

Grants Fund Annual Report 2021/22

For the period of April 1, 2021 to March 31, 2022



wildlife | fish | habitat



Photo: ACA Research Grants
Evaluating Bull Elk Reproductive Success Using a Wild Pedigree Model (030-00-90-319)
Provided by: Nathan Digby





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ACA's Mission

ACA conserves, protects, and enhances fish and wildlife populations and their habitats for Albertans to enjoy, value, and use.

ACA's Vision

An Alberta with an abundance and diversity of wildlife, fish, and their habitats; where future generations continue to use, enjoy, and value our rich outdoor heritage.

Alberta Conservation Association

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COVER PHOTO: ACA Conservation, Community, and Education Grants
 Watershed Education, Literacy, and Restoration Project (015-00-90-28)
 Provided by: Ghost Watershed Alliance Society (GWAS)

Grants Program 2021/22

KEY PROGRAM HIGHLIGHTS for the Grants 2021/22:

CCEG received 112 funding applications requesting a total dollar value of just under \$1.5 million. A total of \$969,727 was allocated to 79 projects.

RG received 27 funding applications requesting \$712,460. A total of \$329,918 was allocated to 14 projects.

GiB received 33 funding applications requesting just over \$470,000. A total of \$211,000 was allocated to 19 student projects (14 master's and five doctorate degree programs). This program is funded by ACA and Syncrude Canada Ltd.

Project budgets for all grants programs ranged from \$700 to \$40,000.

Executive Summary

Funded mainly by the province's hunters and anglers, Alberta Conservation Association's (ACA) Grants Program annually supports a variety of both small and large projects; these projects benefit Alberta's wildlife and fish populations, as well as the habitat they depend on. Operational since 2002, the ACA Conservation, Community, and Education Grants (CCEG) and ACA Research Grants (RG) [CCEG and RG combined were formerly known as the Grant Eligible Conservation Fund (GECF)] has provided approximately \$21.9 million to 1,453 projects carried out in Alberta by the conservation community as of the 2021/22 funding round. The ACA Grants in Biodiversity (GiB) has been awarding grants for 27 years and has now allocated a total of \$5.8 million dollars to 567 student researchers as of the 2021 funding competition. Furthermore, the funding provided by the grants continues to leverage more than three times its value in conservation dollars, estimated at approximately \$117.8 million—money that has been directly used for conservation work and to support the recruitment and retention of hunters, anglers, and trappers in Alberta. GiB will be reported on in this document, as the program administration has been transferred from the University of Alberta to ACA.

These popular grant programs received 172 applications (112 to the CCEG, 27 to the RG, and 33 to the GiB) requesting a total of just under \$2.7 million in 2021/22. Just under \$1.5 million was allocated to 112 projects (79 CCEG projects, 14 RG projects, and 19 GiB projects).

The aim of this report is to document the procedures for 2021/22 and to provide an overview of activities and results of projects financially supported through ACA's Grants Program in 2021/22.

Photo: ACA Conservation, Community, and Education Grants
Nature Kids Family Nature Nights and Nature Network (002-00-90-264)
Provided by: Susan May



Annual Report of Activities and Synopsis of Funding Recipient Projects

Introduction

Alberta Conservation Association (ACA) believes it is our responsibility to join and support the collective effort to conserve, protect, and enhance Alberta's biological natural resources. One of the ways in which ACA does this is to make grants to other members of the conservation community. The ACA Grants Program is widely known among the conservation community operating in Alberta. Applications were received from a diverse cross-section of the population including community groups, grassroots organizations, provincial and national institutes, as well as leading scientific researchers and graduate students.

The projects supported by ACA's grants are intended to enhance and supplement ACA activities, and aid in the delivery of ACA's Vision, Mission, and *Strategic Business Plan*. ACA has been awarding conservation grants since 1997, with the Grant Eligible Conservation Fund (GECF) process starting in 2002/03. As of the 2021/22 funding round, the ACA Conservation, Community, and Education Grants (CCEG) and ACA Research Grants (RG) programs granted approximately \$21.9 million dollars to 1,453 projects implemented across Alberta. These projects have leveraged an estimated \$117.8 million in conservation work across the province.

The administration of the ACA Grants in Biodiversity program (GiB) was moved to ACA's headquarters from the University of Alberta in March 2020. This student grant program has been funding master's and doctorate degree projects since 1994! Since then, \$5.8 million dollars has been awarded to 567 student researchers as of the 2021 funding competition.

After the 2021/22 project selection process, a total of \$969,727 was granted to 79 CCEG projects, \$329,918 to 14 RG projects, and \$211,000 to 19 students' GiB projects. This document provides an overview of the activities of ACA's grant programs for the 2021/22 funding cycle.

The accomplishments of the CCEG-funded projects in 2021/22 were many and varied. Despite the ongoing COVID-19 pandemic, grant recipients worked out ways to get most

projects moving. Most outdoor conservation education camps and events went ahead in 2021/22 with reduced numbers and COVID-19 safety plans in place, such as Alberta Hunter Education Instructors' Association's (AHEIA) Outdoor Youth Seminar and Youth Camps, and Nature Alberta's Nature Kids events. The Nature Kids' program hosted more events with less people and successfully managed to surpass their original goal by hosting more than 700 people at ten events. Albertans were out restoring important habitats for fish and wildlife, for example Cows and Fish and the Ghost Watershed Alliance Society both worked on improving critical habitat for westslope cutthroat trout. Northern Lights Fly Fishers – Trout Unlimited Canada Edmonton Chapter continued their long-term project monitoring Arctic grayling populations and habitat conditions in the Upper Pembina River watershed. Several new docks were installed by local groups, such as Lacombe Fish & Game Association (Boulder Lake and East Storm Water Pond) and Lac La Nonne Enhancement and Protection Association (Klondike Park, Lac La Nonne). Through several Counties (Red Deer County, Mountain View County, and Wetaskiwin County), work continued with landowners to improve riparian and native rangeland habitats positively impacting more than 580 ha of riparian areas, wetlands, and native rangelands.

The RGs funded researchers studied everything from long-toed salamander genomics to recall and selection bias of different hunter survey methods. This year the Blackfoot Confederacy Tribal Council teamed up with researchers from the University of Victoria to develop and/or validate environmental DNA (eDNA) assays for native westslope cutthroat trout and bull trout and non-native rainbow trout and brook trout in the Bow and Oldman watersheds. Researchers at the University of Lethbridge received a second year of funding to look at the impact of recreational trails in the Castle region on plant communities, rare plants, and the spread of invasive plant species. These are just a few of the projects supported by ACA's Research Grants.

From the 2021 competition, the GiB funded, with co-funding from Syncrude Canada Ltd., 14 master's and five doctorate degree candidates from the University of Calgary, University

of Alberta, University of Lethbridge, McGill University, and Université Laval. The ACA funded an interesting variety of student projects. Some projects focus on pests such as urban coyotes and Columbian ground squirrels. Other projects focus on the impact of blatant invaders such as invasive sportfish and the Chinese mystery snail, and another student will explore whether soil disturbance is a factor in plant invasion. Then there are those external forces which impact health—whirling disease in fish, municipal effluent and rainbow trout, and heavy metals in otter. ACA funding will also enable study of long-toed salamander health, and gut development in captive greater sage grouse. Research will be done on white-crowned sparrows and mountain ungulates. Plant biodiversity projects include the Lansing effect (having older parents), neighbour competition, and comparing plants and diversity in logged and burned forests. From the small—using parasites in reclaiming wetlands, to the huge—the impact of glaciers on biodiversity, ACA's funding will provide a new wealth of biodiversity knowledge to inform our future decision making. GiB staff also appreciate a thought-provoking title, and this year's winner is certainly, "What doesn't kill you may not make you stronger: Sub-lethal effects of parasites on body condition and heavy metals in river otter and mink" by Kyle Shanebeck at the University of Alberta.

Read about all the achievements of each of the CCEG and RG projects that received funding in 2021/22 in the Project Summaries section of this report. GiB projects have two-year terms, so the Project Summaries are from GiB grants allocated in 2020 and completed as of March 2022. GiB summaries of projects allocated funded in 2021 will be reported on next year.

The Funding Cycle

The GiB guidelines and application forms were made available on the GiB website in September 2020 and applicants could apply from that date until the deadline of Dec. 1, 2020. The RG and CCEG made the funding guidelines and application forms available to the public on Oct. 1, 2020, via ACA's website and by email to existing contacts. Full details of the 2021/22 funding cycle are in the table below:

2020/21 FUNDING CYCLE DATES

Deadline to receive completed GiB applications	Dec. 1, 2020
Window to receive completed RG applications	Nov. 1–Dec. 1, 2020
Window to receive completed CCEG applications	Jan. 1–22, 2021
GiB adjudication meeting (online)	Feb. 6, 2021
RG adjudication meeting (online)	Feb. 7, 2021
CCEG adjudication meeting (online)	Feb. 25, 2021
ACA Board approval and notification of applicants as to funding status	End of March 2021
Cooperative Project Agreements signed, initial payments made, and project work begins	From April 1, 2021
Interim reports due and second payments made (if required) for CCEG & RG	Sept. 1, 2022
Final reports due for CCEG & RG	March 15, 2022
Projects end and final payments made (if required)	March 31, 2022
Progress reports (funded 2021) and final reports (funded 2020) due for GiB	April 15, 2022
Projects end and final payments made (if required)	March 31, 2021
Progress reports (funded 2020) and final reports (funded 2019) due for GiB	April 15, 2021

Funding Eligibility

Funding Eligibility CCEG

The CCEG supports a wide variety of applicants and project types. Anyone with a suitable project working in Alberta can apply for funding, except for ACA staff, Alberta Environment and Parks (AEP), and individuals without the proper insurance. Certain project types and budget items are not covered by the CCEG, such as land acquisition, emergency funding, or overhead costs.

Since 2009/10, funding priorities have been used by the CCEG to guide applicants in drafting their applications. No changes were made to the funding priorities for CCEG in 2021/22. See Major Funding Priorities Grants 2021/22 section for the full list. CCEG does accept applications that do not relate to the suggested areas; however, projects that address one or more of these priority areas should have a better chance of being funded than those that do not. The eligibility criteria and funding priorities are provided in full in the document *“Project Submission Guidelines for Funding in 2021–2022: ACA Conservation, Community, and Education Grants”* (this document was available on the ACA website and can be requested from the Grants Project Administrator).

The CCEG offers small grants for projects with budgets of \$3,000 and under, and large grants for projects with budgets over \$3,000. The small grants have a simplified application form, although the eligibility criteria and funding guidelines are the same for both small and large grants.

Funding Eligibility RG

Anyone qualified to carry out high-quality research can apply to the RG via their organization, with the following exceptions: ACA and federal and provincial government employees. For applications from universities, faculty staff/research supervisors (rather than students and post-docs) must be the applicant. Graduate students can, however, apply directly to the GiB, see *Funding Eligibility GiB* section. RG applicants cannot apply with the same project to both the RG and GiB. The RG has also used funding priorities to guide applicants since 2009/10. No changes were made to the funding priorities for RG in 2021/22. See Major Funding Priorities Grants 2021/22 section for the full list. The RG do accept applications that do not relate to the suggested areas; however, projects that address one or more of these priority areas should have a better chance of being funded than those that do not. The eligibility criteria and funding priorities are provided in full in the document *“Project Submission Guidelines for Funding in 2021–2022: ACA Research Grants”* (this document was available on the ACA website and can be requested from the Grants Project Administrator).

Funding Eligibility GiB

The GiB supports graduate student research in Alberta with up to \$20,000, to be spent over two years. The GiB is open to master’s and doctorate degree students internationally for projects carried out in Alberta. The GiB program is intended to:

- Increase knowledge of Alberta’s living resources, notably flora, fauna, and habitats.
- Attract graduate students and their supervisors to conduct biodiversity research in Alberta.
- Promote the development of highly qualified, Alberta-based conservation biologists and managers.
- Support ACA’s mission to promote conservation of Alberta’s resources.

The GiB supports research in biodiversity, conservation biology, ecology, and related social science approaches that relate to flora, fauna, and habitat in Alberta. The GiB does not have a funding priority list.

Major Funding Priorities 2021/22 Grants

This text is taken from Section C of the *Project Submission Guidelines for Funding 2021-2022*.

Funding Priorities for the Conservation, Community, and Education Grants

All applicants to the ACA Conservation, Community and Education Grants should be aware that this grant is fully funded by the hunters and anglers of Alberta. All proposals should be able to demonstrate how the proposed project will aid ACA in meeting its mission of conserving, protecting and enhancing fish, wildlife and habitat for all Albertans to enjoy, value and use. To help direct potential applicants the following list of priority areas has been developed. While the ACA Conservation, Community and Education Grants will accept applications that do not relate to these suggested areas, projects that address one or more of these priority areas will have a higher probability of being funded than those that do not.

Although the priorities are numbered, the number should not be considered an indication of the relative importance of one priority over another. All priorities are considered equal with respect to the review process.

1. Habitat enhancement activities specifically listed on provincial recovery plans for Alberta's endangered species (to be done in cooperation with recovery teams). (See: www.alberta.ca/species-at-risk-resources.aspx)
2. Site specific enhancements of habitat, structures and facilities aimed at increasing recreational angling or hunting opportunities, improving habitat or increasing wildlife/fish productivity on the site (planting/seeding vegetation, development of new fisheries access sites, nest box initiatives, food plot trials and cover plot trials, spawning bed enhancement, culvert removals, fishing docks, etc.).
Stewardship Initiatives (e.g., on-going maintenance of conservation sites or fisheries access sites; adopt a fence; property inspections for invasive weeds; manual weed control; grass mowing).
3. Fisheries development, including: initial evaluation of water quality aspects of existing ponds to determine their suitability for fish stocking; purchase of equipment required to ensure suitable water quality for fish stocking (e.g., aeration equipment); fish stocking in public ponds; promotion of urban and rural fisheries (including natural water bodies).
4. Impacts of non-native species on the persistence of native species.
5. Projects related to the retention, recruitment and education of hunters, anglers or trappers (including attracting new mentors, training mentors and providing mentors for new hunters/anglers/trappers; sharing information in schools and with the general public about the link between conservation and hunters/anglers/trappers; this category also includes educating new hunters/anglers/trappers; fishing and archery events for kids). Generate awareness of the hunting/angling/trapping opportunities available to the public.
6. Projects related to outdoor conservation education.

Funding Priorities for ACA Research Grants

All applicants to the ACA Research Grants should be aware that this grant is fully funded by the hunters and anglers of Alberta. All proposals should be able to demonstrate how the proposed project will aid ACA in meeting its mission of conserving, protecting, and enhancing fish, wildlife and habitat for all Albertans to enjoy, value, and use. To help direct potential applicants the following list of priority areas has been developed. While the ACA Research Grants will accept applications that do not relate to these suggested areas, projects that address one or more of these priority areas will have a higher probability of being funded than those that do not.

1. Research activities specifically listed on provincial recovery plans for Alberta's *endangered species* (to be done in cooperation with recovery teams).
2. Impacts of non-native species on the persistence of native species.
3. Develop and validate inventory tools to determine the relative density and range of wildlife and fish species using innovative detection technologies (e.g., DNA/eDNA, camera traps, drones, etc.).
4. Evaluate the effect of agricultural runoff, pesticides, herbicides or pharmaceuticals on fish or wildlife species' food availability and/or quality in agricultural landscapes.
5. Evaluate the effect of recreational access (mode, timing, duration) on wildlife & fish populations and habitat.
6. Investigation of methods for reducing the spread and/or impact of wildlife or fish related diseases.
7. Evaluate the impact of various harvest management regimes on fish or wildlife genetics or demography (e.g., fish size limits, three-point or larger elk requirements, etc.).
8. Social Science studies of hunting and angling related to demography, attitudes, norms and practices.
9. Evaluate the effect of biological solutions of carbon sequestration on grasslands and treed lands.
10. Evaluate approaches for improving the abundance of pollinators in agricultural landscapes.
11. Work towards clarifying status of formally designated data deficient species.
12. Efficacy of alternative wetland restoration and mitigation techniques

Proposal Review Process

CCEG Adjudication

The ACA Board of Directors appointed the Adjudication Committee for the CCEG program. The CCEG adjudication committee in 2021/22 consisted of seven citizens of Alberta representing the province's conservation community, two ACA Board of Directors members, and one ACA staff member; and was chaired by a member of the ACA Board of Directors. Adjudicators were tasked with providing rankings and making funding recommendations for all CCEG applications based on the funding priorities and guidelines provided by ACA.

The CCEG ranks applications with a 0 – 5 ranking system, as outlined below.

5. **Outstanding application.** Must fund. Highest priority for support. This category reserved only for truly outstanding proposals.
4. **Very good application.** Should be supported.
3. **Good application.** Worthy of support. Do your best to fund.
2. **Fair application.** Possibly worthy of support.
1. **Poor application.** Not worthy of support.
0. **Do not fund.** This application should not get funding.

In this system, the 4s and 5s normally all get funded, some of the 3s are funded, and 0 – 2 are usually not funded. Partial funding can also be assigned to applications with a high ranking if there is a padded budget or budget items that are ineligible. After the ranking, the funding level for each application is determined.

Due to the large volume of CCEG applications, the adjudicators were sent approximately half of the applications at random (excluding any applications for which they had obvious conflict of interest) and were asked to electronically submit their rankings ahead of the adjudication meeting. A compilation of application scores was presented at the meeting, leaving time to focus discussions on those projects with mixed rankings.

The CCEG adjudication meeting was held on February 25, 2021 online via the Teams platform. The list of funding recommendations made by the Adjudication Committee was then approved by the ACA Board at the March 2021 Board of Directors Meeting.

RG and GiB Review Process and Adjudication

The application deadline, December 1, 2020, for the RG and GiB was earlier than that of the CCEG to allow for a rigorous academic review procedure. All applications were sent out for review by experts in the subject of the research application. The academic review process was coordinated by the administrator of the GiB who attempted to get three reviews per application.

The Adjudication Committee consisted of a representative from each of Alberta's three largest universities (University of Alberta, University of Calgary, and University of Lethbridge), an industry representative, ACA's Wildlife Program Manager, ACA's Fisheries Program Manager, and the Chair of ACA's Research Adjudication Committee. Two adjudicators were assigned to review (using the application and academic reviews) and rank a selection of the applications. The adjudicators used a five-tiered numerical ranking system (see below), which is the same ranking scale used by the reviewers.

1. **Outstanding proposal.** Must fund. Highest priority for support. This category reserved only for truly outstanding proposals.
2. **Very good proposal.** Should be supported.
3. **Good proposal.** Worthy of support. Do your best to fund.
4. **Fair or poor proposal.** Possibly worthy of support.
5. **Poor proposal.** Do not fund.

Applications ranked by the adjudicators with 1 and 2 are usually all funded, those ranking a 3 are sometime funded, and those ranking 4 and 5 are generally not funded. Funding recommendations were then made after the ranking process. The research adjudication meetings were held on the weekend of February 6, 2021 (GiB) and February 7, 2021 (RG) online via the Teams platform.

Funding Allocations

For the 2021/22 funding cycle, a total of \$1,511,000 was made available for project funding via the Grants: \$970,000 for CCEG, \$330,000 for RG, and \$211,000 for GiB.

Of the 112 applications requesting just under \$1.5 million to CCEG, 79 were funded (a 70 percent success rate for applications receiving full or partial funding). Of the 79 CCEG projects funded in 2021/22, 41 (52 percent) had been funded by ACA in previous years and 38 (48 percent) were new projects.

The RG received 27 applications requesting just over \$712,000 for the 2021/22 competition. Of these, 14 were funded (a success rate of 52 percent for applications receiving full or partial funding). Five (36 percent) of the funded research projects had been funded in previous years, and the rest were new projects.

The GiB received 33 master's and doctorate degree student applications requesting just over \$470,000 for the 2021 competition. Nineteen student projects were funded as follows: 14 master's and five doctorate degree candidates from the University of Alberta, University of Lethbridge, University of Calgary, McGill University, and Université Laval. This represents a success rate of 58 percent for applications receiving full or partial funding. These are all new projects, as the GiB gives one 2-year grant per student project, so there is no repeat funding.

To receive an ACA grant, the grant recipient must sign the ACA Cooperative Project Agreement, which has the approved application and budget appended. The ACA Cooperative

Project Agreement outlines the reporting and payment schedules and other contractual obligations between ACA and the grant recipient. CCEG and RG recipients provided two project reports, an interim report due by September 1, 2021, and a final report due by March 15, 2022. If the project was completed at the time of the interim report (September 1), then applicants could submit a final report. GiB recipients submit a brief progress report at the end of the first year of their grant term, and a scientific final report at the end of year two. Their university sends a financial report upon closure of the student's research account.

Three CCEG recipients did not accept the grant money and did not sign the ACA Cooperative Project Agreement; these applicants decided not to go ahead due to COVID-19 public health orders and the projects were cancelled. In total, 21 projects (11 CCEGs, six RGs, and four GiBs with an end date of March 31, 2022) were granted extensions due to unforeseen circumstances mainly arising from the COVID-19 pandemic. The decision was taken to extend all grants that required an extension due to the Public Health Orders put in place to control the COVID-19 pandemic. To be granted a project extension, CCEG and RG recipients submitted a Request for Extension Form before the grant end date. If a project received an extension, it is mentioned in the project status of the Project Summaries section of this report.

Synopsis of Approved Projects for 2021/22

Summary descriptions of each of the approved projects containing the project's objectives, activities, and deliverables can be found starting on page 15 of this report. The list below is in alphabetical order by organization for CCEG, RG, and GiB.

