science to Monitor Franklin's Ground Squirrels

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Franklin's Ground Squirrels (*Poliocitellus franklinii*) are found in parkland habitats in Alberta. They are not currently listed under SARA, and in Alberta their species status is undetermined. Anecdotally, there are concerns that they could be in decline as some naturalists have observed that this species seems to have disappeared from many locations in the province where it previously occurred. Given the paucity of data available for this species, this project first aims to use citizen science to identify the current distribution of this species and potential locations of colonies. We will then select a subset of these colonies for population monitoring. In this presentation, we will discuss results from the first season of citizen science data collection. We will also outline plans for the upcoming season, which will focus heavily on outreach events to encourage more members of the public to participate in the project. We also hope to collaborate with experienced naturalists who could contribute observations of the current or past distribution of this species.

Great Horned Owls: A Human-Tolerant Species Thriving in an Altered Grassland Environment

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Prior to European settlement, Great Horned Owls (*Bubo virginianus*) were probably limited to riparian areas and small natural aspen groves in the Canadian Mixedgrass Prairie; however, since European settlement, the Great Horned Owl has steadily increased in abundance within the region, likely a result of anthropogenic structures that are suitable for owl nesting, roosting, and hunting. The increase of Great Horned Owls in the Mixed Grassland region can put them in conflict with wildlife conservation efforts. My objective is to assess nocturnal habitat use and territory size of Great Horned Owls in native grassland, cropland, and tame pasture landscapes. In 2022 (the first year of a two-year study), nine owls were tracked using high-resolution satellite telemetry, yielding over 130,000 location data points across three broad habitat types. A subsection consisting of 210 transmitter locations were visited to determine perch and habitat characteristics. Preliminary data show differences in territory size and habitat use between habitat types, with breeding Great Horned Owls travelling farther from nests in native prairie compared to those nesting in cropland-dominated landscapes. My results will be useful for managing habitat to reduce predation risk by Great Horned Owls on other species in this area.

Partnering with Community Pastures for a Proactive Approach to Weed Management

Mindy Hockley

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Partnering with ranchers to help set them up for success not only today but in the years to come is a driving factor for why habitat agreements with the Saskatchewan Stock Growers Foundation are successful. One agreement in place is in collaboration with the Monet Community Pasture on the northern end of the Missouri Coteau by Elrose, SK. They identified the need to not only slow the spread, but proactively protect the entirety of the pasture from Common Burdock, as well as the pastures of their memberships. We are two years into a 15-year habitat management agreement and were able to provide them with the necessary resources and funding to implement a long-term weed management strategy. This landscape is home to large herds of elk, deer populations, and species at risk such as Ferruginous Hawks and Burrowing Owls. Common Burdock negatively impacts overall biodiversity of the native grassland as well as the welfare of cattle and species at risk that call it home. Native grasses are best managed through responsible grazing in combination with proper weed management to ensure these grasslands are healthy and productive for years to come. The Monet Pasture also actively participated in the monitoring of bird species with Birds Canada and offers educational tours throughout the year. Through our habitat agreements, funded by groups such as Weston Family Foundation, Environment and Climate Change Canada, and National Fish and Wildlife Foundation, we partner with conservation minded ranchers to continue to protect this disappearing landscape.

Diet and Ranging Behaviour of Individual Coyotes in Southwestern Saskatchewan

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The Grasslands National Park (GNP) greater ecosystem is home to many species at risk (SAR) and is used as active ranchland for cattle grazing. Recent work revealed considerable cattle in the coyote diet year-round. An abundant source of livestock carrion has the potential to subsidize predator populations and increase predation on native prey, including SAR. To begin to assess the role of cattle in the coyote diet and on native prey, I aim to determine whether individual coyotes specialize on certain prey items (e.g., prairie dog vs. cattle carrion), and if so, how individual variation in diet affects the ranging and social behaviour of coyotes. I collected scat from within GNP and adjacent ranchland. I will use single nucleotide polymorphism fingerprinting of nuclear DNA to identify genotypes for the individual coyotes that deposited each scat, and metabarcoding of mitochondrial DNA to identify vertebrate prey species contained in each scat, including SAR. I will use the DNA results to test the hypotheses that: (1) individual coyotes specialize on certain prey items (e.g., prairie dog vs. cattle carrion) and (2) coyotes consuming cattle have a larger home range, as indicated by their scat being distributed over a larger area. Further, given cases of calf depredation in the region, I will use observations of coyotes to assess the activities they conduct on cattle pastures. This work will help to elucidate the role of cattle consumption on the diet and behaviour of the coyote population and the impact of coyotes on native SAR.