ACA Conservation, Community, and Education Grants

Small Grants (\$3,000 and under)

Adaptable Outdoor Recreation Society; Southern Alberta Adaptive Fishing – Fishing for All; \$2,880

Alberta Hunter Education Instructors' Association (AHEIA); AHEIA's Mentorship Workshop – Cloven-Hoofed Game; \$3,000

AHEIA; AHEIA's Mentorship Workshop – Waterfowl and Upland Game Birds; \$3,000

AHEIA; Rifle Sight-In and Field Prep Seminar; \$3,000

Alberta Watercourse Crossing Collaborative; Alberta Watercourse Crossing Collaborative (AWC3) Spring 2021 Roadway Watercourse Crossing Webinar Series and Capstone Technical Seminar; \$3,000

Athabasca Watershed Council; CABIN Upper Athabasca Collaborative; \$3,000

Benevolent and Protective Order of Elks No. 360 (Coronation Elks); Kids Can Catch Coronation; \$700

County of Grande Prairie; Kids Catch Event and School Fishing Opportunities; \$1,500

County of Warner; Mitigation of Agricultural Effect on the Milk River and the Milk River Ridge Reservoir; \$3,000

Hinton Family Centre – Town of Hinton; Kids Can Catch in Hinton; \$3,000

Innisfail Fish & Game Association (Innisfail FGA); Kids Can Catch; \$1,500

Métis Crossing Experience Company; Traditional Métis Smoked Tanned Animal Skin; \$3,000

Narrow Lake Conservation Centre (NLCC), Zone 4 and Zone 5 Fish and Game Associations; Narrow Lake Conservation Camps – Archery and Wildness Survival Training Equipment; \$1,050

Oldman River Chapter – Trout Unlimited Canada; Crowsnest River Whirling Disease Containment Effort; \$3,000

Peace Wapiti Academy; Peace Wapiti Academy Wildlife Education; \$2,000

Safe Drinking Water Foundation; Water Testing Kits for Aurora Middle School and Our Lady of Grace School to be Used on Field Trips; \$1,190

Sherwood Park Fish & Game Association (Sherwood Park FGA); Ketchamoot Creek Facility Fence Line Update Project; \$2,813 – Grant not accepted

Sherwood Park FGA; Purple Martin House Replacement Project; \$1,400 – Grant not accepted

Smoky Lake County; Pond Leveler Upgrades; \$2,376.80

Spruce Grove Fish and Game Association; Bird/Bat Box Project 2021-22; \$2,000

Yellowhead County; Kids Can Catch; \$1,700 – Grant not accepted

Large Grants (over \$3,000)

Agroforestry and Woodlot Extension Society; Alberta Wildlife Corridors – A Guide to Maintaining, Developing, and Understanding Wildlife Moving Through Alberta's Landscape; \$15,000

Alberta Fish & Game Association (AFGA); Baird Conservation Site Wildlife-Friendly Fencing; \$9,089.32

AFGA; Increasing and Improving Habitat for Species at Risk in Alberta's Grassland Region Through Promotion and Implementation of Best Management Practices; \$38,500

AFGA; Pronghorn Antelope Migration Corridor Enhancement; \$39,619.92

AHEIA; AHEIA's Teachers' Workshop; \$6,000

AHEIA; AHEIA's Outdoor Youth Seminar; \$6,000

AHEIA; AHEIA's Provincial Hunting Day Initiatives; \$20,000

AHEIA; Alberta Hunter Education Scholarship Program (AHES); \$25,000

AHEIA; National Archery in the Schools Program (NASP); \$40,000

AHEIA; Outdoor Bound Mentored Hunt Program; \$7,000

AHEIA; Re-write Hunter Education Manual; \$25,000

Alberta Invasive Species Council (AISC); Development and Promotion of EDDMapS Canada, a Nationally Available Tool for Enhanced Reporting of Invasive Species Through an Integrated Smartphone App and Website; \$20,000

AISC; Training to Use Biocontrol to Stop the Spread of Leafy Spurge in River Bottoms; \$10,126.24

Alberta Riparian Habitat Management Society – Cows and Fish; Implementing Responsible Recreation and Riparian Habitat Improvements for Westslope Cutthroat Trout; \$15,450

Ann & Sandy Cross Conservation Area (ASCCA); Elk Trap Removal for Habitat Recovery; \$8,000

ASCCA; Wildlife-Friendly Fencing to Protect Pine Creek; \$10,000

Beaverhill Bird Observatory; Wildlife Monitoring, Conservation, and Public Engagement at Beaverhill Lake; \$21,250

Boreal Nature Network; Citizen Science Bat Monitoring Program and Community Maternal Roost Installation; \$4,625

Brooks & District Fish & Game Association; Tree Plant; \$4,000

Canadian Parks and Wilderness Society – Southern Alberta Chapter; Outdoor Education for Everyone: Getting Albertans outside to enjoy, value and use Alberta wilderness; \$20,000

County of Two Hills; Jackfish Lake Restoration; \$21,800

County of Wetaskiwin; Wetaskiwin/Leduc Alternative Land Use Services (ALUS); \$15,000

Ecole Francophone d'Airdrie; NASP Archery Education; \$5,000

Edmonton and Area Land Trust (EALT); Improving Native Habitat in the Beaverhills Biosphere Reserve; \$7,025

Ghost Watershed Alliance Society; Watershed Education, Literacy, and Restoration Project; \$20,195

Glenbow Ranch Park Foundation; Glenbow Ranch Park Foundation Nature Camp 2021; \$6,750

H.A. Kostash School; H.A. Kostash Youth Mentorship Program; \$6,550

Lac La Nonne Enhancement and Protection Association; Enhancement of Fishing Opportunities and Activities at Klondike Park; \$4,850

Lacombe Fish & Game Association (Lacombe FGA); Boulder Lake – Floating Dock and Casting Platforms; \$21,603.82

Lacombe FGA; East Storm Water Pond Improvement Project; \$39,797.26

Lesser Slave Lake Bird Observatory Society; Avian Monitoring and Outreach Education Programs at Lesser Slave Lake; \$17,500

Mighty Peace Watershed Alliance Society; Smoky Headwaters Initiative; \$6,719.95

Milk River Watershed Council Canada; From the Field – Virtual Field Trip Educational Series; \$10,000

Mountain View County; Riparian and Ecological Enhancement Program; \$25,000

Muriel Lake Basin Management Society; Surface Water Studies Phase 2; \$12,000

NLCC, Zone 4 and Zone 5 Fish and Game Associations; Narrow Lake Conservation Camps – Sleeping Accommodations and Personal Protective Equipment; \$5,237.50

NLCC, Zone 4 and Zone 5 Fish and Game Associations; Narrow Lake Conservation Camps – Training and Certification; \$5,950

Nature Alberta; Nature Kids Family Nature Nights and Nature Network; \$12,000

Nature Conservancy of Canada; Integrated Weed Management Across Alberta; \$10,000

North East Alberta Fish & Game Association; Fish Habitat Restoration in North-East and Central Alberta Lakes; \$20,000

Northern Lights Fly Fishers – Chapter/ Trout Unlimited Canada Edmonton Chapter (NLFF TUC); Dogpound Riparian Protection – Birchall Property; \$25,488

NLFF TUC; Education – Trout Food and Related Angling Techniques; \$4,725

NLFF TUC; Assess Walleye Population Stability (Vulnerable by Size-Class); \$13,894

NLFF TUC; Conserving and Restoring Arctic Grayling in the Upper Pembina River Watershed – Habitat Restoration Planning; \$17,429

Partners in Habitat Development c/o Eastern Irrigation District; Partners in Habitat Development; \$10,000

Pheasants Forever Calgary Chapter (PF Calgary); Milk River Ridge Reservoir – Eastridge Uplands Reclamation; \$18,450

PF Calgary; Post-Secondary First Pheasant Mentor Hunt; \$5,000

Pheasants Forever Chinook Chapter (PF Chinook); Ross Creek Conservation Site Food Plots Planting; \$4,950

PF Chinook; Sauder Reservoir Habitat Project; \$17,040

Red Deer County; Wildlife and Native Habitat Enhancement in Red Deer County via ALUS (2021); \$40,000

Red Deer Fish & Game Association; Youth Pheasant Building Upgrades; \$3,500

Southwest Alberta Sustainable Community Initiative (SASCI); Recovery Strategies for Industrial Development on Native Grasslands in the Mixed Grass Natural Subregion – 2nd Approximation; \$9,460

Strix Ecological Consulting Ltd.; American Kestrels – Using Nestbox Technology to Increase Awareness and Promote Conservation; \$15,150

Town of Gibbons; Echo Glen Pond Enhancement; \$38,727.50

Trout Unlimited Canada (TUC); Stream Signage Partnership Project; \$9,000

TUC; Tay River Bull Trout; \$12,665

Western Ranchlands Corporation; Management of Overgrown Woodlots to Improve Wildlife Habitat; \$38,000

Wildlife Conservation Society Canada; Alberta Bat Conservation Project; \$20,500

ACA Research Grants

Blackfoot Confederacy Tribal Council (Ms. Houle); Development and Validation of Environmental DNA Assays for Native Westslope Cutthroat Trout and Bull Trout and Non-Native Rainbow Trout and Brook Trout within the Blackfoot Territory for Citizen Science and Community-Based Monitoring; \$32,400

Concordia University of Edmonton (Dr. Mapfumo); Comparison of Three Biological Solutions for Enhancing Perennial Grass Productivity and Soil Carbon Sequestration; \$18,135

University of Alberta (Dr. Adamowicz); Evaluating Recall and Selection Bias in Activity Survey Apps Versus Traditional Surveys for Conservation and Economic Valuation from Recreation; \$36,000

University of Alberta (Dr. Harshaw); Sustaining Access and Social License for Hunting in a Mixed-Use Conservation Site: A case study in the Cooking Lake-Blackfoot PRA – Year 2; \$23,565.60

University of Alberta – Augustana (Dr. McIntosh); Post-Harvesting Biodiversity Recovery Curves for Boreal Forests; \$21,600

University of Calgary (Dr. Gerlach); Indigenous Co-Led Reclamation Project; \$14,850

University of Calgary (Dr. Wrona); Evaluating the Impact and Uptake Pathways of Municipal Wastewater Effluent on Benthic Macroinvertebrates in the Bow River Basin; \$30,555

University of Lethbridge (Dr. Bogard); Causes and Consequences of Eutrophication in the Twin Valley Reservoir; \$24,669

University of Lethbridge (Dr. Goater); Ecological Epidemiology of Emerging Ambystoma tigrinum Virus (ATV) in a Population of Tiger Salamanders in Southwestern Alberta; \$9,000

University of Lethbridge (Dr. Lee-Yaw); Genomic Data to Inform Long-toed Salamander Reintroduction; \$19,800

University of Lethbridge (Dr. McCune); Testing the Effects of Recreational Trails on Plant Communities, Rare Plants, and the Spread of Invasive Plant Species; \$20,317.50

University of Lethbridge (Dr. Wiseman); Predicting Hazard from Chemical Pollutants Associated with Coal Mining to Threatened Alberta Westslope Cutthroat Trout and Bull Trout; \$22,050

University of Manitoba (Dr. Koper); Effects of Unpredictable Industrial Noise on Species at Risk and Nest Predators in Alberta; \$23,400

University of Montana (Dr. Hebblewhite); Evaluating Bull Elk Reproductive Success Using a Wild Pedigree Model; \$33,576.30

ACA Grants in Biodiversity

2021 Award Recipients (alphabetically by last name of student recipient)
for projects starting April 1, 2021 and ending March 31, 2023.

Recipient (Program)	Institution	Supervisor(s)	Project Title	Award
Emily Baumgartner (PhD)	University of Calgary	Steven Vamosi	On the Population Health and Persistence of Long-toed Salamanders, <i>Ambystoma macrodactylum</i> , in the Bow River Corridor	\$11,270
Chloe Christenson (M.Sc.)	University of Alberta	Mark Poesch	Assessing the Potential Impacts of Whirling Disease along a Temperature and Elevation Gradient in the Bow River Basin	\$12,750
Hayley Drapeau (M.Sc.)	University of Alberta	Suzanne Tank	Impacts of Glaciers on Microbial Biodiversity, Food Webs, and Carbon Cycling in Banff and Jasper National Parks	\$17,160
Priyanka Dutt (M.Sc.)	University of Lethbridge	Robert Laird	The Lansing Effect in <i>Lemna turionifera</i> (<i>Lemnoideae</i>)	\$11,620
Megan Edgar (M.Sc.)	University of Alberta	Mark Poesch	Effects of Invasive Chinese Mystery Snail and Northern Crayfish in Food Webs in Southern Alberta Reservoirs	\$12,250
Kaitlin Holden (M.Sc.)	University of Alberta	Viktoria Wagner	A Cross-habitat Comparison of Nutrient Availability and Levels of Invasion in Central Alberta	\$11,095
Gabrielle Lajeunesse (M.Sc.)	University of Alberta	Colleen Cassady St. Clair	Community-based Aversive Conditioning of Urban Coyotes in Edmonton	\$5,275
Brianna Lorentz (M.Sc.)	University of Alberta	Colleen Cassady St. Clair	Bridging the Gap Between Pest Management and Conservation Through the Development of an Effective Translocation Protocol for Columbian Ground Squirrels (<i>Urocitellus columbianus</i>)	\$2,140
Brooke McPhail (PhD)	University of Alberta	Patrick Hanington	Using Digenean Trematodes as a Surrogate for Host Biodiversity in Reclaimed Wetland Habitats in Alberta	\$13,940
Shannon Meadley Dunphy (PhD)	McGill University	Anna Hargreaves	How do Positive and Negative Interactions with Neighbours Affect Elevation Gradients in Fitness and Species Range Limits?	\$10,745
Benjamin Mercer (M.Sc.)	University of Alberta	Rolf Vinebrooke	Cumulative Impacts of Invasive Sportfish and Rising Temperatures on Alpine Stream Ecosystems.	\$11,730
Raytha Murillo (PhD)	University of Alberta	Viktoria Wagner	Quantifying the Role of Soil Disturbance and Propagule Pressure as Drivers of Invasion Across Three Habitat Types in Central Alberta	\$7,710
Bukola Oguntuase-Osagie (M.Sc.)	University of Lethbridge	Theresa Burg	Genetic Basis for the Population Differentiation and Local Adaptation of White-crowned Sparrows (<i>Zonotrichia leucophrys</i>) to Different Forest Habitats	\$8,995
Marcel Schneider (M.Sc.)	University of Alberta	Charles Nock	Comparing Vascular Plant Species and Functional Diversity in Forest Remnants of Harvested and Wildfire Disturbed Stands	\$8,400
Kyle Shanebeck (PhD)	University of Alberta	Stephanie Green and Clement Lagrue	What Doesn't Kill You May Not Make You Stronger: Sub-lethal effects of parasites on body condition and heavy metals in river otter and mink	\$15,300
Marcus Sommers (M.Sc.)	University of Alberta	Charles Nock	Comparing Structural Complexity and Tree Attributes in Fire and Harvest Remnants	\$8,400
Roxanne Turgeon (M.Sc.)	Université Laval	Sandra Hamel and Fanie Pelletier	Relative Influence of the Drivers of Population Dynamics in Mountain Ungulates	\$16,000
Emma Vaasjo (M.Sc.)	University of Calgary	Doug Whiteside	Gastrointestinal Microbiome Development, Diversity, and its Potential Relationship to Captivity and Antibiotic Use in a Captive Population of Endangered Greater Sage-Grouse (<i>Centrocercus urophasianus</i>)	\$10,920
Graham Young (M.Sc.)	University of Calgary	Mathilakth Vijayan	Effects of Municipal Wastewater and Stormwater Effluents on the Metabolic Performance in Rainbow Trout (<i>Oncorhynchus mykiss</i>)	\$15,300



Photo: ACA Grants in Biodiversity
Effects of Habitat Features on Long-toed Salamanders
Provided by: Charity Blaney

Grant Projects' Contribution to ACA's Funding Priorities

In total, 112 projects were approved for funding in 2021/22: 79 CCEG projects, 14 RG projects, and 19 GiB projects. All projects selected were to support ACA with meeting its mission of conserving, protecting, and enhancing wildlife, fish, and habitat for all Albertans to enjoy, value, and use.

Funding priorities were used to further guide and direct CCEG and RG applicants by providing priority areas of specific interest to ACA. The GiB does not use a funding priority list. The funding priorities for CCEG and RG were set by ACA staff and approved by the ACA Board of Directors. Two lists of funding priorities were produced: one for the CCEG, and another one for the RG. Both the CCEG and RG funding priority list remained unchanged in 2021/22. For the full lists of funding priorities for 2021/22, see page 6.

Applications did not have to relate to the funding priorities, but applications that address one or more of the funding priorities should fare better in the project selection procedure. Whether or not a project relates to a funding priority is to some degree subjective. Some projects clearly addressed one or more of the funding priorities, while others only indirectly related to a funding priority. Applicants were asked to specify how their projects related to ACA's mission and funding priorities in their applications. This information was used to determine which of the selected projects for 2021/22 contributed to ACA's funding priorities. All the CCEG funded projects mentioned a link to one or more of the funding priorities. All but one of the RG funded projects mentioned a link to one or more of the funding priorities. The project-affiliated funding priority is listed with the project's summary.

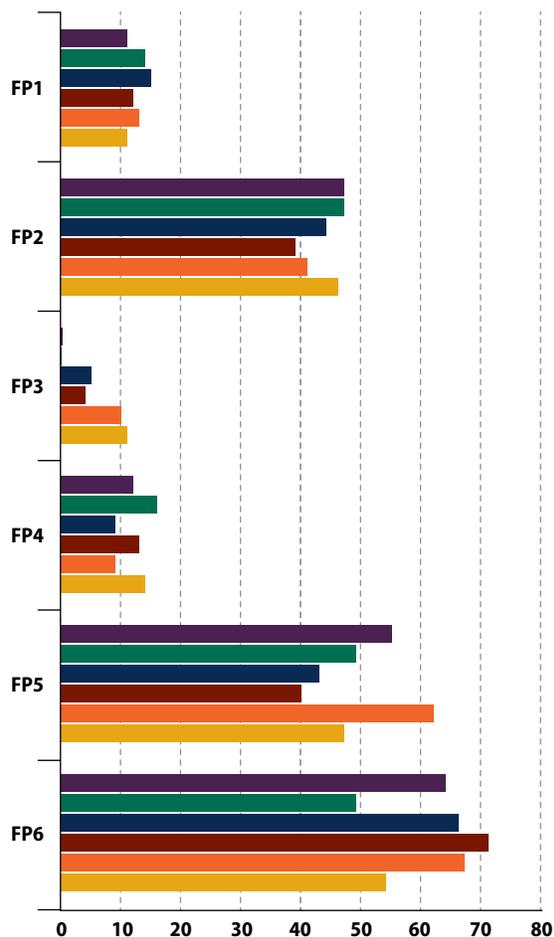
Similar to previous years, this year's three most cited CCEG funding priorities were (in order): funding priority #6 "Projects related to outdoor conservation education" (with 54 percent of projects citing this funding priority); funding priority #5 "Projects related to retention, recruitment, and education of hunters, anglers, or trappers..." (47 percent); and funding priority #2 "Site specific enhancement of habitat... & Stewardship initiatives..." (46 percent). For an overview of how CCEG projects relate to the funding priorities, see Figure 1.

Figure 1: Percentage of CCEG projects per Funding Priority since 2016/17

- FP1:** Endangered Species
- FP2:** Site Specific Enhancements/Stewardship Initiatives
- FP3:** Urban Fisheries Development
- FP4:** Non-native Species
- FP5:** Recruitment and Retention
- FP6:** Outdoor Conservation Education

Percentage of projects addressing Funding Priorities

- 2016/17
- 2017/18
- 2018/19
- 2019/20
- 2020/21
- 2021/22



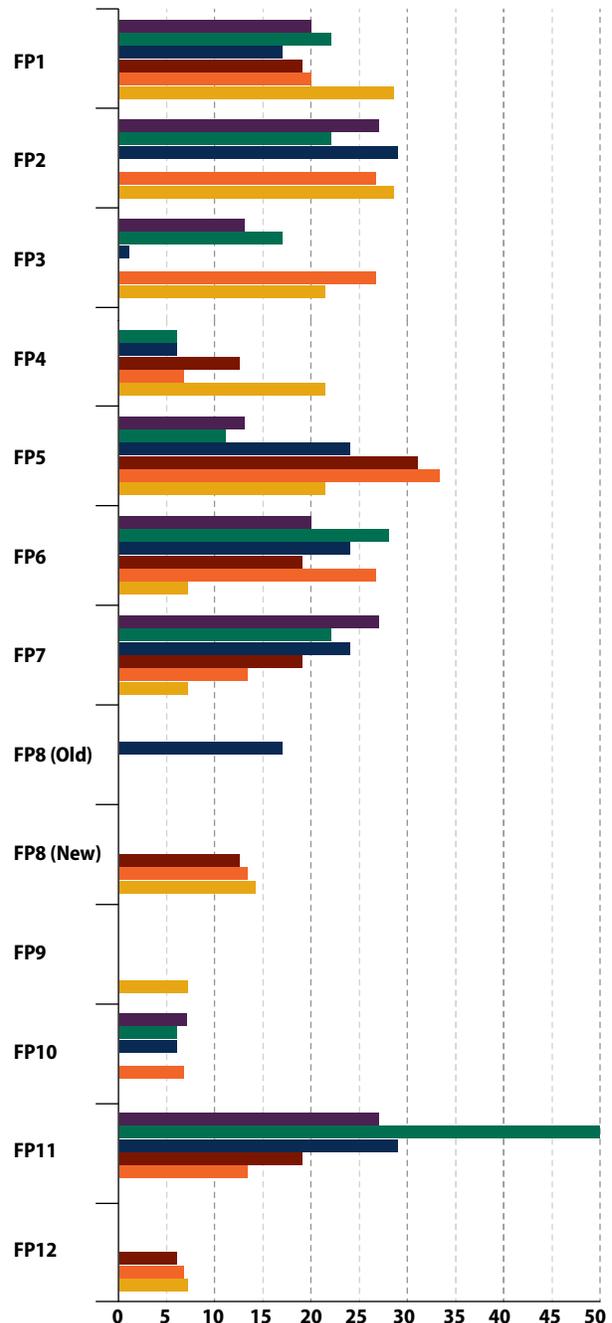
The most cited RG funding priorities for 2021/22 funded projects were funding priorities #1 “Research activities specifically listed on provincial recovery plans for Alberta’s endangered species” and #2 “Impact of non-native species on persistence of native species” (both were mentioned by four of the 14 funded projects or 28.6 percent). Funding priorities #3 “Develop and validate inventory tools to determine the relative density and range of wildlife and fish species...”; #4 “Evaluate the effect of agricultural runoff, pesticides, herbicides or pharmaceuticals on fish or wildlife species’ food availability...”; and #5 “Evaluate the effect of recreational access (mode, timing, duration) on wildlife and fish populations and habitat” were mentioned by three of the 14 funded projects (21.4 percent). Two funding priorities were not mentioned by any of the funded projects that went ahead in 2021/22: funding priorities #9 “Evaluate the effects of biological solutions on carbon sequestration...” and #10 “Evaluate approaches for improving the abundance of pollinators in agricultural landscapes”. One grant did not mention a connection with any of the funding priorities. For an overview of how the 2021/22 RG projects relate to the funding priorities, see Figure 2.

Figure 2: Percentage of RG projects per Funding Priority since 2016/17

FP1: Endangered Species
FP2: Non-native Species
FP3: Inventory Tools Relating to Wildlife and Fish
FP4 (was FP10, is now FP4): Effect of Agricultural Runoff, Pesticides, Herbicides or Pharmaceuticals
FP5: Effect of Recreational Access
FP6: Reduction of Disease
FP7: Impact of Harvest Management
FP8 (Old): Human Dimension of Wildlife and Fish Management
FP8 (New): Social Science Studies of Hunting and Angling
FP9: Biological Solutions of Carbon Sequestration
FP10 (was FP11, is now FP10): Improving Pollinator Abundance
FP11 (was FP12, is now FP11): Status of Data Deficient Species
FP12: Alternative Wetland Restoration

Percentage of projects addressing Funding Priorities

■ 2016/17	■ 2017/18	■ 2018/19
■ 2019/20	■ 2020/21	■ 2021/22



ACA Grants Program Project Summaries

ACA Conservation, Community, and Education Grants

Southern Alberta Adaptive Fishing – Fishing for All

Adaptable Outdoor Recreation Society (Adaptable Outdoors)

Grant: \$2,880

Project Code: 020-00-90-298

Project Status: New; Completed

Funding Priority: 5

Project Website: www.adaptableoutdoors.ca

People with disabilities face unique barriers and are often excluded from participating in outdoor activities, like fishing. Adaptable Outdoors' objective is to improve quality of life for people with disabilities by making outdoor recreation (including fishing from shore or boat) accessible to people of all abilities. Adaptable Outdoors successfully provided 15 adaptive fishing experiences (four from canoe or kayak, and 11 from shore) to 11 different participants. Funding from ACA made it possible to purchase the necessary equipment to make fishing accessible to people of all abilities including individuals living with cerebral palsy, Down syndrome, Huntington's disease, quadriplegia, brain injury, amputation, mental health challenges, and addiction. The adaptive canoe and kayak make it possible for those with mobility challenges to get out on the water, and the all-terrain buggy allows access to shore fishing spots not accessible to wheelchairs. The adaptive rods/reels and various gripping aids purchased with ACA funding make fishing accessible to those with a variety of arm/hand mobility or coordination challenges. Two adaptive switches were purchased, which can be connected to the electric reel, allowing someone to reel in a fish using their foot or even their head. This is great for someone with very limited use of their hands, and Adaptable Outdoors are excited to see them in action! Many smiles were seen during the fishing programs and a lot of positive feedback was received. A partnership with the University of Lethbridge helped Adaptable Outdoors measure the impact of their programs by inviting participants (including clients, family members/caregivers, and volunteers) to complete pre- and post-activity surveys to assess changes in their perceived well-being and health quality of life after participating in an outdoor experience with Adaptable Outdoors. Questions focused on physical, psychological, social, and environmental measures of well-being. Ten fishing participants completed the survey (six clients, three volunteers, and one caregiver). Ninety percent of all participants who completed the survey reported an increase in well-being scores after participating in just one adaptive fishing experience, proving that accessible fishing opportunities do lead to improvements in quality of life.

Alberta Wildlife Corridors – A Guide to Maintaining, Developing, and Understanding Wildlife Moving Through Alberta's Landscape

Agroforestry and Woodlot Extension Society (AWES)

Grant: \$15,000

Project Code: 002-00-90-344

Project Status: New; Completed

Funding Priorities: 4, 6

Project Website: www.awes-ab.ca/projects/wildlife-corridors-project

AWES created both an online and in-person presentation to educate and engage Albertans on the wildlife value of treed buffers acting as corridors. Development of the presentation material was completed in spring 2021 with the first presentation occurring soon after. The presentations provided targeted information on wildlife and habitat based on the audience's location, as well as presenting on projects AWES has partnered on with ACA. Presentations were both standalone and incorporated into larger workshops to spread knowledge and awareness of the importance of marginal land habitat for wildlife. Workshops encouraged interaction and questions from participants, many of whom were landowners interested in supporting wildlife on their agricultural lands. Presentation material included showcasing and discussing the 2021 AWES-ACA Boulder Lake and Bear River Riparian restoration and enhancement projects which will connect and restore natural areas and provide wildlife habitat. Twelve presentations regarding treed buffers/habitat in the agricultural landscape and their role as wildlife corridors were delivered. Over 322 participants were reached through this project. More than five digital posters were created for the presentations, and more than ten related social media information posts created. Participants expressed great interest in learning about how to properly provide effective habitat and habitat corridors and what species of native plants to select when designing eco-buffer projects with a wildlife focus.

Baird Conservation Site Wildlife-Friendly Fencing

Alberta Fish & Game Association (AFGA)

Grant: \$9,089.32

Project Code: 015-00-90-299

Project Status: New; Completed

Funding Priorities: 2, 5, 6

The Baird Conservation Site is a 160-acre habitat property owned jointly by AFGA and ACA that provides critical winter forage and thermal cover for mule deer, white-tail deer, elk, and moose and is

a home for a variety of small mammals and bird species. There is no domestic livestock grazing permitted on the property but there is livestock present on three sides. The current fence along the north boundary is in severe disrepair, does little to prevent vehicle and livestock trespass, and poses a hazard to area wildlife. Vehicular trespass has become a serious issue. The north and south fencelines were repaired, and wires spaced to wildlife-friendly standards to permit easier passage by wildlife while still preventing trespass by vehicles and livestock. It is important that conservation organizations lead by example in the community and bringing fences up to wildlife-friendly standards is a critical component. A total of four volunteers worked on this project for a total of seven volunteer days. An article was submitted for publication in Outdoor Canada for early 2022.

Increasing and Improving Habitat for Species in Alberta's Grassland Region Through Promotion and Implementation of Best Management Practices

Alberta Fish & Game Association (AFGA)

Grant: \$38,500

Project Code: 030-00-90-127

Project Status: Funded since 1999; Completed

Funding Priorities: 1, 6

Project Website: www.grasslandcommunity.org

Operation Grassland Community (OGC) collaborates with stakeholders across Alberta's prairie region to develop, implement, evaluate, and adapt management actions to protect and enhance wildlife habitats, and support diverse socio-economic interests. The vision is a sustainable prairie landscape where communities thrive, diverse interests are balanced, and wildlife and their habitats are in abundance. The main activities and results for 2021/22 include increased protection of grassland wildlife habitat by recruiting seven new OGC landowner contacts in key geographic areas, and seeking and renewing ten 5-year voluntary stewardship agreements. Habitat was improved by establishment of four new Habitat Enhancement Projects (HEPs) in areas of high conservation priority and supporting 14 existing HEP landowners. Beneficial Management Practices (BMPs) were also promoted for focal species at risk by developing a *Species at Risk Conservation Plan* (SARC) for one new OGC member. The 31st annual burrowing owl (BUOW) landowner survey was conducted, and the results shared with the related Recovery Team personnel (i.e., Burrowing Owl Recovery Team). Outreach and education events were limited by the pandemic this year, but OGC still attended three virtual events to present their work and recruit new members. OGC

continued to engage members and non-members alike through their website and social media platforms (primarily Facebook and Instagram), running several paid advertisement campaigns on social media, and increasing our reach by 358 percent in 2021/22 alone.

Pronghorn Antelope Migration Corridor Enhancement

Alberta Fish & Game Association (AFGA)

Grant: \$39,619.92

Project Code: 030-00-90-160

Project Status: Funded since 2009/10; Completed

Funding Priority: 2

Project Website: www.afga.org/pronghorn-corridor-enhancement

As pronghorn are at the northern edge of their range in Alberta and often migrate south in winter and north in spring, unimpeded migratory corridors are important in ensuring pronghorn remain at sustainable populations. Livestock fences can create impenetrable barriers to pronghorn movement if improperly constructed, impacting both pronghorn movement and predator and vehicle avoidance, as pronghorn are typically unwilling to jump fences but prefer to crawl underneath the bottom wire. This project mitigated the barbed-wire fencing issue by replacing the lower barbed wire with smooth wire set at 18 inches, so it is easily passed under by pronghorn without injury or hair loss. Where page wire was found, the fence was removed permanently or removed and replaced with a pronghorn-friendly fence. Due to the remote locations of these projects and topography that prevents large machines from accessing many of the fencelines, specialized small equipment is required, as are a high number of person hours for work that can only be accomplished by hand. Each mile of fenceline requires that all staples and wires are removed, the bottom strand of barbed wire rolled and disposed of, a smooth wire installed, and all wires reinstalled with new staples. The bulk of this is completed by hand, with the assistance of volunteers. This project takes place in prime pronghorn migration routes as identified by radio collar studies conducted by ACA. This project successfully replaced/manipulated a minimum 24 miles of fence (108 miles of actual wire) of restrictive fencing wires, four-five wires per mile, with wildlife-friendly spacing to facilitate easier movement for pronghorn and other area ungulates.

AHEIA Teachers' Workshop

Alberta Hunter Education Instructors' Association (AHEIA)

Grant: \$6,000

Project Code: 002-00-90-248

Project Status: Funded since 2016/17; Completed

Funding Priorities: 5, 6

Project Website: aheia.com/teachers-workshop

The teachers' workshop was conducted from July 15 to 18, 2021, at the Alford Lake Conservation Education Centre for Excellence with nine teachers as participants and two staff in attendance. The program provided instruction and certification in the following Conservation Education Programs: Alberta Conservation & Hunter Education Program, Alberta Fishing Education Program, International Bowhunters' Program, and Pleasure Craft Operator Training Program. In addition, a number of other sessions were taught: Survival & Camping Program, Shooting Program (shotgun, small bore rifle & large bore rifle), Compass/GPS Program, Fishing Program, and Archery Program. These nine newly certified teachers are now qualified to teach AHEIA's Conservation and Hunter Education Course in their respective high schools. This is part of the Alberta Curriculum: Natural Resource Course – Wildlife. These teachers took time out of their summers to take this training and instruction, a reflection of their eagerness to teach this course in their schools. Hunting and conservation is advanced in the youth population by offering the Conservation and Hunter Education Course in the schools. Nine new schools in Alberta now have qualified teachers who are equipped and eager to teach the course in the coming school year.

AHEIA's Mentorship Workshop – Cloven-Hoofed Game

Alberta Hunter Education Instructors' Association (AHEIA)

Grant: \$3,000

Project Code: 002-00-90-337

Project Status: New; Extended until Nov. 30, 2022

Funding Priorities: 5, 6

The cloven-hoofed game mentorship workshop is a new initiative for AHEIA. The workshop is intended to spark interest and prepare attendees for the fall cloven-hoofed big game hunting season. This will be a one-day mentorship program at AHEIA's Calgary Firearms Centre, which will provide a number of learning opportunities including: safe bowhunting practices; safe rifle practices, shooting from a variety of positions, and field simulations; cleaning the firearms; tree stand use; best field practices for cloven-hoofed big game hunting; effective use of calls; and the opportunity to partake of the harvest with a tasty game meal. By providing this fun learning event, the fall hunting experience will be enhanced for those who participate. This project was postponed due to COVID-19 restrictions and has been rescheduled for fall 2022.

AHEIA's Mentorship Workshop – Waterfowl and Upland Game Birds

Alberta Hunter Education Instructors' Association (AHEIA)

Grant: \$3,000

Project Code: 002-00-90-338

Project Status: New; Completed

Funding Priorities: 5, 6

The Waterfowl Warm-Up Workshop was held at the Alford Lake Conservation Education Centre for Excellence on Aug. 7 and 8, 2021, with 38 participants and five staff and volunteers instructing. The workshop was also held at the Calgary Firearms Centre on Sept. 14, 2021, with 30 participants and seven staff and volunteers. Duck and goose blinds and decoys were set up replicating field conditions. Participants learned how to set up effective decoy displays to attract fowl. They learned how to shoot safely and effectively from a blind with trained instructors guiding them. Effective use of decoys, bird dogs, and other associated activities were also taught. This fun and informative workshop was followed up at the end of the day with a tasty meal of waterfowl, along with suggestions on how to prepare waterfowl for the table.

AHEIA's Outdoor Youth Seminar

Alberta Hunter Education Instructors' Association (AHEIA)

Grant: \$6,000

Project Code: 002-00-90-215

Project Status: Funded 2014/15 – 2019/20; Completed

Funding Priorities: 5, 6

Project Website: www.aheia.com/events#section_10827

The 19th annual Outdoor Youth Seminar was a two-day seminar, held from Aug. 20 to 22, 2021, designed to help young people develop basic outdoor skills. Participants practiced archery, shooting, map and compass, survival skills, wildlife identification, and fishing. Numerous experts shared information/instruction in various outdoor pursuits. The Outdoor Youth Seminar, providing a fun filled weekend of learning for young outdoor enthusiasts and parents/guardians, and recruiting new hunters and anglers in Alberta. Ninety youth attended, with 30 volunteers (including parents) and four staff. The weekend concluded with a pig-roast/celebration around the two days of learning that took place. The celebratory conclusion instills a tremendous connection to the cause and a sense of belonging to all participants.

AHEIA's Provincial Hunting Day Initiatives

Alberta Hunter Education Instructors' Association (AHEIA)

Grant: \$20,000

Project Code: 030-00-90-245

Project Status: Funded since 2014/15 and previously by the R&R Fund; Completed

Funding Priorities: 5, 6

Project Website: www.aheia.com/events#section_10825

A Provincial Hunting Day event was held on Sept. 25, 2021, at the Calgary Firearms Centre in Dewinton, AB. There were 120

participants who enjoyed a large variety of outdoor activities related to hunting, fishing, trapping, wildlife/waterfowl identification, and habitat conservation. The multiple activities offered were all free-of-charge and as always very popular and well attended. Albertans were encouraged to introduce and bring a new person to the Provincial Hunting Day Initiatives and were introduced to many outdoor activities, including waterfowl hunting, fishing, trapping, shooting, archery as well as many other related outdoor activities.

Alberta Hunter Education Scholarship Program (AHES)

Alberta Hunter Education Instructors' Association (AHEIA)

Grant: \$25,000

Project Code: 002-00-90-335

Project Status: New; Closed

Funding Priorities: 5, 6

In its first year, the AHES Program has already provided financial support to a number of youth and their families to enable access to AHEIA's many hunter education courses and ancillary programs. This has been received with much appreciation by the recipients of the generosity of the AHES Program. A detailed record of these scholarships is maintained at AHEIA's head office. This is an on-going scholarship fund that will be maintained by AHEIA and will be funded in future years as needed.

National Archery in the Schools Program (NASP)

Alberta Hunter Education Instructors' Association (AHEIA)

Grant: \$40,000

Project Code: 002-00-90-239

Project Status: Funded since 2015/16 (except 2017/18) and previously by the R&R Fund; Completed

Funding Priorities: 5, 6

Project Website: aheia.com/nasp

AHEIA's NASP continues to run successfully. The NASP now has 1,867 teachers delivering the program in 470 schools and is reaching over 30,000 students annually. Even during the COVID-19 restrictions, AHEIA managed to run seven teacher training sessions. An additional 21 schools received archery equipment with the help of this ACA grant. The project certifies schoolteachers as NASP instructors. Introducing archery into the curriculum will encourage more students to be included in the sport of archery, and in bowhunting or hunting in general. Parents whose children become involved in archery are more likely to permit their children to expand their archery interest into bowhunting. The program continues to be a fast-growing and popular program offered through AHEIA's Conservation Education Program.

Outdoor Bound Mentored Hunt Program

Alberta Hunter Education Instructors' Association (AHEIA)

Grant: \$7,000

Project Code: 002-00-90-222

Project Status: Funded since 2014/15 and previously by the R&R Fund; Completed

Funding Priorities: 5, 6

The Outdoor Bound Mentored Hunt Program is a key program that specifically recruits and educates new hunters by providing hands-on hunting experiences with AHEIA-trained mentors who guide and educate these new hunters in the field. Since the program takes place in the field, new hunters are also educated in habitat conservation and stewardship. Additionally, new hunters are taken to meet with and speak to landowners where they will be hunting. This sets the stage for maintaining excellent relationships between the new hunters and landowners that give permission to hunt on their property. The entire Mentored Hunt Program sets new hunters up for success in all aspects of hunting from preparation for the hunt, relationships with others including landowners and fellow hunters, respect and care for wildlife and their habitat, field preparation and care of the harvest, and the after-hunt activities of further care for the harvest and preparing the harvest for the table. The number of mentor partners was limited due to the COVID-19 restrictions in place. However, despite this, there was still much enthusiasm. There were 142 participants in AHEIA's mentored hunts in the fall of 2021 with 200 person days of hunting waterfowl, upland game birds, and big game.

Re-write Hunter Education Manual

Alberta Hunter Education Instructors' Association (AHEIA)

Grant: \$25,000

Project Code: 002-00-90-336

Project Status: New; Extended until Sept. 1, 2022

Funding Priorities: 5, 6

The Conservation & Hunter Education Program has been delivered by AHEIA for many decades. The manual that is used in the course is a significant resource both for the actual course and as reference material for years after completing the course, as well as others looking for the information contained in the manual. This manual needs periodic revisions to keep in step with current hunting information and practices pertinent to course material. The current manual has been in use since the early 1980s and has been edited and reprinted 17 times. The plates are at a stage that requires update to ensure clarity and quality production. The Hunter Education Manual has been reviewed and there are numerous areas that require updating. The size of the manual means that off-set printing is required to print such a large manual. This requires specialized set up costs of print plates and other associated costs from a contracted print shop. With the COVID-19 restrictions in place over the last year, the re-write was significantly slowed down from the anticipated completion date. Outside experts were needed to complete some of the re-written sections, new on-site pictures were required in a time when several of AHEIA's programs were on hold, office attendance restrictions were in place for part of that time, and numerous other such obstacles all contributed to slower-paced communications and results.

Rifle Sight-In and Field Prep Seminar

Alberta Hunter Education Instructors' Association (AHEIA)

Grant: \$3,000

Project Code: 002-00-90-321

Project Status: Funded in 2020/21; Completed

Funding Priorities: 5, 6

Project Website: www.aheia.com/events#section_10824

The Rifle Sight-In Seminar was held at AHEIA's Alford Lake Centre for Excellence. The program was conducted on Sept. 11, 2022, with 21 participants and five volunteers and instructors. Participants learned the concepts of sighting-in a rifle, bore sighting, and a rifle check in order to prepare for the hunting season. Range time was provided with qualified and experienced volunteers. A tasty lunch was provided too. As expected, there were several participants with little to no shooting experience in attendance.

Development and Promotion of EDDMapS Canada, a Nationally Available Tool for Enhanced Reporting of Invasive Species Through an Integrated Smartphone App and Website

Alberta Invasive Species Council (AISC)

Grant: \$20,000

Project Code: 015-00-90-296

Project Status: EDDMapS Alberta project funded in 2018/19 and 2019/20; Completed

Funding Priorities: 4, 6

Project Website: www.abinvasives.ca/take-action/#eddm-s-alberta

Invasive species have widespread negative ecological, economic, and social impacts in Canada. When invaders arrive and spread, they can overcrowd and outcompete native species, changing ecosystem dynamics threatening biodiversity and reducing food and habitat for wildlife. Some invasive species are already present in Alberta (for example, feral pigs and purple loosestrife), and others may threaten the province in the future (for example, emerald ash borer). The EDDMapS (Early Detection and Distribution Mapping System) app is an essential platform to distribute information and receive reports of these invasive species. This initiative will allow for a single app to be used nationwide, not just in Alberta. This allows for consistent messaging and a means for reporting invasive species across Canada, resulting in a larger overall uptake than using several different apps, and a reduction in per jurisdiction app maintenance costs. As the program grows even more, partners are likely to sign-on, reducing those costs further and contributing to the long-term sustainability of this program in Alberta and across Canada. The new app EDDMapS Canada was launched in June 2021. The project engaged current and new EDDMapS downloaders by promoting the new app online (via newsletters, the AISC website, and social media posts) and creating a professional quality EDDMapS Canada promotional video, which reached over 15,000 people on Facebook. The project tried to increase the number of EDDMaps users with species reporting blitzes, running contests, and providing training opportunities. All reports submitted are verified, and all relevant reports sent to the local authority for follow-up and addition to the provincial distribution map.

Training to Use Biocontrol to Stop the Spread of Leafy Spurge in River Bottoms

Alberta Invasive Species Council (AISC)

Grant: \$10,126.24

Project Code: 015-00-90-298

Project Status: New; Completed

Funding Priority: 4

Project Website: abinvasives.ca/biocontrol-release-program/

An alternative environmentally friendly method to managing invasive non-native plants is biological control or biocontrol (i.e., the suppression of populations of pests using living organisms). Over the past 20 years, the AISC biocontrol program has released host-specific insect biocontrol agents to help manage populations of invasive weeds in Alberta, including biocontrol for leafy spurge. Leafy spurge is one of Alberta's most pernicious non-native plants, outcompeting native plants and reducing available forage for wildlife. Leafy spurge invades a wide variety of habitats including riparian areas where it has spread throughout many river systems in Alberta. As there are very few options available to control leafy spurge near rivers, biological control is an ideal option. Due to AISC's biocontrol program, many sites with leafy spurge have populations of biocontrol that can be collected and moved to new patches of leafy spurge. The objective of this project was to train organizations and landowners contending with leafy spurge near rivers how to collect, manage, and relocate populations of biocontrol insects. Activities involved helping participants locate populations of biocontrol, on-site training, and a follow-up to assess the results of the program. Through this project, the AISC trained 11 organizations or landowners to use biocontrol on leafy spurge, developed a best management practices guide for leafy spurge, and communicated the results through the AISC's social media, AGM, newsletter, and annual reports. Through these efforts, AISC hopes to see an increase in the number of individuals with the expertise to use biocontrol to manage leafy spurge in riparian areas, thereby increasing the level of control of leafy spurge in our province.

Implementing Responsible Recreation and Riparian Habitat Improvements for Westslope Cutthroat Trout

Alberta Riparian Habitat Management Society – Cows and Fish

Grant: \$15,450

Project Code: 020-00-90-167

Project Status: Funded 2011/12, 2015/16, 2017/18 to 2020/21; Completed

Funding Priorities: 1, 2

This project encourage stewardship and led to site-specific enhancements that improve overall riparian habitat and sport-fishery habitat, focused on areas where westslope cutthroat trout (WSCT) populations remain. In Alberta, WSCT are listed as Threatened, and Cows and Fish will be working to address

impacts to this important sport species as identified in the provincial Recovery Plan. The Recovery Plan clearly indicates that a combination of impacts has led to habitat degradation and loss and cumulative impacts, including those related to riparian areas disturbance and stream bank structure. Working with stakeholders, Cows and Fish will support changes that match the Recovery Plan priorities, such as minimizing stream bank erosion and sedimentation; managing grazing timing and use; reducing OHV use of non-designated trails; maintaining riparian vegetation; and generally addressing habitat loss through improved management of human activities and land uses. Site-specific enhancements on several sites were completed. Restoration work was done in Castle Provincial Park at an unauthorized random camping site near Highway 774 in fall of 2021. The work included decompaction, hydro-seeding and adding mulch to a trail plus placement of boulders to limit access to full-sized motorized vehicles. At a small tributary to Racehorse Creek, where WSCT populations remain, enhancements were done that will improve overall riparian health and sport-fishery habitat. Due to COVID-19, the restoration could not be done with the help of volunteers, so Cows and Fish staff and one employee from Spray Lakes Sawmills completed the live willow staking. Once established, over 180 live willow stakes on this tributary will reduce sedimentation, minimizing stream bank erosion and enhance habitat near the site where a logging road was reclaimed. Another small restoration with live willow stakes was completed adjacent to a bridge on Wintering Creek, where no prior decompaction of the soil was done. The ground was too severely compacted, and only 43 live willow stakes and three fascines (bundles of willows) were successfully planted. Lastly, signage was repaired at a previous restoration site, to ensure users continue to understand the exclusion area and purpose of the work.

Alberta Watercourse Crossing Collaborative (AWC3) Spring 2021 Roadway Watercourse Crossing Webinar Series and Capstone Technical Seminar

Alberta Watercourse Crossing Collaborative (AWC3)

Grant: \$3,000

Project Code: 002-00-90-346

Project Status: New; Extended until March 15, 2023

Funding Priority: 5

Project Website: www.awccc.ca/awc3-webinar-series/

The AWC3 is a not-for-profit organization with the long-term goal of assisting road and crossing owners to replace, restore, and maintain fish passage and aquatic habitat for all fish species in Alberta. This grant was critical in hosting a series of webinars focused on roadway watercourse crossing policy, management, and remediation. Three key objectives were: to encourage collaboration between practitioners, academics, government, and individuals interested in improving fish passage associated with roadway watercourse crossings; to share information and educate individuals across multiple sectors; and to post video recordings of hosted webinar presentations for continuing education and to

act as a reference for future learnings. Activities included setting up the required webinar presentation platform, coordinating speakers and presentation topics, releasing a schedule, hosting the webinars, and posting the video recordings of the webinars to the AWC3 website. The webinar series and final seminar was attended by a total of nearly 600 individuals, demonstrating the need for watercourse crossing information and education. Feedback was positive and several collaborations from the project continued between industry, consulting, and government representatives. The AWC3 webinar series provided a virtual platform in a time when face to face interaction was minimized because of the COVID-19 pandemic. The entire webinar series and video recordings are provided free to anyone interested in roadway watercourse crossings and hydrology management issues within Alberta. The success of this webinar series has been extended into 2022 with a one-day seminar series held on April 21. Stimulated by the accomplishment of the previous webinar and seminar series was the need for additional information. As a result, the AWC3 is planning to extend the webinar series into the fall of 2022 and spring of 2023.

Elk Trap Removal for Habitat Recovery

Ann & Sandy Cross Conservation Area (ASCCA)

Grant: \$8,000

Project Code: 015-00-90-297

Project Status: New; Extended until June 30, 2022

Funding Priority: 2

The goal of this project was to remove a disused elk trap from a section of the conservation area to allow the area the trap is located on to be remediated. ACA funds received have been spent to clean up a good portion of the trap. The remaining mile of page wire fencing will be removed with assistance from AEP and other potential funders.

Wildlife-Friendly Fencing to Protect Pine Creek

Ann & Sandy Cross Conservation Area (ASCCA)

Grant: \$10,000

Project Code: 015-00-90-268

Project Status: Various fencing projects at ASCCA have been funded 2011/12, 2013/14 to 2015/16, 2018/19, 2020/21; Completed

Funding Priority: 2

The goal of this project was to install wildlife-friendly fencing to protect a sensitive riparian area as part of the Pine Creek watershed at the ASCCA. The ASCCA is especially valuable as a source of clean water, which benefits not only wildlife, but humans as well. Over the years, ASCCA has been remediating springs and protecting them with wildlife-friendly fencing. With this ACA funding, this work was continued as part of ASCCA's goal to be a leader in sustainable habitat management. In total, 114 feet of wildlife-friendly fencing was installed by a contractor around Spring #6.