Aquatic Streambank Restoration

Eve Keller and Erica Maier

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Meewasin is a non-profit organization and regional conservation authority that manages several natural sites and extensive trail networks throughout the city of Saskatoon and the surrounding rural area. Hydrological features such as the South Saskatchewan River, creeks, and wetland complexes are important defining features across Meewasin sites and trail networks. Riparian areas adjacent to the river and creeks within the valley are popular destinations for recreational site users and common locations for infrastructure maintenance and development. Meewasin promotes education, ecological monitoring, and integrated resource management practices within riparian areas in an effort to reduce the negative impacts that development and human recreation pose to these sensitive areas. This poster will discuss recent Meewasin initiatives to engage the community in restorative aquatic plantings and willow staking along disturbed riparian areas to advance bank stabilization and streambank restoration processes.

How Did the Deer Cross the Fence? An Evaluation of Wildlife-Friendly Fence Modifications and Ungulate Response

Amanda MacDonald[1], Paul Jones[1], Jason Hanlon[2], Brian Martin[3], and Andrew Jakes[4]

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Fences are a common feature throughout the agricultural landscape of North America's Great Plains region. Knowledge surrounding the implication that fences are harmful to the movement of wildlife, specifically ungulates, is expanding. It is widely accepted that there is a need to mitigate the impacts of these anthropogenic features and wildlife-friendly fence designs are emerging as a practical tool to meet these goals. Here we evaluate the response of sympatric ungulate species to the implementation of two fence modifications: (1) clipping the top two wires together (clips) and (2) the installation of polyvinyl chloride (PVC) pipe to encompass the top two wires, with the goal of determining the optimal top wire height for a more robust understanding of effective wildlife-friendly fence standards. We used remote trail cameras from 2018-2020 to capture crossing events and recorded responses for Pronghorn (*Antilocapra americana*), Mule Deer (*Odocoileus hemionus*), and White-tailed Deer (*Odocoileus virginianus*). We used generalized linear modelling to test the effect the modifications had on crossing behaviour prior to and after the modifications were installed compared to a control site. We found that the modifications had no significant impact on crossing behaviour and wire height appears to be the most influential factor to evaluate the permeability of fences. We recommend the installation of clips as a cost-effective method to lower top wire height and PVC pipe to improve fence visibility and potentially reduce entanglement events.

Urban Beaver Management in the Meewasin Valley

Erica Maier and Eve Keller

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Meewasin is a non-profit organization and regional conservation authority that manages several natural sites and extensive trail networks throughout the city of Saskatoon and the surrounding rural municipality. Beavers are a keystone species within the Meewasin Valley region that rely on the forage and collection of woody plant materials for sustenance and habitat construction. Beaver presence in urban areas along managed riverside trail networks has become a contentious issue in the Meewasin region due to repeated instances of mature tree harvesting and associated damage to public infrastructure caused by beaver foraging activity. While the presence of beaver populations holds critical importance to the ecological balance of natural landscapes, this species presents complications to the maintenance of mature tree canopy, accessibility, and aesthetics along vegetated river corridors and landscaped trails. This poster will discuss Meewasin's current approach to urban beaver management, highlighting the selective application of preventative tree wrapping as a mechanism for public engagement, mature tree protection, and urban beaver promotion.

Planting Diverse Forage in Marginal Cropland to Restore Biodiversity and Ecosystem Health while Maintaining Crop Yield

Adam Mitchell and Christy Morrissey

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Expansion of monoculture crops has driven substantial losses of habitat, biodiversity, and ecosystem services, resulting in prairies being one of the most imperiled ecosystems on the planet. Restoring these unique ecosystems is particularly challenging due to their economic importance for food production; however, in addition to arable land, many prairies contain wetlands and other marginal saline areas that produce relatively low crop yields. Thus, marginal areas may be the optimal targets for restoration work to address conservation goals without reducing crop yield and profitability. We tested the value of restoring marginal areas within 51 distinct 160-acre canola/cereal fields in Saskatchewan, Canada. Using yield maps, we asked participating producers to plant 10-20% of their fields with a diverse forage mix surrounding low yielding wetlands and/or marginal areas matched with nearby control fields cropped as usual. We then tracked changes in multiple metrics including acoustic biodiversity, water quality, soil health, crop yield, and profit over subsequent years. Acoustic recording units recorded over 3000 hours of soundscapes in treatment and control fields. Bioacoustic indices, which are a proxy for biodiversity, showed increases over time, with measurable increases in the treatment fields relative to controls. There was no significant difference in yield or profit and forage treatments were an effective restoration tool for mitigating soil salinity. This suggests that restoring marginal areas within cropland is a nature-based solution that has significant promise to provide environmental, economic, and agronomic benefits.