CABIN Upper Athabasca Collaborative

Athabasca Watershed Council (AWC)

Grant: \$3,000

Project Code: 020-00-90-299

Project Status: New; Completed

Funding Priorities: 1, 2, 3, 6

Project Website: awc-wpac.ca/projects/upper-athabasca-biomonitoring

The goal of this project by the AWC was to undertake standardized biomonitoring in the Athabasca Watershed. In 2021, the first year of this project was initiated in the Upper Athabasca watershed, starting with the collection of benthic invertebrates and water quality parameters at three sites in the McLeod River Watershed and one site in the Solomon Creek Watershed. These watersheds are home to the Western Arctic bull trout and Athabasca rainbow trout, both species at risk. Two staff were trained to follow the Canadian Aquatic Biomonitoring Network (CABIN) sampling protocol. After that, samples from each site were sent to the University of Guelph for environmental DNA (eDNA) analysis to contribute to the Sequencing the Rivers for Environmental Assessment and Monitoring (STREAM) project. A sample from each site was also sent to ABI Environmental taxonomists for genus and species identification and analysis. The AWC participated in meetings with the Eastern Slopes Aquatic Monitoring Collaborative led by Living Lakes Canada and the Oldman Watershed Council with partners from the North Saskatchewan Watershed Alliance, Ghost Watershed Alliance Society, Kainai Nation, Cows and Fish, Environment and Climate Change Canada, World Wildlife Fund, and Parks Canada. The goal of the Eastern Slopes Collaborative is to develop a reference condition approach for benthic invertebrates in the eastern slopes of Alberta with community groups. The AWC has started bringing stakeholders together to focus on water quality in the Upper Athabasca watershed and watershed management in the Pembina River watershed. A meeting in October 2021 was held with stakeholders to initiate a technical advisory committee for the Pembina River watershed to address watershed management in the area. Two meetings were held in February 2022 to discuss water quality, the role of the AWC and Lesser Slave Watershed Council in aquatic monitoring, how to support water quality management frameworks, and parameters of interest. The AWC also hosted an online seminar about the project in February 2022 that was attended by 40 people.

Wildlife Monitoring, Conservation, and Public Engagement at Beaverhill Lake

Beaverhill Bird Observatory (BBO)

Grant: \$21,250

Project Code: 030-00-90-124

Project Status: Funded since 2006/07, except 2020/21; Completed

Funding Priorities: 2, 6

Project Website: www.beaverhillbirds.com

This project supports the stewardship of the Beaverhill Natural Area, an internationally recognized wildlife area. The BBO continued the

long-term monitoring of wildlife and wildlife conservation activities. The public were engaged about the importance of Beaverhill Lake, wildlife and natural areas in Alberta, and the threat of climate change through public events and workshops. Project objectives were met through habitat enhancement initiatives, increasing the public's access to nature and hunting opportunities, hosting events, and other initiatives. The BBO conducted songbird migration monitoring in the spring and fall, and owl migration monitoring in the fall. Breeding bird monitoring was carried out in the summer at three MAPS stations. Approximately 300 bird boxes were maintained, cleaned, and replaced as needed. ARU bat detectors were operated and 40 bat boxes monitored. Three camera traps monitored the mammals year-round. Data was shared with Environment Canada, Birds Canada, Institute of Bird Populations, AEP, and USA collaborators. Eight student interns were supervised to complete and publish research and monitoring projects. Fence gaps were repaired around the 410ha Beaverhill Natural Area and 6 km of walking trails were maintained in the natural area from May to October. The vehicle access trail was repaired. Over 1,000 people were greeted as visitors to the natural areas. Visitors (~600) were hosted through small COVID-safe events. Approximately 50 volunteers worked at BBO. A Young Ornithologist Workshop was hosted with ten youth attending. More than 106 off-site presentations/demonstrations were given, reaching more than 4,400 people. The 2022 Snow Goose Festival was postponed due to COVID-19 concerns.

Kids Can Catch Coronation

Benevolent and Protective Order of Elks No. 360 (Coronation Elks)

Grant: \$700

Project Code: 020-00-90-291

Project Status: New; Completed

Funding Priority: 5

Kids Can Catch has been a popular event at the Coronation Dam for several years. When the organization that had previously been hosting it was no longer able to do so, Coronation Elks stepped in to ensure that the local children/youth and families could continue the tradition. Kids Can Catch Coronation took place on Sunday, July 4, 2021, at the Coronation Dam Campsite—a “free fishing” weekend in Coronation, making it easier for new anglers to attend. Thirty-five participants were provided with equipment and training on the safe use of equipment as well as education/information on the responsible use of environment. All participants were provided with a picnic lunch, enhancing the concept that fishing is a great family activity; one that provides enjoyment throughout a person's life. A Fish and Wildlife Officer attended this event and handed out various give-a-ways to participants; he was also able to talk about the importance of safety and respect for the environment. There were several first-timers at this event and one young lady caught a fish her fish time out—her joy and excitement brightened the day for everyone. One family that attended comprised three generations, truly embracing the concept that fishing is something to be enjoyed by family members of all ages throughout the ages.

Citizen Science Bat Monitoring Program and Community Maternal Roost Installation

Boreal Nature Network (BNN)

Grant: \$4,625

Project Code: 030-00-90-316

Project Status: New; Extended until May 31, 2022

Funding Priority: 6

The goals of this project were to: 1) engage and train citizen scientists in northwestern Alberta communities on bat conservation and stewardship; 2) collect and contribute data to the Alberta Community Bat Program, and other groups to help fill knowledge gaps; and 3) identify host communities to develop and protect roost sites in bat-friendly communities. In working towards the project goals, partnerships were explored and developed within five northern communities (Northern Sunrise County, Municipal District [M.D.] of Peace River, Town of Peace River, M.D. of Greenview, M.D. of Smoky River) to host bat box installations and provide additional funding in the form of bursaries for resident students to act as primary drivers in leading citizen scientist initiatives. To date, \$11,000 of additional funding has been provided by host communities in support of student bursaries to help drive program delivery. Three information sessions were held in person in Grande Cache in summer 2021. An echo meter sign-out program was established in both Peace River and Grande Cache and saw users in both towns sign out meters for use in community bat detection. Community members have started to interact with BNN and are reporting bat occurrences as well as incidental drop off of dead bats. Though data collection has been sparse to date, information is starting to trickle in and be passed along to the Alberta Community Bat Program. An active bat house in Grande Cache has been identified and will be monitored for activity going forward. Several existing structures on three private land holdings within Northern Sunrise County have been identified and will be monitored going forward as well. BNN staff have worked closely with the Grande Cache high school industrial arts program to build bat boxes for the community. These will be installed in spring 2022. Additionally, four multi chamber boxes and ten single chamber boxes have been purchased and have been divided up between Northern Sunrise and Greenview Counties.

Tree Plant

Brooks & District Fish & Game Association (BDFGA)

Grant: \$4,000

Project Code: 015-00-90-291

Project Status: New; Extended until May 31, 2022

Funding Priority: 2

This grant enabled BDFGA to plant trees at the Sproule property in Rolling Hills, Alberta. Many of the older trees were not getting enough water and were dying off. Some of the habitat was in poor shape due to lack of water despite BDFGA applying water to the site. The club donated many volunteer hours to the site by irrigating the 22 acres of hay and grass mix. BDFGA installed a drop irrigation

system on the plot measuring 200 by 200 feet with seven rows of trees. A mix of choke cherry, Saskatoon, buffalo berry, cotoneaster, and silver maple were planted and watered regularly until established. BDFGA teamed up with 15 volunteers from the Brooks and area 4H group and 30 volunteers from JBS Environmental Group. Six hundred trees were planted in just over an hour on May 15, 2022. Lunch was served and everyone had a good time. The volunteers offered their services for BDFGA's next project at the Brooks aqueduct pond site.

Outdoor Education for Everyone: Getting Albertans outside to enjoy, value and use Alberta wilderness

Canadian Parks and Wilderness Society Southern Alberta Chapter (CPAWS SA)

Grant: \$20,000

Project Code: 002-00-90-253

Project Status: Funded 2016-17 to 2019-20; Completed

Funding Priority: 6

Project Website: cpaws-southernalberta.org/education/youth-experiences

Outdoor conservation education is more important than ever. Throughout the pandemic, Albertans have shown increased interest in the conservation and use of Alberta's wilderness. These spaces are crucial for human health and the sustainability of our fish and wildlife populations. While everyone benefits from nature experience, not everyone has the knowledge or skills to participate in outdoor recreation. Outdoor Education for Everyone: Inspiring Albertans to Enjoy, Value and Use Alberta Wilderness was a project designed by the CPAWS SA that provided outdoor education for groups with limited access to it, particularly rural youth and new Canadians. The project aimed to educate participants about conservation and promote stewardship in Alberta through these topics: citizen science, nature wellness, species at risk, watersheds, and Alberta ecosystems. From April 1, 2021 to March 31, 2022, this project delivered 143 interpretive hikes, field studies, schoolyard explorations, and snowshoe treks for approximately 2,145 Albertans, completely surpassing the cautious targets due to the ongoing pandemic. Of these 143 Alberta based, outdoor conservation education programs, 55 percent were delivered to underserved groups: 32 percent to underserved groups in Calgary, 13 percent to rural groups, and 10 percent to underserved groups in rural communities. CPAWS SA's highly skilled interpretive guides provided safe educational experiences that inspired Albertans to enjoy, value, and use fish and wildlife habitats. Program participants benefited from getting outside, gained conservation knowledge, and engaged in environmental stewardship as a result of this experience. Ninety percent of participants shared that they learned something new with CPAWS. Results showed that 99 percent enjoyed their outdoor experiences and 98 percent committed to taking environmental action. By connecting youth and new Canadians with nature and educating them about the importance of outdoor recreation, conservation, and healthy ecosystems, CPAWS SA increased conservation awareness and helped continue to build the next generation of Alberta conservationists.

Kids Catch Event and School Fishing Opportunities

County of Grande Prairie

Grant: \$1,500

Project Code: 002-00-90-341

Project Status: Other ACA support; Completed

Funding Priority: 5

In 2021 the County of Grande Prairie hosted its fourth annual Kids Can Catch event. With the ongoing COVID-19 pandemic, the event required to have pre-registration. This allowed organizers to facilitate the participants on docks and maintain a volunteer to participant ratio. This event was well attended with most participants having little to no experience with fishing. New anglers had the opportunity to try fishing in a safe and supervised environment. The event achieved the goal of getting more kids exposed to fishing in a safe environment. Eighty-nine kids registered through Eventbrite and a total of 74 participated throughout the afternoon. This including parents and guardians. This year a portable aerator was purchased to allow participants to interact with a rainbow trout from the pond. Given the temperature and that the event was hosted late afternoon, participants were not overly successful in catching fish during the event time frame. The event date and time was scheduled to accommodate County staff and volunteers. In 2022, the County will look to schedule an early morning event to hopefully increase the success of fish caught by the participants. Unfortunately, with COVID-19 restrictions, the school/sport academy program was unable to be run in 2021. A classroom/group set of fishing gear was purchased that groups can sign out from the County to use as part of a fishing session within their programs or classrooms. This will allow community groups to sign out fishing gear to use at the Sportsplex pond for years to come.

Jackfish Lake Restoration

County of Two Hills

Grant: \$21,800

Project Code: 020-00-90-294

Project Status: New; Completed

Funding Priorities: 2, 3, 5

The primary goal of the Jackfish Lake project is to increase lake oxygen levels. This primary goal fosters three core objectives: 1) to enhance the overall health of the lake's ecosystem; 2) to decrease fish mortality rates; and 3) to grow fish into a healthy size range for a self-sustaining population and recreational angling. The surface aerators were installed with help from ACA at the lake in September 2021. Since then, four aerators have been running steady. By purchasing and installing the aeration equipment the fish habitat has improved drastically. Oxygen readings were undertaken every month since the aeration was installed. Continuous testing demonstrates that the oxygen levels in Jackfish Lake have increased, thereby achieving an ecosystem which supports the mortality rate of stocked fish. The outcome has been fantastic due to the partnership with ACA and Cold Lake Fish Hatchery. The Cold Lake Fish Hatchery is supporting the Jackfish Lake project by testing the oxygen levels and lake depths; in addition, they have used a Livescope to show pictures of fish beneath the ice. The lake was restocked with tiger and rainbow trout in April and September of 2021 and the County is hopeful the fish will live through the winter. Jackfish Lake had an increase of recreational anglers this winter due to public awareness and success of the project. The County is actively promoting the project's success on social media and in County newsletters.

Mitigation of Agricultural Effect on the Milk River and the Milk River Ridge Reservoir

County of Warner

Grant: \$3,000

Project Code: 002-00-90-339

Project Status: New; Extended until Nov. 30, 2022

Funding Priorities: 1, 2, 4, 5, 6

The Milk River is a transboundary watershed in which the river crosses the border with the United States of America; this watershed is unique to Canada and the quality of its waters should be a concern to both countries. Producers along the Milk River, and the Milk River Ridge Reservoir, tributaries, and main watercourse, continue to graze cattle and conduct agricultural activities within the immediate riparian zones. This effect degrades the riparian zone plants, soils, and contributes nutrients, fecal coliforms, and sediments. The degradation of the watersheds affects the users by decreasing tourism, sportfishing, boating, and consumption of the water. Solutions to prevent or mitigate these effects are needed. A proposed method to implement large scale changes in behavior is to provide educational opportunities to existing producers and future producers so they recognize the importance of riparian area protection through offsite watering technology, and to minimize soil disturbance in proximity to the water shoreline. The educational series focuses on preventing, assessing, and mitigating damage to the riparian zones through webinars, presentations, and in-person technical demonstrations. The goals of this project would be to inform producers and to encourage them to implement offsite watering sources, boundary fencing, constrained access to surface waters, and to conduct riparian health assessments. The expected result of the project is a series of video recordings. The presentations will be advertised throughout Canada and into the United States with the goal to reach 500 people. Also, the project plans to provide in-person presentations to 100 people, over two events. This project is ongoing, and presenters have been contacted.

Wetaskiwin/Leduc Alternative Land Use Services (ALUS)

County of Wetaskiwin

Grant: \$15,000

Project Code: 015-00-90-261

Project Status: Funded since 2018/19; Completed

Funding Priorities: 2, 6

Project Website: alus.ca/alus_community/alus-wetaskiwin-leduc

The project goal is to engage Wetaskiwin and Leduc County farmers through the ALUS Program to conserve, enhance, and restore wetland and upland habitats, which helps to restore and conserve species and their habitats on private land. The project objectives are to: increase the number of acres enrolled in wildlife habitat stewardship (reforestation, riparian area enhancement, and pollinator habitat); raise the profile of the ALUS program and raise awareness of the benefits of ALUS to all of society; increase wildlife habitat/ecosystem services education among the farming community and public; increase awareness of the benefits of working with private landowners to improve wildlife habitat conditions for public enjoyment; and provide multiple ecological benefits including habitat for fish and wildlife, flood mitigation, erosion control, biodiversity, and cleaner water. Six new ALUS projects were carried out: four projects

in the Battle River watershed and two in the North Saskatchewan watershed. The results include 42.21 hectares of enhanced habitat, wetlands, and creeks plus riparian areas, 1,756.6 metres of fence installed, and three off-site watering systems developed. Now that projects are in place, riparian health, habitat, and biodiversity should improve over time with reduced livestock access. Water quality should also improve for those downstream. Gate signs, which include ACA's logo, were provided to participants upon verification of project establishment.

National Archery in the Schools Program (NASP) Archery Education

École Francophone d'Airdrie

Grant: \$5,000

Project Code: 002-00-90-329

Project Status: New; Completed

Funding Priorities: 5, 6

This project began with the purchase of necessary materials (NASP bows and equipment) to implement the archery program at École Francophone d'Airdrie school. Two teachers were trained and qualified to teach NASP archery in November 2021. The plan was to teach archery to the Grade 5s and 6s in January 2022; unfortunately, due to COVID-19 restrictions the archery program was cancelled. However, in the second semester, outdoor education was taught by one of the NASP certified teachers. Bow hunting is specifically offered, teaching the skills and knowledge necessary for the NASP program. A few sessions of archery were held in the gym with these students. NASP has also been offered to the Grade 9 physical education classes with future sessions expected in the future for Grade 7s and 8s. Overall, the archery program is starting to move along regardless of the COVID-19 restrictions. The school is extremely happy with how things have evolved thus far.

Improving Native Habitat in the Beaverhills Biosphere Reserve

Edmonton and Area Land Trust (EALT)

Grant: \$7,025

Project Code: 015-00-90-271

Project Status: Similar project funded in 2019/20; Completed

Funding Priority: 2

The goal of this project is to improve native habitat for wildlife in the Beaverhills Biosphere Reserve by reducing the prevalence of invasive plants and promoting the growth of native plants at Smith Blackburn Homestead. The project has two main objectives: to reduce the extent of invasive plants thereby improving the quality of wildlife habitat at Smith Blackburn Homestead, and to engage volunteers in land stewardship activities. These objectives were achieved through three main activities: mowing and manual removal of weeds at the site, implementing weed control at the site of a future pollinator garden, and holding three volunteer events to manually remove weeds. This project was successful in managing invasive plants at the Smith Blackburn Homestead. As part of this project, two meadows that were heavily infested with creeping thistle were mowed by a contractor. The topsoil with invasive seeds in the seedbank was removed at the site of the future pollinator garden (garden installation funded by Alberta EcoTrust). Three volunteer events were held to manually remove invasive plants from the land, engaging 19 volunteers. An additional 13 volunteers from the Conservation Land Stewards program manually removed weeds independently during

approximately two visits per month, for a total of 32 volunteers engaged in this project. Several parallel projects occurred at this land that will reduce the extent of invasive plants here in the future. With funding from Alberta EcoTrust, a heavily infested area was replaced with a native pollinator garden. Additional funding from One Tree Planted allowed EALT to plant 110 native shrubs and seedlings in the surrounding landscape, and another 30 young spruce trees were planted. These trees and shrubs will shade out and slow the growth of invasive plants here in the future. One of the most impressive achievements of this project was the number of volunteers engaged outside of organized events. The 13 Conservation Land Stewards who removed invasive weeds at the Smith Blackburn Homestead are committed to stewarding this land for two years and providing high level monitoring and engagement at this land. The work done by these stewards will increase the effectiveness and longevity of the work that EALT does to control invasive plants during this project.

Watershed Education, Literacy, and Restoration Project

Ghost Watershed Alliance Society (GWAS)

Grant: \$20,195

Project Code: 015-00-90-289

Project Status: Funded since 2018/19; Completed

Funding Priorities: 1, 2, 6

Project Website: www.ghostwatershed.ca

The goals of the project were to increase watershed literacy and awareness, build capacity in restoration techniques, and encourage people to become watershed stewards. The objectives of the project were to achieve these goals by engaging people of all ages in hands-on learning experiences. Activities included: conducting an amphibian nocturnal survey; starting a citizen science water quality testing program with CreekWatch involving volunteers; hosting families and students in the Ghost Watershed to learn about aquatic macroinvertebrates; participating in the City of Calgary's virtual Mayor's Environment Expo; engaging with recreational users in the inaugural and collaborative Recreation Stewardship Fair; publishing an educational video about the GWAS Water Monitoring Program; and providing online educational resources on westslope cutthroat trout. GWAS's bioengineering workshop was attended by 18 people (limited by COVID-19 regulations) including motorized recreational users, First Nations, consultants, municipal staff, and NGO staff. As part of this workshop and in partnership with Trout Unlimited Canada and Cows and Fish, the group restored about 360 m² of riparian habitat impacted by motorized recreation in the Ghost Watershed, planting over 1,200 willow stakes along a stream designated as critical habitat for westslope cutthroat trout. A nine-minute educational video featuring the bioengineering workshop was developed and presented online with 55 people attending. The film has been viewed 227 times since January 26 on GWAS's YouTube channel. A presentation on bioengineering was also given as part of the Native Trout workshop series in March 2022. Presentations on the project were also given at the GWAS AGM and the Bow River Basin Council Educational Forum in December. All materials have been published on the GWAS website. Over 1,000 people of all ages benefited from these activities throughout this grant period. Tremendous, positive feedback was received from participants on both the bioengineering workshop and the educational program. This project enabled GWAS to forge new relationships and strengthen existing ones, heighten awareness, and improve physical conditions of critical fish habitat.

Glenbow Ranch Park Foundation Nature Camp 2021

Glenbow Ranch Park Foundation (GRPF)

Grant: \$6,750

Project Code: 002-00-90-330

Project Status: New; Completed

Funding Priority: 6

Project Website: grpf.ca/summer-camps

GRPF's objective was to create and deliver seven weeks of safe, inclusive, and educational nature camps for youth aged six through nine. Camps ran Monday through Friday 9:00 am to 1:00 pm and each camp consisted of ten campers. The group size was selected to accommodate changes due to COVID-19 and to ensure camps followed all public health measures. The first camp, Buzzing Bumblebees, Burrowing Birds, and Brown Bats, focused on flying creatures and the adaptations they have to help them survive at the park. The second camp, Glenbow's Grassland Protectors, youth discovered the mammals at GRPF through a grassland safari. Campers also learned about the Indigenous people that took care of this land for millennia. In both camps, youth learned about grasslands, wetlands, biodiversity, land acknowledgements, Indigenous people's relationship with the land, co-existing with wildlife, and how to be environmental stewards. Campers gained an appreciation and curiosity about nature through fun hands-on activities, hikes, games, guest visitors, and crafts. The camps were sold out for the summer and 67 out of 70 campers attended (95 percent attendance for the summer). Unfortunately, three campers were unable to attend due to unavoidable, last-minute circumstances. In addition, program participants were 100 percent satisfied with GRPF's summer camps (post-camp surveys were distributed to parents). This was our first year of delivering summer camps. The Program Coordinator developed substantial material and as a result, GRPF has program materials to successfully run camps again next summer.

H.A. Kostash Youth Mentorship Program

H.A. Kostash School

Grant: \$6,550

Project Code: 020-00-90-209

Project Status: Funded in 2014/15 and since 2016/17 and previously by the R&R Fund; Extended until June 15, 2022

Funding Priorities: 5, 6

The plan for the project was to introduce students to various outdoor programs allowing them to gain an appreciation for fishing, camping, hunting, and archery. The school learned to adapt their programs and find innovative ways to teach and mentor their students during the COVID-19 lockdowns and restrictions. With the lifting of COVID-19 restrictions in fall 2021, students were able to go on a mentorship hunt, with many students harvesting their first deer. The archery program started with more than 90 students participating and students were able to travel to tournaments. Ice fishing trips went ahead, and several field trips were planned for late spring 2022, such as fish stocking at Bellis Beach and a camping trip to Jackson Lake.

Kids Can Catch in Hinton

Hinton Family Centre, Town of Hinton

Grant: \$3,000

Project Code: 020-00-90-265

Project Status: Funded in 2018/19 and 2019/20; Completed

Funding Priority: 5

The Kids Can Catch Hinton event (adapted to the COVID-19 Alberta Provincial Health Orders) went ahead! Instead of having a large gathering at a local lake, the Hinton Family Centre designed fishing packages for individual families to pick up and use at a time and location that suited them. This way families could decide their own comfort level and find a fishing hole where they could remain six feet away from other people. The families were very appreciative of the event adaptation. The objective was to provide a positive family experience, showcase the outdoors, and introduce fishing to children. Each fishing package contained brand new rods, bait, lures, maps, fishing license and regulations information, buckets for the kids, swag, a gift card for Subway, and picnicware. Everything was put into a portable plastic tote labelled with the Kids Can Catch logo and ACA's logo. Everything was returned to the Hinton Family Centre after the event, so that it can be re-used for future events. Participating families were required to answer a post-event survey, then their names were entered into a draw for a fishing-themed toy package. The results of the survey reflected that participating families thought a free-fishing weekend was a wonderful idea, and the provision of rods inspired some families to go and buy their own rods for future use!

Kids Can Catch

Innisfail Fish & Game Association (Innisfail FGA)

Grant: \$1,500

Project Code: 020-00-90-287

Project Status: New; Completed

Funding Priorities: 5, 6

Innisfail FGA held their second Kids Can Catch event on Sept. 11, 2021, at a stocked private pond in Spruceview, Alberta. This pond had an estimated 400 rainbow and brown trout. The event is geared towards providing children and teenagers with a fun-filled day of first-time catches, a demonstration on processing fish, with on-site teaching by Innisfail FGA members. All fish caught were put on ice and taken home by the lucky angler. Some decided to release them back into the pond. There was a mascot on site for entertainment, lots of gifts and prizes such as fishing rods and tackle boxes. Lunch was provided for all attending the event. The site was equipped with mobile washrooms, plenty of parking, and great access to the pond. A tent was set up on site with picnic tables so participants could sit down, relax, and enjoy their lunches. The fish were biting and all the participants had a great time. With the help of 11 great volunteers from the Innisfail FGA club, and the support from ACA, Zone 3 AFGA, and Wolverine Guns and Tackle, this event was flawless. The pond owners were very excited and are continuing to support the club in future years to hold more events.

Enhancement of Fishing Opportunities and Activities at Klondike Park

Lac La Nonne Enhancement and Protection Association (LEPA)

Grant: \$4,850

Project Code: 020-00-90-292

Project Status: New; Completed

Funding Priorities: 2, 5

The community dock project at Klondike Park, Lac La Nonne, Alberta has proved to be a success. The project provides a safe environment for local people and visitors to fish and supports safety for boaters. Temporary placement of the dock occurred in May 2021, and installation of the dock took place early August. The temporary placement was to avoid disturbing nesting birds along the lakeshores. The dock installation was a successful collaborative effort of many stakeholders in the community. ACA, County of Barrhead No. 11, Lac Ste Anne County, LEPA, along with many private businesses and community volunteers worked together to complete this project. LEPA facilitates many activities around the park enhancing awareness; some activities include the Family Fishing Derby, Boat Regatta, Boat Rally, Concert at the Park, and Pond Days for school children. The dock is now a vital feature to the park that is used by many people. It complements the enhancement of the park and the continued effort to educate park visitors and the community. The dock allows for hosting education and recreational activities in a safer environment. These public events and educational resources around the park are all steppingstones to foster an environment to help conserve and protect our lakeshores.

Boulder Lake – Floating Dock and Casting Platforms

Lacombe Fish & Game Association (Lacombe FGA)

Grant: \$21,603.82

Project Code: 020-00-90-296

Project Status: New; Completed

Funding Priorities: 2, 5

Lacombe FGA worked in conjunction with ACA to increase access to the newly created Boulder Lake, a publicly accessible, family-friendly fishpond in the Lacombe/Blackfalds area. Lacombe FGA purchased, constructed, and installed a floating dock and four casting platforms at the new Boulder Lake day-use site; two ACA employees offered valuable help with the dock installation. The floating dock is perfectly placed near one of the deeper sections of the pond and draws people to the prime fishing area. The casting platforms help anglers access the pond and minimize damage to the shoreline. All results greatly improved the overall accessibility and attractiveness of Boulder Lake as a premium trout pond fishery. A sign will be installed within the next few weeks acknowledging ACA funding for the casting platforms and the dock. The sign location will be near to the main dock and the signage pole will include an excess fishing line receptacle as well as some safety equipment in case of the need for a water rescue.

East Storm Water Pond Improvement Project

Lacombe Fish & Game Association (Lacombe FGA)

Grant: \$39,797.26

Project Code: 020-00-90-297

Project Status: New; Completed

Funding Priorities: 2, 3, 5, 6

Project Website: www.lfga.ca/news/east-trout-pond-development

Lacombe FGA worked to greatly improve accessibility and water quality at the East Storm Water Pond in Lacombe. This work happened in conjunction with a massive City of Lacombe dog park development adjacent to the pond to create the East Recreation Area. The project objective was to build a bridge which allows anglers to walk around the full pond, to install a dock and five casting platforms, as well as to install mechanical aeration equipment. A floating dock and five casting platforms were purchased and constructed. Mechanical aeration equipment was installed. A walking bridge was purchased, and contractors constructed the bridge over the 8-foot-wide storm water canal. Also, LFGA added a chemical treatment to the water to expedite the water quality. The City of Lacombe paid for the install of power to the aerator, as well as a new parking area that will be shared by anglers as well as dog park patrons. A sign will be installed acknowledging ACA funding for all casting platforms and the dock. The sign will be near the main dock and the signage pole will include an excess fishing line receptacle as well as some safety equipment in case of the need for a water rescue.

Avian Monitoring and Outreach Education Programs at Lesser Slave Lake

Lesser Slave Lake Bird Observatory Society (LSLBO)

Grant: \$17,500

Project Code: 030-00-90-128

Project Status: Funded since 1999; Completed

Funding Priorities: 1, 2, 4, 5, 6

Project Website: www.lslbo.org

Dedicated to bird conservation through research and education, the LSLBO is a member of the Canadian Migration Monitoring Network (CMMN), and it has operated an avian monitoring station at Lesser Slave Lake since 1994. The first goal of this project was to assess the population status of migratory and breeding bird species at Lesser Slave Lake using the following avian monitoring programs: 1) Spring and Fall Migration Monitoring saw over 154,000 birds from 160 species recorded during migration, including the banding of 6,355 birds of 71 species. Fall migration was once again our busiest ever at the LSLBO with many species setting new banding records. All migration monitoring data was forwarded to Birds Canada for population trend analysis; 2) Monitoring Avian Productivity and Survivorship (MAPS) Program determined the reproductive status of breeding birds at four stations and a total of 862 birds of 31 species were banded—the busiest season ever. Data has been provided to the Institute of Bird Populations for analysis; and 3) Owl Fall Migration Monitoring program captured 213 saw-whet owls and one boreal owl. The LSLBO also supported collaborative research projects on boreal bird species with forest industry and academics.

The second goal of this project was to deliver innovative education programs that promote a greater understanding of the importance of the boreal forest ecosystem for Alberta's wildlife. As restrictions were finally lifted for school fieldtrips, over 130 education and outreach programs were delivered to over 3,000 participants of all ages. At the Boreal Centre for Bird Conservation, over 4,300 visitors gained a greater appreciation of birds and boreal forest ecology through our programs and exhibits. Programs and resources are available on the LSLBO website (link above). The most unexpected result is how quickly program participation and visitation have rebounded from COVID-19 once the centre reopened and fieldtrips resumed. Winter programming numbers and centre visitation are the highest that they have been in years as families and teachers are actively seeking fun outdoor learning experiences for their children/students. Although virtual programs were very successful last season, LSLBO's focus has been on providing in-person programs.

Traditional Métis Smoked Tanned Animal Skin

Métis Crossing Experience Company

Grant: \$3,000

Project Code: 002-00-90-347

Project Status: New; Completed

Funding Priorities: 5, 6

Youth and women of all ages had an opportunity to learn how to make smoked tanned hide in the traditional Métis method. All the steps and materials in preparing a deer skin to make smoked tanned leather were presented. Natural sources available from the land were used to facilitate this project. Participants learned the type of tree used to build a fire for drying and how to maintain a smudge fire for smoking the hide. Proper use of tools was introduced, as well as safety training for handling axes, knives, and hide scraping tools. Smoked tanned hide was used historically and it has many unique qualities that other leathers cannot offer. You can insert a needle easily through the leather because it is like a thick felt, so it is much easier to sew by hand. Smoked tanned hides are great for beadwork, hair tufting, and embroidering on. It is also warmer and more waterproof because of the natural oil in the smoked tanning process. The smoked tanned leather has a unique smell due to the process making it recognizable as a traditional tanned hide. The history that is connected to this process was taught as participants worked on the hides. Delays were experienced in delivering the project as COVID-19 made it impossible to host on the initial days planned. As the situation got better, Métis Crossing Experience Company were able to host the event over three weekends, February 18 to 21, February 25 to 27, and March 25 to 27. A total of 131 participants took part in the traditional tanned animal hide teachings over the course of the three weekends. Members of the Métis Community and general public were brought together to share in the exploration and learning of traditional hunting and trapping skills that have sustained humanity since time immemorial. The program name changed to Connecting through Culture. A large emphasis of the Connecting through Culture programming was the traditional tanned animal hides, but other elements were added to the program such as an Early Learning Education Area, as well as wildlife tours and the *Tales from the Trapline* signature experience delivered by Métis Crossing.

Smoky Headwaters Initiative

Mighty Peace Watershed Alliance Society (MPWAS)

Grant: \$6,719.95

Project Code: 020-00-90-293

Project Status: New; Completed

Funding Priorities: 2, 6

Project Website: www.mightypeacewatershedalliance.org/projects/smoky-headwaters-initiative

The Smoky River Headwaters (Grande Cache area) is a unique area that still supports fish listed as *At Risk* and *May Be at Risk* by the Government of Alberta including bull trout (*Salvelinus confluentus*) and Arctic grayling (*Thymallus arcticus*). The goal of this project was to conserve and improve cold water fish habitat for species at risk in the Smoky Headwaters. The project objectives were to: identify which road segments are delivering the most sediment to watercourses; identify opportunities to enhance the thermal shading provided by riparian zones; create workplans to reduce the amount of sediment delivery to watercourses; enhance riparian zone shading with livestock and plug planting; and communicate about the effects of sediment and thermal radiation on fish habitat to the public, recreationalists, and decision-makers. To meet these objectives, MPWAS engaged fRi Research to model sediment delivery and riparian shading, and then called on the expertise of partners (Agroforestry Woodlot Extension Society, ACA, Alberta Wilderness Association, Cows and Fish, Trout Unlimited Canada, and Weyerhaeuser Company Ltd) to help develop workplans. Using social media and the local newspaper, MPWAS communicated about the project to the local community. Presentations were made to a local school and a field trip with a local youth group is planned for the spring of 2022, as well as discussions around engaging these groups to help with the live staking and planting. Initial monitoring has occurred, workplans are being finalized and live staking and planting are being planned. The greatest achievement has been securing collaborative support to work on conserving our cold-water fish using the best methods to focus efforts where they are most effective and getting local involvement. In terms of identifying sediment loading in the Smoky Headwaters, MPWAS have identified and verified the hot spots in four subwatersheds. Although this is being setup to track the effectiveness of restoration, the focus is on fish habitat restoration and the workplans will be designed to mitigate all the issues identified. To allow for a measurement of effectiveness a staggered approach was chosen by the working group. One subwatershed after another will be treated to reduce sediment, addressing every sediment loading issue identified before moving onto the next watershed. The order of this mitigation and restoration work will be Route Creek, Unnamed Creek, Upper Seymour Creek and finally Norton Creek. The education component was, and continues to be, very successful, allowing us to share about cold-water fish conservation.

From the Field – Virtual Field Trip Educational Series

Milk River Watershed Council Canada (MRWCC)

Grant: \$10,000

Project Code: 002-00-90-343

Project Status: New; Extended until May 31, 2022

Funding Priorities: 4, 5, 6

Project Website: www.mrwcc.ca/index.php/get-involved/education-outreach-programs

This project allowed for the development of curriculum-linked Grade 8-12 in classroom virtual fieldtrips with wildlife researchers, habitat managers, and ranchers that are responsible for sustainable management of land, water, and biodiversity in southern Alberta. The MRWCC with financial support of ACA has developed and will continue to deliver a virtual field trip program available to educators across southern Alberta to build a connection of students to working agricultural landscapes and highlight the ecological goods and services ranchers provide. The project resulted in completion of two *From the Field* modules featuring stewardship of species at risk on native grasslands, as well as management along watercourses of the Milk River including the unique challenges such as management of invasive species and water shortages. Along with the ten-minute fieldtrip videos, two custom classroom toolkits were completed for each module with field guides, management information, mock ranch data, blank ranch plans, and teacher's guides. Also included is a classroom activity where students use the classroom toolkit to develop a ranch management plan that incorporates the activities outlined in the video and best practices for the species of concern or interest from the introduction. Students are dealt *Wild Cards* of wildlife species at risk that must be incorporated into their ranch plans and these plans are presented to the group for discussion and feedback. The program is rounded out with an optional zoom follow up with the land and watershed managers to provide feedback and answer additional questions. This program builds a connection with rangelands and wildlife found in southern Alberta and is projected to be used by a minimum of 20 classes this year. With continued promotion over the next four years, the program will allow MRWCC to reach a minimum of 400 students annually.

Riparian and Ecological Enhancement Program

Mountain View County (MVC)

Grant: \$25,000

Project Code: 015-00-90-102

Project Status: Funded since 2005/06; Completed

Funding Priorities: 2, 6

Project Website: www.mountainviewcounty.com/p/agriculture-environmental-funding

MVC has been in partnership with ACA since 2000 and has received an ACA grant since 2005 toward the delivery of a Riparian and Ecological Enhancement Program (REEP). Funding is offered to producers who want to protect, restore, and maintain the health of their riparian and sensitive areas, encourage biodiversity, and maintain fish and wildlife habitat. REEP uses the following means: protecting a permanent riparian and sensitive area with wildlife-friendly fencing; native grass, tree, and shrub protection and establishment; off-site watering system

installation; and approved creek crossings. The funds received from ACA are used to contribute up to 100 percent of the material costs for constructing fences, creek crossings, or the purchase of native seed or seedlings. Off-site watering systems are funded at 25 percent of the material costs. A riparian or rangeland health assessment is performed on each project in the year of completion and again in five years once contract commitments are completed. The contract with MVC also allows the site to be used for demonstration purposes and a road-side sign describing the project to be posted. The health of the watersheds within MVC are improved through this program and there is an increased awareness regarding the importance of riparian and sensitive areas for biodiversity, native plant life, wildlife habitat, and fish distribution and productivity. Ongoing partnerships with technical advisors, extension-focused non-profit specialized groups, and government agencies in the environmental and agricultural fields ensure that projects implemented under REEP are beneficial and lasting. This past year there were 33 projects completed by 16 producers that were funded through REEP; this included 14 new ALUS conservation agreements for projects focused on the enhancement of waterbodies and the adjacent uplands. Funded projects included 21 fencing projects, 11 off-site watering systems, and one planting project. A total of 111.5 hectares of wetland, riparian and upland areas have been protected or enhanced with the total length of newly installed fence being 13.5 kilometres.

Surface Water Studies Phase 2

Muriel Lake Basin Management Society (MLBMS)

Grant: \$12,000

Project Code: 020-00-90-295

Project Status: New; Completed

Funding Priorities: 2, 3

Project Website: www.savemuriellake.com

The goal of the project was to improve the water level, and hence the environmental health, of Muriel Lake by examining surface water runoff in five specific locations in its drainage basin. Muriel Lake provided a healthy aquatic habitat for sport fish species until water levels declined. The project used a previously built Digital Elevation Model (DEM) to model elevations and generate stream elevation profiles. Rapid changes in creek elevations were examined as possible locations where surface water flow could be inhibited. Historical aerial imagery was also compared to recent satellite imagery to examine changes in all locations. The study identified two locations where anthropogenic features were inhibiting the flow of surface water to the lake. Corrective actions have been initiated for both. At one location, the orphan well association has corrected a stream crossing. At the second location, the need for installation of a culvert has been reported to the municipal authority. A third location requires additional field investigation but is likely natural as it is located in a forested area. Drainage area affected by the two locations totals 695 hectares, and their potential contribution to surface water flow to the lake is estimated at 150 decameters per year. The final report has been issued by Solstice Environmental. It documents all work and findings. Four professionals contributed to the study and four MLBMS volunteers were involved in field investigations. The final report has been posted on the MLBMS website (www.savemuriellake.com/wp-content/uploads/2022/02/MurielLake_HydrologyPhase2_FinalReport_24Nov2021.pdf).

Narrow Lake Conservation Camps – Archery and Wilderness Survival Training Equipment

Narrow Lake Conservation Centre, Zone 4 and Zone 5 Fish & Game Associations

Grant: \$1,050

Project Code: 002-00-90-334

Project Status: New; Completed

Funding Priority: 5

Project Website: www.afga.org/conservation-camps

The objective of Narrow Lake Youth Conservation Camp's (NLYCC) archery and wilderness survival training project is to bring the equipment inventory back to par, additional equipment is required for these two specific areas. This specific training includes archery as well as outdoor safety and survival skills training on land and water. For the wilderness survival training the students are provided with the basic tools (survival knife and fire starters) that they will use during the training. The students will take these tools with them at the end of the week. The inventory on site was increased to the targeted number of 50 sets. For the archery program, which is offered to 150 registered campers, an additional 120 arrows have been added to the inventory. The equipment has been purchased and added to the existing inventory. It will be used during the 2022 NLYCC archery classes and the wilderness survival training.

Narrow Lake Conservation Camps – Sleeping Accommodations and Personal Protective Equipment

Narrow Lake Conservation Centre, Zone 4 and Zone 5 Fish and Game Associations

Grant: \$5,237.50

Project Code: 002-00-90-332

Project Status: New; Completed

Funding Priority: 5

Project Website: www.afga.org/conservation-camps

The Narrow Lake Youth Conservation Camp (NLYCC) goal is to provide a safe environment to provide training facilities for Hunter Education, the Canadian Firearms Safety course, and the Boat Safety course. In addition, camp activities include such things as canoeing, archery, rifle, pistol, shotgun and black-powder shooting, wilderness overnight camping/practicing outdoor survival skills, swimming, and fishing. Of the approximately 150 youth that will attend one of the two camps in 2022, it was determined that NLYCC needed to provide the campers with additional sleeping space. This project focus is to increase the available sleeping accommodations with additional outfitter tents and lean-to structures. Six canvas outfitter tents, three sets of outfitter tent poles, and nine lean-to tarps were purchased. The additional sleeping accommodations have been purchased and placed in storage to be initially used during the 2022 NLYCCs.

Narrow Lake Conservation Camps – Training and Certification

Narrow Lake Conservation Centre, Zone 4 and Zone 5 Fish and Game Associations

Grant: \$5,950

Project Code: 002-00-90-333

Project Status: Funded in 2016/17; Completed

Funding Priority: 5

Project Website: www.afga.org/conservation-camps

The objective of this project is the training and certification for two specific Narrow Lake Youth Conservation Camp (NLYCC) groups: the first-year campers and the volunteer instructors and staff. This was done by certifying the instructors and obtaining the necessary training material for the registered youth prior to the start of the 2022 camps. The following training material was purchased: 80 Alberta Conservation and Hunter Education course manuals, 81 Transport Canada Boater Safety Course exam fees, 100 Boat Study Guides, and 100 Canadian Firearms Safety Course manuals. The required certification for the program instructors has been completed. Twenty-four program instructors have received their Standard First Aid training and certification. Three new staff members have completed the Range Safety Officer training and certification, and nine returning program instructors have been recertified.

Nature Kids Family Nature Nights and Nature Network

Nature Alberta

Grant: \$12,000

Project Code: 002-00-90-264

Project Status: Funded 2015/16 – 2019/20 and previously funded by R&R; Completed

Funding Priority: 6

Project Website: naturealberta.ca/nature-kids

The Nature Kids Family Nature Nights and Nature Network project increased Albertan's understanding and awareness of our natural history and instilled a sense of responsibility for natural spaces in the province. Families were provided with positive outdoor experiences which empowered them to foster an appreciation for nature, creating a more sustainable future. To successfully deliver the in-person portion of the program during the pandemic, more events with smaller attendance were hosted during times of greater restrictions. This resulted in surpassing the original goal of reaching 630 people over seven events; instead, Nature Alberta successfully hosted ten events reaching a total of 701 people! These events engaged participants in educational nature activities such as tree planting, bird watching, pond dipping, water quality testing, and bug catching. Event volunteers and experts shared their passion for nature, creating memories to last a lifetime for kids and adults alike, and inspiring a long-lasting relationship with nature. Relationships were cultivated with numerous conservation, stewardship, and nature groups to bring this important project together, connecting our community through a love of nature. A network of 40 nature clubs across the province were further supported through the

development of the Nature Network which enabled more communities and families to be educated about the importance of nature and foster a love of the environment. The Nature Network quickly grew to include an extensive Nature Network Speaker Series available across the province highlighting local environmental issues and current research of nature-related topics. Resources and opportunities to collaborate among grassroots clubs were shared across the network, strengthening Alberta's nature community.

Integrated Weed Management Across Alberta

Nature Conservancy of Canada (NCC)

Grant: \$10,000

Project Code: 015-00-90-279

Project Status: Funded in 2019/20; Completed

Funding Priorities: 2, 4

With ACA's support, NCC was able to continue their ongoing efforts to tackle the threat of invasive weeds on our natural ecosystems efficiently and effectively across the province. This grant supported work for a hybrid approach which included gathering the most up-to-date information on weed control methods, traditional chemical spraying, biocontrol of specific species, and targeted browsing by goats—all in combination to help best steward the vital Alberta habitats we care for. While some challenges were faced with project delivery due to limited funding and extreme environmental conditions created by last summer's heat wave, overall, this project was a success in combatting weeds on over 543 acres through an array of tactics across the province. This work is a vital pillar of stewarding the landscape, and NCC appreciates ACA's support to help accomplish it.

Fish Habitat Restoration in North-East and Central Alberta Lakes

North East Alberta Fish & Game Association – Zone 5 (NE AFGA)

Grant: \$20,000

Project Code: 020-00-90-274

Project Status: Funded in 2019/20; Completed

Funding Priority: 2

The project objective was to develop restoration plans for several lakes in north-east and central Alberta and to implement actions that will lead to improved fish habitat and water quality that will restore several lakes for the benefit of all Albertans. The restoration actions may include aeration of the lakes as required to re-establish fish populations. Fish stocking and transplants could also be considered in establishing increased fishing opportunities. A winter monitoring program to measure of dissolved oxygen was completed by the lake restoration team for various lakes including Muriel, Upper Mann, Lower Mann, Missawawi, Frenchman, Cache, Sandy (North of Two hills), Bonnie, Minnie, Vincent, Jackfish near Myrnam, Lac Delorme, and St. Paul Trout Pond. As a result of declining water levels, several lakes in north-east and central Alberta that used to be fish-bearing are no longer suitable fish habitats. The water quality and fish habitat suitability for thirteen waterbodies were sampled during the winter of 2021-22. The project was an example of the use of volunteers to collect important fish habitat information, also known as citizen science, to improve the management of fish resources in Alberta. The public interest in fisheries management

or environmental management allows for interested publics to monitor and assess fish habitat and water quality. All the lakes were assessed by volunteers with some supporting funds from ACA, AFGA, Sherwood Park Fish & Game Association, Edmonton Fish & Game Association, St. Paul Fish & Game Association, NE AFGA (Zone 5), and Edmonton Oldtimers Fishing Club. EnviroMak also volunteered considerable time to this project. With increased water levels it is expected that the fish habitat will recover in some lakes; in other lakes some fish habitat restoration (i.e., lake aeration, increasing water levels) could be conducted and fish transplants or fish stocking would lead to increased angling opportunities and increased fish production in Alberta. The information gathered should assist fisheries managers to take action that will improve fish resources in the province. The project resulted in a report that provides the list of the lakes that were sampled along with the conclusions and recommendations.