Relearning the Buffalo through Collaboration and Knowledge Sharing

Nicola Odaisky

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I provide a brief overview of the role Sturgeon River Plains Bison play as a keystone species in a native prairie ecosystem. The discussion will touch on the challenges faced by the Sturgeon River Plains Bison and the application of shared knowledge for the learning and conservation of this population. An emphasis will be placed on the importance of relationships and collaboration between partners to achieve a common goal. Prince Albert National Park (PANP) continues to work closely with land-based education programs to better understand the movements of bison and attain population counts and demographics. Indigenous communities have an abundance of traditional ecological knowledge that greatly improves conservation and is contributed and passed on through storytelling of their long historical connection to the land and buffalo. This knowledge will play a critical role in bison research and conservation efforts. PANP is working to provide opportunities to land-based learning school groups that will foster connection to the buffalo and their habitat. Ecological monitoring skills will be honed, which can then be used to assist in knowledge sharing and programs within the park and their community. The discussion will touch on the successes and challenges of past efforts as well as plans and goals for the future.

Nature Central: Celebrating our Wild Alberta Parklands

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Nature Central: Celebrating our Wild Alberta Parklands is an initiative sponsored by Alberta's oldest natural history organization, the Red Deer River Naturalists (RDRN). The main objectives of the program are to compile an online and readily accessible inventory of protected rural properties in central Alberta (within 100 km of Red Deer) and to encourage the respectful enjoyment of these publicly accessible landscapes in cooperation with stakeholders (e.g., Nature Conservancy of Canada, Ducks Unlimited, Alberta Conservation Association). The program also seeks to foster nature appreciation, support young naturalists, and raise the public profile of the RDRN. The program was launched in 2021. A young naturalist and an assistant were hired to document the properties, create a website, and launch a social media presence. The team also hosted very popular programs over the summer, including nature kayaks, guided hikes, and family events. Nature Central enjoyed a successful 2022 summer season, with several family-based programs delivered and additional sites visited to document facilities as well as to conduct biophysical inventories. An ArcGIS StoryMap was launched, and drone footage was collected on several sites. A total of 170 publicly accessible, protected areas in central Alberta have been documented and many of the sites have been visited by Nature Central staff. Site information as well as photographs and links to stakeholder websites can be found on Nature Central's website and on the StoryMap. Current efforts include developing an extensive database of each site and exploring ways for the public to add their own photographs, stories, and experiences.

Establishing a Common Language for Ecological Restoration

Julie Sveinson Pelc and Stephanie Murray

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The United Nations has declared 2021-2030 as the Decade on Ecosystem Restoration to encourage the advancement of restoration opportunities and examine restoration as a science and practice. The term ecological restoration, or simply restoration, is applied in many ways with the most accepted definition being "the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed" (Society for Ecological Restoration 2004). Restoration objectives tend to focus on targets such as biodiversity, species at risk, natural disturbance regimes, and ecosystem processes. More recently, abating climate change and increasing carbon sequestration have become additional objectives. To facilitate connections and collaboration between interested parties, the Nature Conservancy of Canada (NCC) is reexamining restoration terminology. There are many definitions and terms used to describe restoration, such as reclamation, reconstruction, recovery, reestablishment, reforestation, regeneration, rehabilitation, reintroduction, rematriation, remediation, revegetation, rewilding, and socio-cultural restoration. Although most restoration efforts aim to repair ecosystems that have been altered by human activity, the goals of a restoration project may vary based on motivations like conservation, culture, economics, compliance, and legislation. Furthermore, restoration objectives tend to highlight the need to restore a site to an historic state; however, the target temporal state prior to alteration varies between projects, making it difficult to determine a reference state. NCC will initiate discussions and support knowledge sharing to provide clarity within the conservation community with regards to restoration terminology.

Balancing Beavers in a National Park

Shannon Poppy

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Beavers (*Castor canadensis*) play an important ecological role in Boreal transition and Mid-Boreal Upland ecoregions such as in Prince Albert National Park (PANP). Beavers have a long history and tradition in PANP including being the Parks Canada mascot. In the 1930s, visitors traveled far and wide to see Grey Owl's famous beavers Jelly Roll and Raw Hide. Still, every year thousands of visitors make the pilgrimage to see where Grey Owl and his beavers lived. In the 21st century, road and trial networks in the park dissect and inhibit natural waterways leading to conflicts. How do we balance managing unwanted infrastructure damage with the Parks Canada mandate to protect and present examples of Canada's natural and cultural heritage? What are the possible conservation technologies that could be implemented to maintain healthy landscapes, infrastructure, and beaver?

Influence of Grazing Management on Grassland Songbird Communities

Brielle Reidlinger

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Temperate grasslands and the species they host are on the brink of extinction. Many species of grassland songbirds are at risk due to habitat loss, fire suppression, climate change, and the use of herbicides, insecticides, and fertilizers. Old Man on its Back Prairie and Heritage Conservation Area (OMB) was established by the Nature Conservancy of Canada (NCC) as part of their initiative to protect Canada's grasslands. OMB, along with a bordering community pasture, is the setting for my research. These grasslands support native and non-native grazing species, including bison, cattle, deer, and antelope. Chestnut-collared Longspur, Baird's Sparrow, and Bobolink are among a few of the grassland species at risk found at the sites. I am researching the effects of cattle and bison grazing on grassland songbird and vegetation communities. Three different grazing comparisons will be examined: (1) the difference between pastures grazed by cattle and bison, (2) the difference between pastures grazed by bison in the summer and winter, and (3) the difference between cattle pastures operated under two different grassland managers. I expect that the different species of livestock, the season of grazing, and management groups will create a variety of habitat patterns that will support a variety of species at risk. This research is important because it could allow livestock producers and managers to sustain, and possibly improve, habitat for at-risk songbirds, which could shift the way rangelands are managed. The goal of this research is to determine successful grazing management practices for land managers, specifically NCC.

Ranching Viability and Habitat Stewardship on Alberta's Northern Grasslands and Forested Rangelands: Introducing SHARP

Amanda Rezansoff, Kris Kendell, Corey Rasmussen, Sue Peters, and Brad Downey

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Livestock producers play an important role in sustaining wilderness areas, ecosystem function, and biodiversity. On well-managed rangelands, grazing animals support plant health, improve soil quality, and preserve open space and wildlife habitat. The Species Habitat Assessments and Ranching Partnership (SHARP) is a voluntary, collaborative program delivered by Alberta Conservation Association (ACA) that supports landholders who want to maintain the unique grazing and ecosystem services on their property. SHARP operates in Alberta's northern grasslands along with Foothill, Parkland, and Boreal natural regions where forest grazing is interspersed. Together with the producer, we develop strategies for ecological and sustainable grazing, each contributing in some way to long-term profitability and environmental stewardship of the ranch. Participants of SHARP benefit from the trained expertise of ACA staff and technical partners who are committed to supporting the ranch. We provide ranch managers with the information needed for evaluating their rangelands based on indicators like ecosystem health, vegetation cover including sustainability of soil and plant production, and presence of weed species. A wildlife survey (e.g., ungulates, songbirds, grouse, waterfowl, amphibians, bats, and pollinators) is completed on each ranch to facilitate the proper implementation and evaluation of habitat enhancements that depend on the number and distribution of wildlife. Grazing recommendations based on selected forage and browse availability and wildlife habitat needs may also be proposed. We work cooperatively with landholders to implement voluntary cost-shared habitat enhancement agreements that co-benefit wildlife and ranching operations, such as wildlife-friendly fencing projects and the installation of off-site watering systems for livestock.

Invasive Moth Threatens a Population of *Yucca glauca* and *Tegeticula yuccasella*

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In 2019, during annual monitoring of the *Yucca glauca* population an unknown disease was present on a population of *Y. glauca* plants. The signs were a brown powdery/crumbly material covering the seed pods. After investigation and collaboration, the cause was determined to be from a moth called *Holocera gigantella*, a species native to the southern United States. *Holocera gigantella* is considered a significant threat to *Y. glauca* and its mutualistic moth, *Tegeticula yuccasella*. The invasive moth consumed and destroyed all the seeds within the infected pods, possibly outcompeting *T. yuccasella*; however, this has not been examined. Three years of efforts by Government of Alberta wildlife biologists to eradicate this invasive species appears to have been successful.