Dogpound Riparian Protection – Birchall Property

Northern Lights Fly Fishers – Trout Unlimited Canada Edmonton Chapter (NLFF TUC)

Grant: \$25,488

Project Code: 020-00-90-284

Project Status: Similar project funded in 2020/21; Completed

Funding Priority: 2

This project was initially approved to protect 12 acres of riparian land along Dogpound Creek on the Birchall property but did not proceed as the landowners decided not to go ahead with the project. However, owners of land downstream, the Leask property, were interested in protecting the 12 acres of riparian land along the Dogpound Creek on their property. The project goals were to assist ACA in implementing a Riparian Habitat Enhancement Agreement with the owners of Leask Ranch; to protect 12 acres of riparian land along the 1,800 metres of Dogpound Creek flowing through Leask Ranch from damage by livestock; to conduct a Riparian Health Inventory of protected land to enable future monitoring; and to provide for a healthier river, improving habitat for fish and wildlife, and increasing recreational opportunity for anglers and those interested in experiencing nature in a more pristine setting. Agreement to undertake this work resulted in the signing of a ten-year agreement between ACA and the landowners. Protection of the riparian area necessitated repair of some existing fencing and installation of approximately 300 metres of new fencing to exclude the landowners' cattle. Gates for public access to the creek were unnecessary as sufficient access was readily available. The willingness of the property owners to voluntarily provide the labour for fence repair and construction resulted in unexpected cost savings. Fencing material costs were covered by this grant together with a contribution from Mountain View County (Alternative Land Use Services program). Installation of an alternative cattle watering system was also needed. The steepness of the creek banks required more complex engineering of a new watering system than needed on similar projects. This was contracted to Sundog Solar Systems and, with some financial support from Cows and Fish, was completed using a standing culvert well, pump, solar panels, hose, and troughs.

Education – Trout Food and Related Angling Techniques

Northern Lights Fly Fishers – Trout Unlimited Canada Edmonton Chapter (NLFF TUC)

Grant: \$4,725

Project Code: 002-00-90-331

Project Status: New; Completed

Funding Priorities: 5, 6

Project Website: www.nlff.org/what-trout-eat-digital

The objectives of this NLFF TUC project were: to increase knowledge of and appreciation for the natural food items available to trout in Alberta's stocked ponds and of proven angling techniques for imitating the characteristics and behaviour of each food item for greater angling success and enjoyment; to replace the damaged educational signage at Muir Lake with updated, scientifically accurate, and more readable versions; and to make the display material freely available in digital form to organizations and individuals providing education on "what trout eat" and on associated angling techniques. With the assistance of a fisheries biologist, an aquatic insect taxonomist, and an educational consultant, illustrated information on the aquatic life forms that provide the primary food sources for trout in stocked lakes was developed. Information on fly and spin fishing techniques for imitating the appearance, behaviour, and other characteristics of each food item at each stage of its life cycle was added and illustrated with input from experienced anglers. A professional graphic designer created proofs of the work to be produced and displayed on eight 32" x 72" signs at Muir Lake, Alberta, as follows: Backswimmers and Water Boatmen; Caddisflies; Chironomids; Damselflies and Dragonflies; Leeches; Mayflies; Minnows and Sticklebacks; Suda and Daphnia. The construction and installation of the signage at Muir Lake was contracted and completed prior to the end of September 2021. A digital link to the displays—[What Trout Eat](#)—was posted on the NLFF TUC website. Meanwhile, an expanded digital version of the display information, [What Trout Eat - Digital Edition](#), was developed to incorporate certain outcomes from Alberta Education's Program of Studies for Outdoor Education. It includes additional illustrations and links to over 130 additional sources of information on specific topics within the text. The information is freely available to any individual or organization interested in using it for educational purposes.

Assess Walleye Population Stability (Vulnerable by Size-Class)

Northern Lights Fly Fishers – Trout Unlimited Canada Edmonton Chapter (NLFF TUC)

Grant: \$13,894

Project Code: 020-00-90-290

Project Status: New; Completed

Funding Priorities: 3, 6

Project Website: www.nlff.org/2022/04/06/walleye-vulnerability-study-lets-go-outdoors

NLFF TUC conducted a mark-recapture study of walleye in Jackfish Lake, Alberta, during the open-water season of 2021. The objective was to estimate the vulnerability of different size classes of walleye to capture by angling and to capture using index netting. Most mark-recapture data was provided by volunteer anglers from NLFF TUC in a collaborative, citizen science project. During this project, these anglers

caught 1,206 walleye, marked 837 walleye, and recaptured 199 walleye. Analysis of the recapture data showed that vulnerability to angling did not increase with walleye size, beyond the size at first recruitment to the fishery, at approximately 35 cm total length. Specifically, quality and trophy-sized walleye larger than 50 cm did not show higher vulnerability than walleye 40 to 50 cm. Walleye vulnerability to index netting also did not show increases over these sizes. However, the high vulnerability of all size classes of walleye to angling was illustrated by the data showing that these three anglers were able to capture approximately 20 percent of the catchable-sized walleye in a popular fishing lake in one season. These data are important to designing effective regulations to maintain these very popular and demonstrably sensitive fisheries. This study has provided Alberta biologists with a rich data set, well beyond NLFF TUC accomplished objectives. Michael Short recorded two videos for "Let's Go Outdoors"; they can be viewed here: www.nlff.org/2022/04/06/walleye-vulnerability-study-lets-go-outdoors.

Conserving and Restoring Arctic Grayling in the Upper Pembina River Watershed – Habitat Restoration Planning

Northern Lights Fly Fishers – Trout Unlimited Canada Edmonton Chapter (NLFF TUC)

Grant: \$17,429

Project Code: 020-00-90-197

Project Status: Funded since 2012/13; Completed

Funding Priorities: 1, 2, 3, 6

Project Website: www.nlff.org/grayling

In 2021, NLFF TUC continued to collect data in support of a multi-year initiative that started in 2011 to study Arctic grayling populations and habitat conditions in the Upper Pembina River watershed. The data collected will be used to identify habitat concerns and conservation opportunities to help re-establish Arctic grayling populations and angling opportunities for future generations. Water temperatures were monitored at 23 sites in the Upper Pembina River watershed. Water temperatures in many locations were higher than previous years, a reflection of sustained low flows and high air temperatures. Habitat conditions were documented at ten sites this year using aerial videography using a quadcopter. Trail cameras were installed in selected sites to collect data on angling non-compliance or damage to habitat caused by OHV traffic as well as documenting seasonal high/low flow events. Sixteen angling noncompliance incidents were recorded. The identified sites were forwarded to enforcement officials for future follow-up. Tissue samples were analyzed from 182 Arctic grayling in comparison to a previously generated reference set of 1,116 individuals spanning the province. In the new samples, DNA from fish in the Pembina River were assigned to the groups from Dismal Creek or Rat Creek, indicating that there is no distinct group for the Pembina River. In fact, the analysis shows that Pembina fish possess ancestry from multiple groups, and there is also some mixing between the groups in Rat Creek and Dismal Creek. NLFF TUC's findings confirm that Arctic grayling numbers in the watershed have declined drastically. Many streams that formerly supported grayling are no longer suitable due to high water temperatures and other factors. However, Dismal Creek still provides suitable water temperatures and habitat for Arctic grayling. NLFF TUC are supportive of the AEP initiatives and will continue to work with AEP in a stewardship role regarding opportunities for habitat restoration or other activities to help conserve and restore Arctic grayling populations in the Upper Pembina watershed.

Crowsnest River Whirling Disease Containment Effort

Oldman River Chapter – Trout Unlimited Canada

Grant: \$3,000

Project Code: 020-00-90-289

Project Status: New; Status unclear

Funding Priorities: 2, 3, 4

The Oldman River Chapter – Trout Unlimited Canada designed and had fabricated two decontamination stations to help reduce the spread of whirling disease. The units are equipped with boot picks and boot brushes to remove debris from wading equipment and were installed on Oldman River Chapter's conservation leases: Burmis Lake and Hillcrest. The first two units are being used often by anglers. In addition to these units, an order was submitted for four additional units of a smaller design, which will be installed once complete. Two units are set for installation at Brown's Crossing on the St. Mary River, another one on the Burmis Lake conservation lease, and the fourth unit's location is to be determined. Expected completion will take place before the end of May. Proposed installation is set for the first week of June, depending on volunteer availability.

Partners in Habitat Development

Partners in Habitat Development (PHD) c/o Eastern Irrigation District (EID)

Grant: \$10,000

Project Code: 015-00-90-103

Project Status: Funded since 2005/06 to 2018/19, 2020/21, and 2021/22; Completed

Funding Priority: 2

The PHD program, founded in 1998, is a long-term habitat program that was developed to create, restore, and protect wildlife habitat within the farming region of southern Alberta. This initiative was developed to mitigate the loss of wildlife habitat in the agricultural areas of southern Alberta due to irrigation infrastructure improvements, agricultural intensification, and industrial activities. The PHD program works with landowners to create and, when possible, preserve wildlife habitat. The program's focus is on the creation of shelterbelts and block plantings to provide critical winter habitat to upland game birds. In 2021, 8,245 trees and shrubs were planted in the Eastern Irrigation District on four new habitat sites and six existing habitat sites. The PHD program also assists with fencing livestock out from existing and newly created habitat sites. In 2021, 1 km of fence material was distributed to fence out one new habitat site.

Peace Wapiti Academy Wildlife Education

Peace Wapiti Academy (PWA)

Grant: \$2,000

Project Code: 002-00-90-342

Project Status: New; Completed

Funding Priorities: 5, 6

The project goal was to show students the wide diversity of wildlife in the area. PWA classes were to set up trail cameras in the local area to see what animals are using the same trails that humans do and to use the trail camera data to observe patterns in movement, populations, and behavior. After two canceled field trips due to COVID-19 related restrictions/cancellations, two teachers went out on a weekend to place cameras around a local ranch and a local hiking/biking area (Lost Lake Loop near Evergreen Ridge). A few pictures of animals were captured, but unfortunately someone covered the camera with a mask and the cold weather in December killed the batteries in the cameras near the ranch. The photos and the animals captured in them were discussed with PWA students, but the timing did not line up with the curriculum. However, Science 9 and Biology 30 students will be using the camera data in field studies in the second semester. PWA have signed an agreement with Ducks Unlimited Canada to establish a "Wetland Centre of Excellence" for next year, which will provide a designated space and additional time to put these cameras into practice in a project-based ecology course. Next year, PWA hope to use the cameras more, with hopefully no interruptions from COVID-19.

Milk River Ridge Reservoir – Eastridge Uplands Reclamation

Pheasants Forever Calgary Chapter (PF Calgary)

Grant: \$18,450

Project Code: 015-00-90-295

Project Status: New; Completed

Funding Priority: 2

Project Website: www.pfcalgary.ca/the-final-piece-of-the-puzzle

The objective of this project is to naturalize 80 acres of previously cultivated land on the east shore of Milk River Ridge Reservoir. This is the final phase of the Milk River Ridge Reservoir Water Quality Stewardship Initiative, a multi-year collaborative initiative in the County of Warner that started in 2013. The stewardship initiative is overseen and managed by a working group consisting of AEP, ACA, and the County of Warner. By establishing permanent cover and planting shelterbelts, PF Calgary are providing wildlife many of the food, shelter, and security necessities essential during critical life stages. By reclaiming habitat onto the tracts of land around the reservoirs and canals, connectivity and travel corridors are provided that allow wildlife to emigrate and immigrate from critical habitat areas, allowing populations to increase their ranges, increase numbers, and help moderate extremes of population cycles. The development of habitat along reservoirs and canals is occurring on crown land, which provides recreationalists additional opportunities without access limitations. Approximately 65 acres were seeded to permanent cover and 7,500 shrubs were planted for wildlife habitat on the east side of Milk River Ridge Reservoir. Shrub survival was not calculated last year, although multiple site visits were made, and shrub survival was estimated to be at least 80 percent going into the winter. Actual survival will be calculated either this fall or the next one. PF Calgary planned on planting 1,500 shrubs this spring to replace any dead shrubs in the habitat rows planted last year.

Post-Secondary First Pheasant Mentor Hunt

Pheasants Forever Calgary Chapter (PF Calgary)

Grant: \$5,000

Project Code: 030-00-90-296

Project Status: Funded since 2019/20; Extended until Nov. 30, 2022

Funding Priority: 5

The goal of this project was to put approximately 48 post-secondary students through a comprehensive oneday upland game bird hunting seminar. PF Calgary's program has been tried and tested with Environmental Science Students from Lethbridge College who will be some of our future conservation officers and managers. The program also includes students from the University of Calgary and the University of Lethbridge. It is a comprehensive seminar covering conservation of upland game birds, life history of upland game birds, hunting techniques and strategies, shooting seminars with expert field instruction, seminars on safety, cleaning and cooking birds, culminating in a pheasant hunt with mentors over professional pointing dogs and their respective handlers from the Wild Rose North American Versatile Hunting Dog Association. Each student/mentee receives a blaze orange hunting hat along with eyewear and ear protection. Birds, targets, and ammunition are provided. As well, a one-year membership to Pheasants Forever is provided. Meals and beverages are also included in the day. The project was delayed due to COVID-19 restrictions and is now planned for fall 2022.

Ross Creek Conservation Site Food Plots Planting

Pheasants Forever Chinook Chapter (PF Chinook)

Grant: \$4,950

Project Code: 015-00-90-273

Project Status: Funded 2019-20; Completed

Funding Priority: 2

The goal of this project is to have a robust food plot, which will provide quality feed for wildlife through the fall and winter ensuring healthy wildlife through this most critical period so that they go into fawning and nesting season in the best condition possible. Winter wheat also provides critical nesting habitat for ground nesting birds. The objective was to plant two food plots totaling 11 acres in winter wheat by early September to take advantage of fall moisture allowing for maximum germination of the seed before freeze up. In late August 2021, seed was purchased, and equipment brought in to disc up the old crop. Once the ground was tilled, the seed was then planted. Fall rains allowed for germination.

Sauder Reservoir Habitat Project

Pheasants Forever Chinook Chapter (PF Chinook)

Grant: \$17,040

Project Code: 015-00-90-274

Project Status: Funded 2019/20 and 2020/21; Completed

Funding Priorities: 1, 2, 6

Project Website: pheasantsforeverchinook.ca/projects/sauder-peninsula-project

The goal of this project was to establish a multi-row shelterbelt, which when mature will filter agricultural chemicals before entering Sauder Reservoir, provide habitat for both ground nesting and shrub nesting birds, provide dense woody cover for ungulates, and replace ten acres of

crested wheat grass to a wildlife friendly grass mixture. The objective is to improve water quality in and downstream of the reservoir which may help improve the fish population, improve upland habitat, increase the population of upland birds and songbirds, and increase the population of deer. Over the last two years, 10,000 shrubs have been planted and watered through the growing season helping to establish a multi-row shelterbelt on land owned by the St. Mary River Irrigation District (SMRID). A secure wildlife friendly fence has been installed and a small parking area built allowing foot access to the property. Unfortunately, due to severe drought conditions, the crested wheat grass was not replaced. The great achievement has been showcasing to the public the working arrangement between ACA, SMRID, and Pheasants Forever.

Wildlife and Native Habitat Enhancement in Red Deer County via ALUS (2021)

Red Deer County (RDC)

Grant: \$40,000

Project Code: 015-00-90-128

Project Status: Funded similar projects since 2006/07; Completed

Funding Priority: 2

Project Website: www.rdcountry.ca/603/ALUS

The project goal is to work with landowners who wish to implement actions on their land to conserve or improve riparian and native range habitat in RDC. The project objectives are as follows: support RDC landowners in enhancing and stewarding riparian and/or native range habitat on their land by providing financial and technical resources for their on-the-ground projects; enhance riparian and native range habitat through various types of ontheground projects completed by participating landowners; and assist landowners in developing an informal "Management Plan" for each of the completed projects. RDC conducts a "call for participants" and asks interested landowners to contact the RDC's Conservation Coordinator. Project plans are developed for each project. RDC and the County's ALUS Partnership Advisory Committee then review submitted project plans and allocate funding to projects. ACA funding goes toward a portion (up to 85 percent for highest priority projects, more commonly 75 percent) of the cash costs associated with each project. The individual landowners are responsible for any other costs to construct, and subsequently maintain/repair their project(s). RDC, and other partners as appropriate, contribute technical expertise to planning the projects, developing ongoing project management plans, etc. For project monitoring and evaluation purposes, RDC (via Cows and Fish) conducts Riparian or Range Health Assessments, and/or establishes formal Photo Monitoring Points, at the beginning of the on-the-ground project. Follow-up assessments come four to five years later, to compare to the baseline condition. RDC works with the landowners during project planning, project construction/installation, and regularly afterwards, to develop, evaluate, and adapt the landowners' project management plans over time. In 2021, 555 ALUS projects were initiated by 31 landowners throughout RDC. These 555 projects impacted 1,061 acres of riparian and/or native range habitat, 14 km of river and stream, and 835 acres of waterbody will be conserved and/or enhanced through sustainable management. Approximately 2,535 animal units will be impacted in the new livestock management regimes.

Youth Pheasant Building Upgrades

Red Deer Fish & Game Association (Red Deer FGA)

Grant: \$3,500

Project Code: 030-00-90-314

Project Status: Funded Pheasant Pen Replacement Program in 2019/20; Completed

Funding Priority: 5

The Youth Pheasant Program started in Airdrie and was taken over by the Red Deer FGA when the Airdrie group was no longer able to continue with the program. The need for a central Alberta location was perfect for Red Deer, with the central location providing better access for Fish and Game clubs both in the southern and northern parts of the province. Over the years, Red Deer FGA have gathered a knowledgeable staff of volunteers, firearms safety instructors, clay shooting coaches, dog handlers, dogs, and game bird and game bird habitat specialists. With the ACA grant this year, Red Deer FGA were able to enhance participant comfort by purchasing a shelter; on cold and windy days, participants were able to get out of the wind and host the safety meeting inside. It made it possible to hang safety rules and donors' information for all participants to see. The grant also supported an electric fence for the pen and water heater, which will allow protection and ensure the birds have water once freezing temperatures come. Due to the landowner passing away and having to relocate the Youth Pheasant Program, some items were purchased but not installed due to fear of theft due to the site's remote location. The Youth Pheasant Program was held every Saturday from September to November with eight to ten kids each day. Most parents were also unfamiliar with hunting and firearms. Introducing parents to firearms as well will be beneficial; if the parents do not get involved it is unlikely for the youth to continue with an interest in hunting and conservation.

Water Testing Kits for Aurora Middle School and Our Lady of Grace School to be Used on Field Trips

Safe Drinking Water Foundation (SDWF)

Grant: \$1,190

Project Code: 002-00-90-235

Project Status: Funded in 2015/16, 2016/17, 2018/19, and 2019/20; Completed

Funding Priority: 6

Project Website: www.safewater.org

This project aimed to provide educational materials for students to enable them to conduct hands-on analyses of water samples. SDWF sought organizations that are willing to sponsor these educational kits for the schools because schools often do not have the funds available to purchase the kits. SDWF worked with the teachers and students at Our Lady of Grace School in Calgary and at Aurora Middle School in Lac La Biche to provide them with materials for their field trips. Students were going to use the kits as part of their participation in the Fish in Schools: Raise to Release program, as they wanted to test the water into which they would release their fish.

They were to study wetland ecosystems and use the kits as part of field trips. Teachers and students were encouraged and supported at Our Lady of Grace School and Aurora Middle School in sharing what they learned with others in their community and in taking action to alleviate drinking water quality issues. On May 17, 2021, one *Operation Water Pollution* kit and eight *Elementary Operation Water Drop* kits were sent to Our Lady of Grace School in Calgary and four *Elementary Operation Water Drop* kits to Aurora Middle School in Lac La Biche.

Ketchamoot Creek Facility Fenceline Update Project

Sherwood Park Fish & Game Association

Grant: \$2,813

Project Code: 015-00-90-294

Project Status: Grant not accepted

Funding Priority: 2

This grant was not accepted due to the impact of the COVID-19 pandemic on the club.

Purple Martin House Replacement Project

Sherwood Park Fish & Game Association

Grant: \$1,400

Project Code: 030-00-90-315

Project Status: Grant not accepted

Funding Priority: 2

This grant was not accepted due to the impact of the COVID-19 pandemic on the club.

Pond Leveler Upgrades

Smoky Lake County

Grant: \$2,376.80

Project Code: 015-00-90-292

Project Status: New; Completed

Funding Priority: 2

The overall goal of this project was to improve four existing pond levelers within Smoky Lake County that would allow for better fish passage and water movement. The old devices had small eight-inch pipe that was not allowing optimal fish passage, so these devices were upgraded to 12-inch pipe to allow for better fish passage. The main activities consisted of removing the old devices and installing the new and improved material. These were some of the first upgrades that Smoky Lake County has done in an attempt to improve the overall beaver management program and they were very successful with these installs. The amount of water moving from these locations without any troubles regarding beaver activity has helped immensely with maintaining the infrastructure (roads) in these areas. Two students from the North Saskatchewan Watershed Alliance joined the Animal Control Technician to do an install and it was a fantastic learning opportunity for them because neither of them was familiar with these devices. This allowed the Technician to teach the students and they actually shared a small amount of information on their social media about Smoky Lake County and pond levelers.

Recovery Strategies for Industrial Development on Native Grasslands in the Mixedgrass Natural Subregion – 2nd Approximation

Southwest Alberta Sustainable Community Initiative (SASCI)

Grant: \$9,460

Project Code: 002-00-90-340

Project Status: New; Extended until March 15, 2023

Funding Priorities: 1, 4, 6

The manual, *Recovery Strategies for Industrial Development on Native Grasslands for the Mixedgrass NSR*, published in March 2014, will be updated and expanded to include current guidance and policy for minimizing disturbance and promoting restoration, and new mitigation tools such as matting, targeted grazing, and erosion control. The scope will be expanded to include new disturbances on the landscape. Content will be sought from literature reviews and subject matter experts. The draft manual will be reviewed by knowledgeable stakeholders including college instructors. The final document will then be developed and produced. Updating the first manual and sister document in the series, *Recovery Strategies for Industrial Development in Native Grasslands for the Dry Mixedgrass Natural Subregion* is progressing slower than expected. Some of the updated content from this document will be transferrable to the second document funded in part by ACA, *Recovery Strategies for Industrial Development in Native Grasslands for the Mixedgrass Natural Subregion*. A draft literature review and draft Ecological Site Restoration Risk Assessment tables have been completed. Transferrable text from the Dry Mixedgrass Recovery Strategies has been completed and reviewed internally.

Bird/Bat Box Project 2021-22

Spruce Grove Fish & Game Association (Spruce Grove FGA)

Grant: \$2,000

Project Code: 030-00-90-255

Project Status: Funded in 2019/20; Completed

Funding Priorities: 2, 5, 6

The objectives of this project are to: 1) educate youth about local wildlife and their life cycles; 2) increase awareness of the Spruce Grove FGA among local youth and their families; 3) expand membership of the Spruce Grove FGA; and 4) increase participation of youth in the Spruce Grove FGA. To this end, the Spruce Grove FGA requested funds to purchase materials and hardware to cut out sufficient songbird nesting box kits to reach approximately 300 children in the Spruce Grove vicinity. The intent was to have the children assemble the boxes with the help of their parents/siblings/friends and place the boxes in locations where they can watch and identify birds using the boxes. A fact sheet and assembly instruction manual were developed to be included with each nest box kit. With COVID-19, classroom visits were not attempted. Because of COVID-19 nothing went as planned and the project was delayed. However, by early December 2021, the club was finally able to get together and purchase the lumber and hardware needed to get the project underway. Two hundred songbird nesting boxes were cut and pre-drilled, 20 duck nesting boxes have been built, and the remaining plywood will be used for bat boxes and additional songbird boxes. As of March 2022, only 20 songbird nest boxes were distributed, mainly at the Onoway Kids Can Catch event. Distribution of the boxes will continue

throughout the spring and summer at local events such as the Picnic in the Park event at the end of June in Spruce Grove. Duck nest boxes will be placed before the ducks return this spring. Bat boxes were distributed in spring 2022. One local landowner contacted the club asking that duck nest boxes be installed on his land.