Recovery Actions to Conserve Sand Dune Habitat and Four Species at Risk

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A plant commonly used in flower arrangements is a significant threat to sand dune habitat and the endangered and threatened species that inhabit the area. In the sand dunes west of Pakowki Lake, Alberta, Baby's Breath became established and expanded into the habitat of Western Spiderwort (provincially Endangered, federally Threatened), Smooth Goosefoot (federally Threatened), Gold-edged Gem (federally Endangered), and Dusky Dune Moth (federally Endangered). Baby's Breath is a large perennial invasive plant capable of spreading over 10,000 seeds per plant. If it is not managed effectively, it can consume native prairie habitats, particularly habitats with sandy soils. Removal of Baby's Breath resumed in 2018-2020, five years after earlier efforts to eliminate Baby's Breath were carried out. In the five-year gap, Baby's Breath expanded into the critical habitats of species at risk. The efforts in 2018-2019 removed over 20 times the number of plants removed between 2008-2012. Removal efforts in 2020 included spot spraying with herbicide in areas away from the endangered and threatened species. Surveys in 2022 showed that the efforts to date have been successful in removing large Baby's Breath plants and significantly decreased the number of Baby's Breath plants in the sand dunes and surrounding area.

Identification and Management of a Cryptic Invader in a National Park: *Phalaris arundinacea*

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Reed Canary Grass (RCG) (*Phalaris arundinacea*) is often considered a native species in western Canada; however, throughout North America introductions of aggressive RCG cultivars have resulted in its cryptic invasion, leading to the current presence of both native and non-native subspecies. The two subspecies are not morphologically distinguishable and can only be identified genetically. Elk Island National Park (EINP) is 194 square kilometres of fully fenced mosaic of aspen, wetland, and grassland communities situated in the Beaver Hills Biosphere, west of Edmonton, Alberta. The park supports several ungulate species, including approximately 1000 bison and 750 elk. Throughout EINP, RCG is invading wetlands, riparian areas, and upland grasslands. This can decrease plant and insect diversity, alter wetland hydrology, and reduce palatable forage for ungulates. Recent genetic analysis revealed three distinct genotypes of RCG within EINP: native, non-native, and hybridized, with non-native RCG being dominant. Across EINP, managers are actively controlling invasive, non-native plant species to restore ecological integrity and maintain adequate forage habitat for ungulate populations. Control trials for the management of non-native RCG in grassland habitats have been ongoing since 2020 and will continue until 2023. Trials are testing the effectiveness of mechanical removal through mowing, the application of the graminicide clethodim, and a combination of both on RCG biomass, cover, shoot density and length, and ability to reproduce sexually. Once completed, results from trials will direct best approaches for effective and enduring management of RCG.

Fish and Wildlife Stewardship – Ferruginous Hawk Recovery in Alberta

Simon Slater and Cindy Kemper

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Surveys for Ferruginous Hawks (*Buteo regalis*), a grassland obligate species in Alberta, have been conducted in Alberta since the early 1980s. Results showed an increase in the estimated number of breeding pairs from 1982-1987, a slight decrease from 1987-1992, and a dramatic decline between 1992 and 2000. These population declines formed the basis for listing the species as Endangered in 2006. Threats to Ferruginous Hawks include habitat loss, habitat disturbance, reduced nesting opportunities and prey populations, increased numbers of predators and competitors, indirect human-caused mortality, and climate change. In response to these challenges, Alberta Environment and Protected Areas, together with various partners, have been implementing and/or supporting conservation actions to recover Ferruginous Hawks including, but not limited to, various regulatory tools to protect nest sites and important habitat, erecting artificial nest platforms, research on industrial disturbance, climate change impacts and mortality, educational programming, annual monitoring, and a province-wide inventory every five years. The provincial inventory in 2022 showed a statistically significant increase compared to the 2015 survey, with an estimated population of 1,417 pairs (±276). Although when comparing inventory data since 1982 using a linear regression analysis we see a gradually declining long-term trend, the increase in population during this survey is cause for cautious optimism. Alberta Environment and Protected Areas will continue to work with partners to continue recovery efforts for Ferruginous Hawks.

Biodiversity and Conservation Agreements: Providing Habitat on a Working Landscape

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Native rangelands on the Canadian Prairies are an increasingly valuable resource that fall predominantly under the stewardship of cattle producers. Conservation agreements, where long-term commitments are made not to develop the land or break the soil, are an effective way to ensure that working rangelands remain in native grass. The South of the Divide Conservation Action Program Inc. and the Saskatchewan Stock Growers Foundation are partnering with the southwest Saskatchewan ranching community, environmental non-profits, and universities to develop conservation agreements and measure their impact on prairie biodiversity. To that end, we have begun a project to measure the role of grazing intensity on the grassland breeding bird community within native grasslands in Saskatchewan. In collaboration with Birds Canada and the Canadian Wildlife Federation, and with financial support from the Weston Family Foundation, we conducted avian point counts and deployed automatic recorders at 24 sites varying in previous year's grazing intensity. Preliminary analyses reveal that diversity and structure contribute to bird community composition and abundance, but perhaps the most challenging attribute of conservation agreements is found in determining biodiversity thresholds to ascribe effectiveness of management actions. This study, together with gathering background knowledge from the wealth of research on grazing-biodiversity interactions on native rangeland will form the basis of these agreements.

Defining Critical Habitat: A Case Study of Least Flycatchers at Beaverhill Bird Observatory, Alberta

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Critical habitat is often defined by the last place(s) that an endangered species occurs, not by its abundance and productivity in a particular location. Least Flycatchers (*Empidonax minimus*), like most aerial insectivores, have declined rapidly over the last 50 years in North America, mostly due to the extensive use of insecticides. Since the Least Flycatcher is the most common species encountered at the Beaverhill Natural Area, likely due to the high insect densities, in 2022 we studied the productivity, nesting density, and habitat preferences of this species. We monitored 28 nests until fledging and found a higher success rate than other researchers have found for this species. Nesting density in our research area is double that found in other studies. Interestingly, our study shows no evidence for any clustered breeding, a well-documented breeding behavior for Least Flycatchers. Least Flycatchers seem to prefer nesting in Trembling Aspen compared to Balsam Poplar trees. We suggest that high productivity and nesting density should be factors to help identify critical habitat, and that the Beaverhill Natural Area be considered critical habitat for Least Flycatchers should it become necessary.

Grazing Management to benefit Multiple Species at Risk in Mankota, SK

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In the summer of 2022, SODCAP Inc. partnered with Mankota Pasture Ltd. to develop and implement a grazing management plan that would benefit the multiple species at risk that make their home on that 30,000-acre pasture. Their vast stretch of native prairie provides potential habitat for many species, including Greater Sage-Grouse (*Centrocercus urophasianus*), Sprague's Pipit (*Anthus spraguelli*), Chestnut Collared Longspur (*Calcarius ornatus*), and Swift Fox (*Vulpes velox*). Implementing a multi-species habitat management approach has posed a challenge for decades. With funds from the United States National Fish and Wildlife Foundation, we will assess habitat attributes for multiple species at risk by using a monitoring protocol recently developed by the Saskatchewan Prairie Conservation Action Program. Information from the "Guide to Habitat Attributes by Ecosite for Multiple Species at Risk" will be used to lead the grazing plan development and monitoring for this project. Habitat assessments were completed this summer and will continue in 2023. In 2020, Mankota Pasture Ltd. took control of the grazing management of the former Mankota Prairie Farm Rehabilitation Administration Pasture, relying on the vast array of local knowledge provided by their board and shareholders and advice from the Saskatchewan Ministry of Agriculture. The grazing management plan will benefit habitat for multiple species as well as shareholders business.

The Multiple Benefits of Connectivity when Reseeding Native Prairie in Southwest Saskatchewan

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The South of the Divide Conservation Action Program (SODCAP) Inc. engages with landowners in southwest Saskatchewan to restore cropland to native prairie with a focus on improving connectivity between existing grasslands. In Saskatchewan, much of the remaining prairie that has been left intact is patchy and present in small, fragmented pieces. This patchiness makes it hard for wildlife to adapt and thrive in their environment. Wildlife that evolved on the Prairie not only need native habitat, but they also require habitat connectivity of these intact patches to succeed. Improving habitat connectivity ensures wildlife are able to move, migrate, and expand to areas where they can find cover, food, mates, and proper breeding habitat. It also allows for increased population growth and genetic diversity, as well as increased dispersal of species. Not only does reseeding improve connectivity, but perennial grasslands also serve as highly effective carbon sinks. Unlike forests, where most of the carbon is stored above ground, carbon in grasslands is largely stored below ground in the root systems. SODCAP Inc. engages with landowners who have a strong conservation ethic. With funding from ALUS and the National Fish and Wildlife Fund, we are able to work with landowners on restoration and establishment activities that will benefit their operation and also benefit wildlife species, improve ecological goods and services, and serve to sequester carbon.

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