American Kestrels – Using Nestbox Technology to Increase Awareness and Promote Conservation

STRIX Ecological Consulting Ltd. (Strix Eco)

Grant: \$15,150

Project Code: 030-00-90-311

Project Status: Funded in 2020/21; Extended until Sept. 30, 2022

Funding Priorities: 2, 4, 5, 6

The project objectives are to increase awareness of kestrels and their conservation needs; to use camera monitoring at kestrel nest boxes and GPS trackers to engage people; to promote landowner habitat conservation such as maintaining forest patches and hedgerows in agricultural areas; and to promote citizen science participation. By using nest cameras and GPS trackers, the project will engage Albertans with our local kestrels, their behaviours, and where they travel. Project staff will visit schools in-person or online to deliver curriculum-based presentations in Parkland and Battle River School Divisions about kestrels and their conservation needs and will include the role that hunting/angling/trapping communities play in the conservation and management of wildlife and wild places. Presentations and banding demonstrations will be given at public events. They will also meet with local landowners and people in the communities around the nest boxes to promote conservation and citizen science participation. STRIX Eco deployed nine of the ten satellite transmitters during the 2021 breeding season. Throughout the year, landowners, students, and the public have been involved with this project including directly in the field, presentations online and in-person, and via social media (Instagram). With COVID-19 restrictions lifting, STRIX Eco are hoping to involve more people in the 2022 field season activities, hence the project extension.

Echo Glen Pond Enhancement

Town of Gibbons

Grant: \$38,727.50

Project Code: 020-00-90-288

Project Status: New; Completed

Funding Priorities: 2, 3

The goal of this project was to clean out Echo Glen Pond from excess silt and organic material to create a more habitable environment for fish and wildlife and create a safer and overall better experience for anglers. Increasing depth, adding underlay and liner will prevent excess water loss and improve the water and environment quality. Anglers now have more opportunities compared to the pond's previous structure with more locations to cast off and a larger, deeper pond to fish in. The pond improvement project ACA helped fund was wrapped up in the summer of 2021; however, more beautification to the site is ongoing (e.g., adding trees, park benches, picnic tables, and new signage). Events did not happen due to the pandemic, but the Town of Gibbons hopes to have a great 2022 with a grand re-opening, a Kids Can Catch event, and opening it up to the public for use.

Stream Signage Partnership Project

Trout Unlimited Canada (TUC)

Grant: \$9,000

Project Code: 002-00-90-345

Project Status: New; Completed

Funding Priorities: 2, 5

This Stream Signage Partnership Project was a collaborative effort launched in Alberta by TUC, building on the Fish Habitat Signage program started by Fisheries and Oceans Canada (DFO). Efforts to install signage at stream crossings is intended to establish a widespread and easily recognizable system of signage in Alberta, consistent with those in BC, with signs installed at stream crossings, displaying the following: stream name, stream importance (e.g., “you’re in native trout country”), and protection/value statement (e.g., “species at risk area”). Project activities included the facilitation of sign design, production, site selection, distribution, and installation within participating municipalities. The project produced the following results and achievements: 120 signs designed, produced, and distributed to partner agencies; 22 signs installed at 11 streams, with the remainder scheduled for install during summer 2022; and partnerships established with six rural municipalities and one town. There is continued interest in the project, with expected signage installs continuing throughout Alberta. TUC exceeded the number of signs set as a target to print and distribute to partners, but installations continue to take place as partner capacity allows. A guidance document was also drafted to support future sign installations by partner groups, municipalities, and other interested stakeholders and will be made available through the TUC website. A project map showing the progress of the sign project was also created and is available for anyone to explore at: <https://arcg.is/1KO051>.

Tay River Bull Trout

Trout Unlimited Canada (TUC)

Grant: \$12,665

Project Code: 020-00-90-275

Project Status: Funded similar project in 2019/20; Completed

Funding Priorities: 1, 3, 4, 6

Project Website: www.tucanada.org/2022/02/28/helping-to-restore-albertas-bull-trout

In 2020, TUC partnered with AEP to run a fish trap on the Tay River. Nine bull trout and several other salmonids were implanted with Passive Integrated Transponders (PIT tags). To follow up on this effort, in 2021 the Tay River bull trout project assessed the movement patterns of the tagged bull trout in the Tay River watershed. To accomplish this, four PIT tag arrays were set up throughout the Tay River watershed from August to October 2021. The information gathered from this project will contribute to a growing database of information on bull trout in the Tay River and help inform conservation and reclamation activities in future years. ACA funding of the project was critical in supporting the setup, maintenance,

and takedown of the four PIT tag arrays throughout the duration of the project. Additionally, the ACA funding supported three supplementary angling survey days, which had the goal of capturing and tagging additional fish for the project. The project produced the following deliverables: four PIT tag arrays were deployed and maintained for two months, and five volunteer workdays for array checks were held. In some cases, volunteers were not available, so arrays were checked by staff only. One volunteer workday to PIT tag fish was held in April; three volunteer workdays for supplementary angling sampling/PIT tagging were held between September 12 and 26; and one redd survey volunteer day was held. Thirty students from Old College’s Land and Water program participated in this volunteer day, with each student doing redd surveys for half of their day. One summary report of the data collected from the arrays and the supplementary volunteer angling surveys was completed. A News Stream article was posted Feb. 28, 2022 (tucanada.org/2022/02/28/helping-to-restore-albertas-bull-trout) and shared via social media.

Management of Overgrown Woodlots to Improve Wildlife Habitat

Western Ranchlands Corporation

Grant: \$38,000

Project Code: 015-00-90-293

Project Status: New; Completed

Funding Priority: 2

Since European settlement, natural and aboriginal fire regimes in North America have been suppressed, leading to vast areas of over dense woodlots and forests. The resulting fuel loads are of ecological and human safety concern, and these areas are unable to provide many ecological goods and services as stem densities are too high to support commercially viable timber, canopies are too closed to support vibrant understories, and both above-ground and subsurface carbon-sequestration ceases. Of critical importance to ACA and its stakeholders, structural and nutritional habitat utility for wildlife is severely decreased in these areas as a result. The project objectives are to reduce the risk of catastrophic wildfires (and the associated carbon volatilization) by thinning over dense woodlots and increasing the production of forage for wildlife and livestock, while enhancing human recreational opportunities (including public hunting potential). The project’s main deliverable is a patch mosaic of 600 acres of newly silvo-pastured lands, developed through treated (cleared, heavily thinned, lightly thinned) and untreated areas of various sizes and natural “amoebic” shape configurations designed to encourage biodiversity, and promote species richness through non-linear edge effects. Although two-thirds of the affected area was not previously used for livestock grazing and most of it is not expected to ever be managed for cattle, the principles of silvo-pasture that underlie this project are as relevant to providing habitat for a variety of wildlife as they are to pasturing domestic animals. This project will demonstrate to landowners of all types that the right mix of trees and grasslands creates better wildlife habitat and more of the other things that society wants than virtual monocultures of either trees or fully cleared farms/grassland do. Moreover, it will show that these results can be achieved with relatively little cost to like-minded organizations or landowners themselves.

Alberta Bat Conservation Project

Wildlife Conservation Society Canada (WCS Canada)

Grant: \$20,500

Project Code: 030-00-90-284

Project Status: Funded 2018/19 – 2019/20; Completed

Funding Priorities: 4, 6

Project Website: www.albertabats.ca

The conservation status of bats is deteriorating across Canada because of the cumulative impacts of human activities. One of the most devastating threats has been the introduction of the exotic fungus *Pseudogymnoascus destructans (Pd)* to North America, which causes white-nose syndrome in bats. Having been discovered for the first time in Saskatchewan in 2021, the arrival of this fungus in Alberta is imminent, but its current status and eventual impact is uncertain. Reducing cumulative sources of mortality is imperative to build resiliency in our bat populations if the catastrophic declines seen in eastern Canada were to occur in Alberta. WCS Canada is leading conservation efforts of bats in Alberta through two key projects—the Alberta Community Bat Program and BatCaver Program. Together these efforts are building support for bat-friendly practices among Alberta's public, contributing to bat monitoring initiatives, and filling key knowledge gaps that impede conservation and recovery. During 2021/22, WCS Canada expanded outreach and education by delivering over 37 public events, providing information resources and phone and email support to hundreds of landowners with bat management issues, and building a more engaged public through community science and social media. Well over 100,000 people per year are now being reached through the project's social media presence alone. The project provided Alberta's only large-scale surveillance program for *Pd*, resulting in the sampling of 49 roosts across the province. Through its BatCaver project, WCS Canada visited four caves in Alberta with bats to collect or deploy monitoring equipment—all of these caves were confirmed to support bats because of ongoing work by WCS Canada, including two that are known hibernacula. Through community participation, WCS Canada has built Alberta's largest database of known roost sites, which are not only contributing unique and vital information on important habitats but are now being used to enable multiple applied projects, including one piloted in 2021 examining the exposure of bats to neonicotinoid-based pesticides.

Kids Can Catch

Yellowhead County

Grant: \$1,700

Project Code: 020-00-90-260

Project Status: Funded in 2018/19 and 2019/20; Grant not accepted

Funding Priority: 5

This grant was not accepted due to staffing limitations brought on by the COVID-19 pandemic.

ACA Research Grants

Development and Validation of Environmental DNA Assays for Native Westslope Cutthroat Trout and Bull Trout and Non-Native Rainbow Trout and Brook Trout within the Blackfoot Territory for Citizen Science and Community-Based Monitoring

Blackfoot Confederacy Tribal Council (Kimmie Houle)

Grant: \$32,400

Project Code: 020-00-90-301

Project Status: New; Completed

Funding Priorities: 1, 2, 3, 4, 5

Blackfoot people have always maintained a close connection with the land. Water and water beings are central to their culture and wellbeing. The Blackfoot Confederacy (BFC) seeks to exercise their role as guardians of the East Slopes by engaging in conserving and restoring westslope cutthroat trout and bull trout in the Bow and Oldman watersheds. These watersheds are central to their territory, and the only two east of the continental divide where both species are native. The objective of this project was to develop and/or validate environmental DNA (eDNA) assays for native westslope cutthroat trout and bull trout and non-native rainbow trout and brook trout in the Bow and Oldman watersheds. Sampling eDNA is being used by the BFC as one of multiple tools to assess native trout habitat, and prioritize and evaluate recovery efforts, including conserving and restoring habitat, re-connecting fragmented habitat, preventing non-native trout invasion, and removing non-native fish where possible. As part of the eDNA assay development and validation project, BFC Nation staff partnered with AEP to collect voucher tissue samples from all four species, electrofished to collect additional tissue samples, received training in eDNA sampling and filtration, and sampled eDNA from known occupied sites for all four species. BFC has sampled eDNA at a total of 60 sites throughout the two watersheds. BFC's research partner, Dr. Caren Helbing, and her lab manager and research team, conducted tests to determine eDNA assay specificity and sensitivity, analyzed mitochondrial sequence data, sequenced the mitochondrial genome of brook trout, developed new assays for rainbow trout and brook trout, and validated existing assays for bull trout and westslope cutthroat trout. A set of four species-specific assays are now validated using local tissue samples from Alberta and confirmed to detect target DNA based on samples BFC collected from known occupied sites. These assays are now freely available for use by all biologists working in the Bow and Oldman watersheds.

Comparison of Three Biological Solutions for Enhancing Perennial Grass Productivity and Soil Carbon Sequestration

Concordia University of Edmonton (Dr. Mapfumo)

Grant: \$18,135

Project Code: 015-00-90-301

Project Status: New; Extended until Oct. 1, 2022

Funding Priority: 9

Project Website: concordia.ab.ca/dr-emmanuel-mapfumo-awarded-research-grant-by-alberta-conservation-association

The project goal is to compare three potential biological solutions (fertilization, grazing, and legumes inclusion) for enhancing pasture productivity and soil carbon sequestration on a black chernozemic soil. The project objectives are: to determine if soil carbon in a black chernozemic soil remained at equilibrium under perennial grass; to determine how fast soil carbon can increase or decrease over time when a cultivated chernozemic soil is seeded to perennial grass with or without fertilization or inclusion of a legume, and grazed or hayed; to determine if forage productivity was related to soil nitrogen (from fertilizer or N-fixation) and carbon; and to determine the contributions of aboveground and belowground inputs to the soil carbon and nitrogen balances under perennial grass, perenniallegume mixtures, and annual cereals. As of the final report, statistical analyses of data on forage productivity, soil carbon stocks, total nitrogen, light fraction carbon, and light fraction nitrogen have been completed. A manuscript was submitted to the *Canadian Journal of Soil Science*. A literature review on soil carbon sequestration was prepared by a research assistant. An abstract was accepted for an oral presentation at the Canadian Society of Soil Science/Alberta Soil Science Workshop conference on May 23–27, 2022. The key results show that unfertilized grazed perennial grass produced similar yields to fertilized grazed perennial grass. Nitrogen fixation of 82 kg/ha occurred in mixtures of alfalfa and perennial grass. These findings are in the manuscript submitted to the *Canadian Journal of Soil Science*. Between 2008 and 2012, grazed treatments had average increases in soil carbon of 0.75 milligrams carbon/hectare (mg C/ha). Haying treatments had average decreases in the soil carbon of 0.45 mg C/ha. From 1994 to 2012, soil carbon under perennial grass remained constant over time and averaged 87.7 mg C/ha, whereas soil carbon under annual cereal (barley used for silage) averaged 76.2 mg C/ha.

Evaluating Recall and Selection Bias in Activity Survey Apps Versus Traditional Surveys for Conservation and Economic Valuation from Recreation

University of Alberta (Dr. Adamowicz)

Grant: \$36,000

Project Code: 015-00-90-283

Project Status: Funded in 2020/21; Completed

Funding Priorities: 5, 8

The project goal is to answer the question: Does the Alberta Hunt Log app (ABHuntLog) reduce recall and selection bias compared to traditional recall surveys? Recall bias is when participants do not remember previous experiences accurately. Selection bias is when a non-random sample of individuals responds to a survey, resulting in a nonrepresentative response. The first objective is to collect the activity data required to estimate the economic value of hunting in Alberta

using two different approaches, from ABHuntLog and from traditional end-of-season recall surveys. The second objective is to evaluate recall bias by comparing data from ABHuntLog users to data from those who complete the recall survey at the end of the season. The research team will determine if recall bias results in different numbers of reported trips, and therefore different estimates of the value of hunting. The final objective is to evaluate selection bias by comparing the demographics of those who use the ABHuntLog to those who complete a traditional recall survey, as well as both these groups to the overall hunter population. This approach illuminates potential selection bias associated with demographics and suggests how it might impact valuation estimates. With respect to recall bias, the results suggest ABHuntLog users underreported trips using the app. ABHuntLog users reported an average of 4.2 trip-days via the app, whereas ABHuntLog users who also completed the traditional recall survey reported an average of 12.7 trip-days via the recall survey. With respect to selection bias, the app and recall survey groups both match up well to the overall hunter population for gender and income distributions. The geographic representation of the recall survey group is close to that of the overall hunter population, whereas the ABHuntLog group is more heavily comprised of hunters from Edmonton and Calgary. The age group frequency of ABHuntLog users is close to that of the hunter population, whereas the traditional recall survey group is skewed towards older hunters.

Sustaining Access and Social License for Hunting in a Mixed-Use Conservation Site: A case study in the Cooking Lake-Blackfoot PRA – Year 2

University of Alberta (Dr. Harshaw)

Grant: \$23,565.60

Project Code: 015-00-90-284

Project Status: Funded in 2020/21; Completed

Funding Priority: 8

The potential for conflict between hunters and non-hunters poses threats to the continued access for hunting at public mixed-use sites in the province. Understanding and characterizing the potential for conflict at the Cooking Lake-Blackfoot Provincial Recreation Area (CLB PRA) will help to identify sources of conflict before they become major issues. This research proposes to investigate the ways that hunters and non-hunters are sharing the landscape in the CLB PRA east of Edmonton. Three objectives framed this research: 1) investigate how hunters and non-hunters share the landscape at CLB PRA, and the current state of, and potential for, interpersonal and social values conflict between hunters and non-hunters in the PRA; 2) understand the underlying drivers of conflict at the CLB PRA using an established framework that has been consistently applied to recreation conflicts, including hunting; 3) determine whether visitors' and managers' perceptions of site use levels and concerns for safety are supported by empirical data of recreation effort, and intensity of firearm use. Data was collected from 309 hunters that had discharge permits for Wildlife Management Unit 936 and from 174 non-hunting CLB PRA visitors. Preliminary analyses suggests that non-hunters reported higher levels of conflict than hunters did (evidence of asymmetrical conflict); non-hunters reported higher levels of conflict with non-hunting situations than with the three hunting situations. The generally low levels of conflict between hunters and non-hunters provides evidence that hunters and non-hunters are able to share the landscape in the CLB PRA.

Post-Harvesting Biodiversity Recovery Curves for Boreal Forests

University of Alberta – Augustana (Dr. McIntosh)

Grant: \$21,600

Project Code: 015-00-90-300

Project Status: New; Extended until June 30, 2022

Funding Priority: 2

Alberta's boreal forests are dynamic landscapes containing biodiversity which is altered by natural and human-caused disturbances. Since timber harvesting is one of the dominant disturbances in these forests, understanding post-harvest biodiversity recovery is critical for sustainable management of these forest landscapes. The main project objective was to develop biodiversity recovery curves for harvested boreal forests and compare them among various biotic groups. To achieve this objective, a systematic review of literature was first conducted. The research team identified 487 research papers that appeared to have appropriate data. Further screening of these articles for inclusion in this study (e.g., forest type, mature forest comparator, replication) resulted in 264 articles remaining. Attempts were then made to contact article authors and asked them to provide datasets to include in development of the biodiversity recovery curves. After reviewing the potential datasets for each taxa, the researchers focused on biodiversity recovery of the following taxa: understory plants (vascular, non-vascular), lichens, birds, small mammals, and arthropods (collectively and separated into beetles and spiders). Within these taxa, 82 datasets were received. Existing datasets from the Ecosystem Management Emulating Natural Disturbance (EMEND) project were also used. Each dataset has/is being formatted and Chao-Jaccard similarity indices are being calculated, between harvested and unharvested reference sites, for each of the datasets to compare community composition recovery among taxa and forest types using linear regression or generalized additive mixed models (GAMMs). Analyses are still in progress (thus far preliminary analyses of the EMEND data and data on beetles from the larger dataset collection have been completed). Preliminary results have been presented to the Government of Alberta and at two scientific conferences. The final findings will be published in a peer-reviewed open-access journal in fall 2022. The research findings can then be used to inform the Biodiversity Management Framework, sustainable resource development, land use planning, and cumulative effects management, while simultaneously contributing towards conservation and enhancement of Alberta's forest habitat that is used and enjoyed by Albertans, including hunters, anglers, and trappers.

Indigenous Co-Led Reclamation Project

University of Calgary (Dr. Gerlach)

Grant: \$14,850

Project Code: 015-00-90-302

Project Status: New; Extended until Sept. 1, 2022

Funding Priority: none

Local Indigenous communities lack confidence in the Alberta oil sands industry's ability to reclaim impacted lands that meet their expectations for the environmental quality required to support their traditional land use activities within the boreal forest. In

part, this is a response to the industry not adequately considering social and cultural elements during conservation, reclamation, and closure planning, like it does technical environmental and economic elements. Even though "social closure"—the practice of managing closure-related socioeconomic and cultural impacts—is recommended by international mine closure principles, mine closure good practice documents, and international legislation. While these international instruments identify intended closure outcomes, the tools and processes to support effective communication, understanding, and decision-making between industry and local communities do not yet exist. This research focuses on developing and applying a new approach to conservation, reclamation and closure, termed collaborative reclamation ("co-reclamation"), at an oil sands mine in northeast Alberta and evaluating its ability to meet the needs of both an Indigenous community and an oil sands company. Using a participatory action research approach, they will collaboratively make landscape design decisions, which incorporate both scientific and Indigenous knowledge, during each phase of conservation, reclamation, and closure planning. The intent is to: enhance reciprocal learning in land stewardship between conservation and reclamation scientists, and boreal forest land users; advance development of social reclamation and closure processes and tools; improve relationships and trust; and support the boreal ecosystem conservation and reclamation landscape outcomes being acceptable to both industry and local Indigenous Peoples. Due to provincial and Fort McKay First Nation COVID-19 restrictions and COVID outbreaks in the Hamlet of Fort McKay, the Co-Reclamation project team pushed the travel for a final validation workshop in Fort McKay back several times. This was to keep both vulnerable community members and academic health top priority and to comply with restrictions. Research continued remotely where possible with three employees and one community members of Fort McKay who have been readily available remotely throughout the pandemic. However, many other Fort McKay co-researchers, most of whom are Elders, did not have the videoconference technology and/or IT support in their homes to participate. Hence, a final validation workshop with all the Fort McKay co-researchers is scheduled for summer 2022. The doctoral student will present draft results and recommendation for validation and optimization prior to finalizing her thesis. She will also conduct a close out survey to evaluate if a co-reclamation approach and its associated tools improved trust and relationships. Additionally, the research team plans to co-present the project results at the 39th American Society Reclamation Science Annual Meeting, June 12–14, 2022, in Duluth, Minnesota. A traditional knowledge holder and the director of the Fort McKay sustainability department will co-present with the doctoral student. The abstract entitled "A 'Two-Roads Approach' Evaluation of Oil Sands Mine Closure Plans for Traditional Land Uses" has been accepted.

Publication: Daly, Christine, Jean L'Hommecourt, Bori Arrobo, Alexandra Post, Daniel McCarthy, Gillian Donald, S Craig Gerlach, and Dr. David Lertzman. 2022. "Gesturing Toward Co-Visioning: A New Approach for Intercultural Mine Reclamation and Closure Planning." *The International Journal of Architectonic, Spatial, and Environmental Design* 16 (1): 11-32. <https://cgscholar.com/bookstore/works/gesturing-toward-covisioning>

Evaluating the Impact and Uptake Pathways of Municipal Wastewater Effluent on Benthic Macroinvertebrates in the Bow River Basin

University of Calgary (Dr. Wrona)

Grant: \$30,555

Project Code: 020-00-90-303

Project Status: New; Completed

Funding Priorities: 3, 4

This project focuses on addressing a key knowledge gap related to typifying the spatial patterns and magnitude of change in benthic macroinvertebrate food web biodiversity in the Bow River. Between May and November 2021, sampling at key sites aimed to delineate potential reach-specific and cumulative impacts of municipal wastewater effluents and tributary inputs in the Bow River in Canmore and the City of Calgary. Sampling sites were designed to identify representative reaches of the river on a longitudinal disturbance gradient, with a particular focus on wastewater treatment plant inputs, due to concerns regarding increased effluent volume, presence of pharmaceuticals and personal care products in treated effluent, and the potential for nutrient-contaminant interactions. Food web biodiversity is being assessed through conventional community metrics, but also through a focus on functional ecological traits, such as the presence/absence of various functional feeding groups along the longitudinal gradient. Trophic and functional relationships will also be constructed from carbon and nitrogen stable isotopes analysis of the relevant autotrophs (periphyton, riparian vegetation) and macroinvertebrate communities. This project also includes a review of available historical data of benthic invertebrate communities, production, and physical and chemical conditions in the study area. Also crucial to the development of an improved monitoring program for the Bow River is the testing and comparison of various sampling methodologies. This project assesses the use of passive and rapid sampling techniques for benthic macroinvertebrates (kicknets, environmental DNA [eDNA], and artificial substrate rock baskets), periphyton (area delimited scrapings, whole rock scrapings, and artificial substrate scrapings from rock baskets), and for water chemistry (grab samples and long-term probes). Developing a better understanding of potential stressors is crucial to evaluating how increased anthropogenic activity (e.g., expanding population growth) affects the aquatic health of the Bow River/South Saskatchewan watersheds and to provide information necessary to inform possible management/mitigative options. Sample collection for the 2021 season is fully completed. Sampling planned for 2022 will occur on a much smaller and more specific scale to complement a larger campaign completed in 2021. Traditional invertebrate taxonomic identification is underway, with significant progress made on samples from May and November 2021. At the time of the final report, samples for eDNA processing had been submitted, but results not yet received back from the analyzing laboratory. It is expected that the analysis from this project, and corresponding thesis will be completed in December 2022. Associated manuscripts will then be targeted to be submitted for peer-review by June 2023. Overall, sample collection and processing are developing as intended, although not yet complete.

Causes and Consequences of Eutrophication in the Twin Valley Reservoir

University of Lethbridge (Dr. Bogard)

Grant: \$24,669

Project Code: 020-00-90-302

Project Status: New; Extended until Dec. 31, 2022

Funding Priorities: 4, 12

As a key site for recreation and angling in southern Alberta, the Twin Valley Reservoir (TVR) provides services that support diverse user groups (recreational, municipal, industrial, non-profit). Despite being the newest reservoir constructed in Alberta, the TVR receives excess nutrient inputs from the upstream Little Bow River watershed, which has caused the degradation of fish habitat and source water quality for regional communities. The project addresses three uncertainties to guide the remediation, management, and protection of aquatic habitats in the TVR and the upstream river network. First, a year-long watershed sampling effort will be conducted to construct a nutrient budget at sites above the TVR and at its outflow. This budget will enable the identification of upstream source (non-point agriculture versus point effluent loading) and internal recycling fluxes of nutrients. Second, seasonally resolved surveys of algal community and cyanobacterial toxin abundance across the TVR will be used to map the extent of harmful algal bloom proliferation, and the key limnological predictors of harmful algal growth will be identified. Third, the researchers will quantify whether eutrophication of the TVR is causing dissolved oxygen losses that degrade habitat and stress the food web of the TVR. The extent of benthic anoxia in the TVR will be defined, anoxia linked to algal growth and limnological conditions, and sensor deployments used to model temporal patterns of oxygen cycling. In addressing these issues, actionable information will be provided to inform and guide the conservation of aquatic resources in the TVR and its watershed.

The component of the project involving the nutrient budget for TVR is advancing well. Most data are in place and analyzed, and writing of the manuscript has started. The researchers are waiting on cleaned, finalized discharge data from AEP for a few sites. With those data, nutrient flux analyses for the reservoir can be completed, and the paper finished in spring 2022. The harmful algal bloom surveys and biomass analyses are near completion for the 2021 ice free season. This portion of the research was expanded from the TVR to the entire Upper Little Bow River network, so once in hand the patterns of algal bloom development and toxicity will be understood for the entire watershed. This manuscript is part of the graduate student's thesis and will be prepared in the fall 2022 and likely ready for publication in 2023. The oxygen budget and metabolism of the TVR is the portion of the project that is delayed. The researchers were unable to complete the full annual cycle of oxygen measurements, in part because the sensor deployed in the reservoir was vandalized, and now because of inability to sample under ice in February when ice conditions are safe (due to strike action at University of Lethbridge). This latter delay will impact the timing, but not the quality of data collected.

Ecological Epidemiology of Emerging *Ambystoma tigrinum* Virus (ATV) in a Population of Tiger Salamanders in Southwestern Alberta

University of Lethbridge (Dr. Goater)

Grant: \$9,000

Project Code: 030-00-90-285

Project Status: Funded since 2018/19; Completed

Funding Priority: 6

The aim of our research is to understand variation in transmission dynamics for a lethal emerging virus (*Ambystoma tigrinum* virus [ATV]) of threatened tiger salamanders in southwestern Alberta. One objective of this long-term research is to combine annual assessment of larval salamander demographic characteristics with assessment of ATV transmission rates. A second objective is to evaluate if the observed variation in annual salamander mortality is caused by annual variation in host condition, annual variation in ATV virulence, or both. Dr. Goater and his research team have been monitoring salamander demography and ATV infection dynamics in Livingstone Lake in southwestern Alberta since 2012. It is one of the longest running monitoring programs for an emerging disease of amphibians in the world. Larval salamanders are collected in live traps during the start, middle, and end of their larval period. During each collection, individual rates of larval development, and ATV induced pathology are assessed. Prior to release of the larvae, a 'tail-clip' is removed in each individual for later assessment of ATV infection. The current funding was to complete salamander population monitoring and ATV diagnostics work during the 2021 field season. The results from year nine (2021) of this monitoring program were striking. For the first time, infected larvae were not detected in the salamander population. This result has key conservation implications since the local extirpation of ATV will likely enhance salamander population size. Yet caution is advised because this low-transmission year coincided with the lowest salamander densities observed over the nine-year period. The nine-year data set indicates that years in which ATV occurs in every individual in the lake (2014, 2017, 2019) tend to be followed by a year (or two) with much lower transmission rates and the host population recovers.

Genomic Data to Inform Long-toed Salamander Reintroduction

University of Lethbridge (Dr. Lee Yaw)

Grant: \$19,800

Project Code: 030-00-90-317

Project Status: New; Completed

Funding Priorities: 1, 2, 3

Recovery plans for vulnerable taxa increasingly call for species reintroductions. Incorporation of genomic data into the selection of source populations for these efforts may improve the success of such programs by ensuring that introduced individuals are genetically matched to local conditions and have sufficient genetic variation to avoid inbreeding depression. Long-toed salamanders are a species of *Special Concern* in Alberta. Waterton Lakes National Park (WLNP) is planning to reintroduce the species to several high-elevation sites in southwestern Alberta where it was extirpated as a result of historic fish stocking. The current project aims to provide genomic data to guide

source site selection for this effort. Towards this end, 746 tissues samples were collected from 40 putative source populations in WLNP and in the Castle parks. Genomic data is being generated from these samples and from previously collected samples to the north to assess: a) the genetic relatedness of populations in WLNP to populations elsewhere in the province; b) genetic differences between high- and low-elevation sites; and c) levels of genetic diversity at putative source sites. The results to date confirm that populations in WLNP belong to a different genetic subspecies than populations in the other Rocky Mountain parks in Alberta. Thus, protecting the genetic integrity of populations in WLNP requires sourcing individuals from within or adjacent to the park. The project results also point to substantial genetic differences between high- and low-elevation populations within WLNP, despite the close proximity of sites in the park. This result raises the potential for there to be local adaptation with respect to elevation. Thus, sourcing individuals from sites that are matched in elevation to the reintroduction sites may be critical for establishment success. Further analysis of the data will reveal information about the genetic health of populations in the park and will thus inform recommendations as to how many and which sites are genetically appropriate sources for the planned reintroductions.

Testing the Effects of Recreational Trails on Plant Communities, Rare Plants, and the Spread of Invasive Plant Species

University of Lethbridge (Dr. McCune)

Grant: \$20,317.50

Project Code: 015-00-90-282

Project Status: Funded in 2020/21; Completed

Funding Priorities: 2, 5

The Castle Region (Castle Provincial Park and Castle Wildlands Provincial Park) is a provincial hotspot for biodiversity. It is also a popular area for recreation, resulting in the proliferation of trails and roads. The project objectives were to measure the effects of recreational trails and roads on plant diversity and composition, and on the presence of exotic species and provincially rare species. The plant communities were surveyed in 118 transects extending perpendicular from trail edges throughout the Castle Region and 24 transects far from any trail. Statistical models were used to examine the effects of distance from trail, vegetation type, and trail usage type on plant species richness, community composition, presence of exotics, and presence of provincially rare species. A species distribution model was built and tested for the rare genus *Botrychium* (moonworts) by searching 24 50x50m cells. Results show that plant species richness increases near hiking and off-highway vehicles (OHV) trails but declines near road edges. Shifts in community composition moving towards a trail are greater for OHV trails and roads than for hiking trails. Exotic species are more likely to occur near trail edges and extend farther away from the edges of OHV trails and roads than they do from hiking trails. The occurrence of provincially rare species does not vary with distance from a trail edge, or with the type of trail. Moonworts were discovered in seven of the 24 off-trail grid cells. Although the cells with moonworts tended to have higher predicted habitat suitability, this difference was not statistically significant. Trails and roads have a significant impact on plant communities in the Castle Region. OHV trails are associated with greater shifts in community composition near trails and spread of exotic species farther away from trail edges compared to more lightly used hiking trails. However, the occurrence of provincially rare species is just as likely near OHV trails as near hiking trails.

Predicting Hazard from Chemical Pollutants Associated with Coal Mining to Threatened Alberta Westslope Cutthroat Trout and Bull Trout

University of Lethbridge (Dr. Wiseman)

Grant: \$22,050

Project Code: 020-00-90-304

Project Status: New; Project extended until Dec. 31, 2022

Funding Priority: 1

It is probable that the Rocky Mountains and Foothills of Alberta will experience a resurgence in coal mining. Coal mining can release polycyclic aromatic hydrocarbons (PAHs) and other pollutants to the surrounding environment. This has raised concern that local fishes might be impacted, including westslope cutthroat trout (*Oncorhynchus clarkii lewisi*) and bull trout (*Salvelinus confluentus*) which are listed as *Threatened* under the federal *Species at Risk Act*. Sensitivities of these fishes to PAHs is unknown which prevents assessment of the hazard. Standard toxicity testing is conducted using large numbers of animals, but this approach is not practical for threatened species. Therefore, this project will assess the sensitivities of these species to PAHs using 21st century advances in predictive toxicology which are amenable to use with threatened species because only nonlethal samples are required (e.g., fin clip). This research will use an *in vitro* Ah receptor transactivation assay to predict the sensitivities of westslope cutthroat trout and bull trout to priority PAHs relative to three potential surrogate species. The surrogate species most similar in predicted sensitivity to westslope cutthroat trout and bull trout will be selected for chemical toxicity testing of PAHs using embryo microinjection to support the predictions. Binary mixture toxicity testing will also be performed to determine whether PAHs cause additive toxicity in conjunction with another priority pollutant, selenomethionine (Se). These predicted hazard data can be considered in the AEP Cumulative Effects Assessment Joe Model to inform the severity of reduced water quality on threatened salmonid populations from resurgent coal mining. The project has been delayed due to complications with staffing. The project deliverables should be largely completed by fall 2022. The research team plan to publish two manuscripts: manuscript one will describe sensitivity of native species of fishes to PAHs, as determined from *in vitro* and *in vivo* bioassays with PAHs, and manuscript two will describe effects of co-exposure to PAHs and Se.

Effects of Unpredictable Industrial Noise on Species at Risk and Nest Predators in Alberta

University of Manitoba (Dr. Koper)

Grant: \$23,400

Project Code: 030-00-90-318

Project Status: New; Completed

Funding Priority: 1

Grasslands are an endangered habitat that experience high levels of fragmentation, especially with increasing energy development, which generates harmful noise pollution that negatively impacts wildlife behavior, habitat use, and movements. Grassland songbirds are particularly affected by noise pollution due to their reliance on acoustic communication to send and receive important signals to conspecifics. This may help to explain why grassland songbird populations are in steep decline as habitat continues to be fragmented and lost and many are classified as species at risk. As part of a long-term study, researchers in the Koper Lab at the University of Manitoba are studying the impact of oil and gas well extraction noise on the grassland ecosystems of southern Alberta. This project builds on this body of work by focusing on impacts

of unpredictable noise on grassland songbird abundance, nesting, and nestling body condition. To evaluate the impact of unpredictable noise on grassland songbirds, an experimental setup was designed that uses playback of different types of oil extraction noise including intermittent drilling, chronic screw pump noise (a type of well), and screw pump experimentally manipulated to play unpredictably, as well as controls. This will allow the researchers to determine whether the reason that earlier research found a greater impact of drilling noise than well noise is because drilling noise is unpredictable. Grassland songbird abundance was measured, and nests tracked over the breeding season in the presence of these noise types to determine how different types of playback recordings impact birds to compare the impacts of chronic and unpredictable noise. Previous years' research found that chestnut-collared longspurs avoided intermittent drilling noise. Preliminary results from 2021 data show that birds may be impacted by unpredictable noise, as chestnut-collared longspur abundances declined with distance away from the noise source. Chestnut-collared longspurs also avoided chronic noise sites, which suggests that they may be sensitive to the presence of noise regardless of its predictability. Chestnut-collared longspurs nest success was not impacted by noise type. Another field season is recommended to increase power. Determining whether the negative impacts of drilling noise results from its unpredictability will help to improve the effectiveness of Canadian environmental regulations and industrial Best Management Practices.

Evaluating Bull Elk Reproductive Success Using a Wild Pedigree Model

University of Montana (Dr. Hebblewhite)

Grant: \$33,576.30

Project Code: 030-00-90-319

Project Status: Funded since 2017/18; Completed

Funding Priority: 7

Project Website: www.umt.edu/yahatinda

The project goal is to develop the first wild pedigree of the Ya Ha Tinda (YHT) elk population to investigate new research questions associated with this long-term elk project: 1) determine the reproductive success of female elk and compare results between their wild pedigree analysis and their integrated population model (IPM); 2) test whether elk are more likely to adopt their mother's migratory tactic; and 3) determine the reproductive success of male elk and the effect of individual age and trophy quality on male reproductive success. To reach the research objectives, in 2021–2022 the research team continued to track male and female elk and their migratory tactics, monitor elk survival, monitor male elk fall harvest and trophy condition, conduct cow–calf resights, and investigate mortalities. Twenty-seven new GPS-collars were deployed on female elk in March 2022 and at the time of the final report biopsy darting was carried out to obtain ~40 samples of the 2022 juvenile elk cohort. After significant COVID-19 related delays, the previously collected elk blood and biopsy samples were transported through customs for processing at the University of Montana. Working with project partners, DNA extractions and concentrates were successfully completed, unique genotypes from these samples were identified, and genomic sequencing of the first set of 96 samples of calves from the 2020 cohort and their putative parents completed. The viability and efficacy of these research protocols for collecting samples from elk, extracting and concentrating DNA, identifying unique genotypes, and successfully running the specialized genotyping microarray (BeadChip) were established and confirmed. The researchers expect to complete the first ever wild pedigree of the YHT elk population in 2022 or 2023 to answer their overall research questions. Results from this research will provide managers tools to evaluate different harvest scenarios for elk at YHT and beyond.

ACA Grants in Bioersivity

Summaries for projects funded April 1, 2019 – March 31, 2021; funding was extended due to COVID19.

The effect of habitat connectivity on genetic rescue potential in the alpine butterfly *Parnassius smintheus* Doubleday (Lepidoptera: Papilionidae)

University of Western Ontario

Student (Program): Andrew Chaulk (PhD)

Supervisor: Dr. Nusha Keyghobadi

Project Status: Funded April 1, 2019 – March 31, 2021; Extended

Scientific reporting expected fall 2022.

How Many Mites Can Dance on a Pin-feather?

University of Alberta

Student (Program): Andrew T. Cook (PhD)

Supervisor: Dr. Heather Proctor

Project Status: Funded April 1, 2019 – March 31, 2021; Extended

At least half of the world's described species are symbionts, organisms that use their hosts for both resources and habitat. Despite this, there are large gaps in our knowledge of the basic biology of many symbiont groups. Feather mites are small symbiotic arachnids that live on or in bird feathers and include a subgroup of vane-dwelling mites found on the surface of the flight feathers, the long rigid feathers of the wings and tails that give birds their ability to fly. Most work on feather mites has focused on describing new species. How vane mites utilize their hosts' plumage and the potential selective pressures on mite morphology are relatively unexplored. In my ACA-funded research, I attempted to answer two major questions: 1) do mites follow a pattern known as Harrison's rule, where larger hosts have larger symbionts? and 2) what are the spatial and temporal patterns of feather occupation within and between feathers of the wing?

My results show that feather mites on Albertan passerine hosts follow Harrison's rule—larger mites on larger birds. I also found that mite abundance on exposed flight feathers is highest at sunrise and drops precipitously within an hour of daylight. In combination with observations of mite gut contents, this temporal shift in mite abundance adds to a growing body of literature that shows mites likely use the wing's surface during the night when their hosts are asleep and then retreat from flight feathers during daytime.

Ground Beetle Dynamics: Natural enemies of pea leaf weevil, *Sitona lineatus*, in pulse agroecosystems in central Alberta.

University of Alberta

Student (Program): Maggie MacDonald (M.Sc.)

Supervisor: Dr. Maya Evenden

Project Status: Funded April 1, 2019 – March 31, 2021; Extended

The pea leaf weevil (PLW) is an invasive pest of pea and faba and is currently undergoing range expansion on the Canadian Prairies Provinces. Various tactics have been investigated for population management; however, there is no overall integrated pest management (IPM) program to manage PLW sustainably. Adult PLW activity can be monitored using baited pitfall traps, but trap capture includes arthropod bycatch that can be used to identify the presence of natural enemies. Conservation and promotion of natural enemy biodiversity, activity, and habitat may contribute to PLW population management in Alberta. My research assessed various components and processes at the regional and local scales that influence the success of ground beetles as natural enemies in pulse crops. I sampled ground beetle assemblages in 151 pea and faba fields in Alberta over a three-year period. I identified over 20 species of ground beetles in pea and faba agroecosystems. Ground beetle abundance and diversity differed by region, with *Pterostichus melanarius* (Coleoptera: Carabidae) as the most abundant species collected. I then tested the role of *P. melanarius* as a potential predator of PLW under lab conditions by performing predatory bioassays with various densities of adult PLW. Preliminary results suggest that when starved, *P. melanarius* readily predated and consumes PLW adults. To understand trophic interactions of ground beetles, I collected live *P. melanarius* in pea and faba fields over a two-year period to perform molecular gut content analysis (MGCA) to determine arthropod prey. My research will help make recommendations for conservation biological control using ground beetles and assess trophic interactions and food webs involving ground beetles in pulse agroecosystems in Alberta.

Spatial Distribution and Factors Affecting Human Caused Cougar Mortality in Alberta

University of Alberta

Student (Program): Alexa MacPherson (M.Sc.)

Supervisors: Dr. Andrew Derocher, Dr. Mark Edwards, Paul Frame.

Project Status: Funded April 1, 2019 – March 31, 2021; Extended

Cougars (*Puma concolor*) are subject to mortality through hunting, vehicle collisions, incidental trapping, landowner kills, or natural causes. Little research has focused on how anthropogenic features affect the spatial distribution of cougar mortalities, specially by mortality type, age, and sex. Therefore, the objectives of my study were to 1) describe the driving factors of cougar mortalities and how age and sex affect mortality, and 2) examine the spatial relationships between mortality type and landcover. To conduct this research, I used cougar registration data from 2016–2019 from the province of Alberta to determine locations of deceased cougars to evaluate spatial relationships of mortality with anthropogenic, landscape, and terrain features.

My results showed that 1) cougar mortality was concentrated in WMUs 332 and 312 and hunting was the driving source of mortality with a bias towards adult males. In addition, my research found that 2) there are spatial relationships between mortality type and landcover that vary by cause of death. I found that hunting mortality was best explained by close distances to water bodies, rugged terrain, and away from agricultural areas. Cougar mortality due to landowners (for example, landowners may kill cougars due to risk of their livestock) was best explained by close distances to industrial and agricultural areas in less rugged environments. Trapping mortality was best explained by close distances to water, in forested areas, and away from linear features like roads and trails. Lastly, road mortality was best explained by cougar road crossing locations adjacent to water bodies in forested areas. Understanding how habitat features influence mortality across the landscape is important because this information will provide insight into reducing human-wildlife conflict, mitigating unnecessary cougar mortality, and lastly, developing harvest regimes at the meta-population level under source-sink dynamics.

The Influence of Larval Diet and Microsporidian Infection on Life History Traits of the Forest Tent Caterpillar, *Malacosoma disstria* Hübner (Lepidoptera: Lasiocampidae)

University of Alberta

Student (Program): Flavio Preti (M.Sc.)

Supervisor: Dr. Maya Evenden

Project Status: Funded April 1, 2019 – March 31, 2021; Extended

The forest tent caterpillar (*Malacosoma disstria*) is an important ecological disturbance factor affecting trembling aspen (*Populus tremuloides*) ecosystems in Alberta and across North America. The forest tent caterpillar undergoes cyclical fluctuations in population densities, resulting in reoccurring outbreaks—sudden increases in population density over a short period of time. Feeding damage by larval populations at outbreak densities can cause extensive defoliation of aspen, which may lead to reduced tree growth and increased mortality. In turn, this results in quantifiable ecological and economic damage. My research set out to better determine which mortality agents play a role in dictating population dynamics of this pest. Specifically, I explored how microsporidia infection—intracellular parasites with transmissible spores that cause sublethal disease—and larval diet interact to affect development and adult traits of the forest tent caterpillar. I used two larval diets: 1) artificial diet and 2) artificial diet supplemented with one percent lyophilized trembling aspen foliage. Moreover, I assessed three levels of infection: none, low, and high.

Interestingly, microsporidian infection and larval diet did not interact to influence population dynamics of the forest tent caterpillar. However, they caused individual effects on its development and adult traits. Microsporidian infection significantly reduced the proportion of pupae that were able to produce a cocoon, likely as a result of impaired silk gland function. On the other hand, the supplementation of trembling aspen in artificial diet caused an

increase in development time, likely as a result of aspen's secondary metabolites—compounds associated with chemical defense against herbivory. Lastly, resource allocation between dispersal and reproduction were affected by both infection and larval diet. Even though microsporidian infection did not influence insect-diet interactions, I provide further evidence that these factors work in concert, but not interactively, to affect forest tent caterpillar development and adult traits, with implications as drivers of population dynamics.

Investigating Stability of an Avian Hybrid Zone

University of California, Riverside

Student (Program): Daniel Pierce (PhD)

Supervisor: Dr. Alan Brelsford

Project Status: Funded April 1, 2019 – March 31, 2021; Extended

Shifts in species' ranges can be a directly observable consequence of environmental change. In particular, changes in the position of a hybrid zone can mediate long-term evolutionary effects of short-term ecological disturbance. I set out to determine if the position of a hybrid zone between two subspecies of a boreal forest songbird (Audubon's and Myrtle yellow-rumped warblers) has shifted since data were last collected in 2005–2007. I also aim to test whether the shift is related to the impact of the mountain pine beetle outbreak that has caused extensive damage to the habitat of these birds. I successfully captured, sampled, and released 618 yellow-rumped warblers, primarily from two transects that cross the hybrid zone. My preliminary comparison of contemporary and historical plumage color data from sites within the hybrid zone show that, in the three most northern transects, populations have become more Myrtle-like. In contrast, my southernmost transect through Kananaskis country shows that hybrid populations have become more Audubon's-like. These results suggest that the hybrid zone is dynamic and may be influenced by ecological factors like the mountain pine beetle outbreak. I have nearly completed sequencing genomes of each of the birds sampled for this project and am excited to re-examine these patterns using the higher precision data that our genetic sequences will yield.

Influence of Climate on Columbian Ground Squirrel Hibernation Energy Budgets

University of Saskatchewan

Student (Program): Rebecca E. Smith (M.Sc.)

Supervisor: Dr. Jeffrey E. Lane

Project Status: Funded April 1, 2019 – March 31, 2021; Extended

In the Rocky Mountains, future climate change is expected to increase average annual temperatures and total precipitation. Columbian ground squirrels (*Urocitellus columbianus*) spend eight to nine months hibernating and the rest of the year reproducing and rebuilding the body fat stores they need to re-enter hibernation. Climate change may challenge Columbian ground squirrels to maintain positive energy budgets (i.e., body mass) due to 1) their

limited window to regain body mass in the summer and 2) their long hibernation periods with no access to food in the winter. I tested these two hypotheses by manipulating the pre-hibernation body mass—through supplemental feeding—and hibernation conditions—by building snow fences—of two samples of female ground squirrels. I found that females with higher body mass prior to hibernation maintained a slightly warmer body temperature over winter, which presumably helped them mitigate some of the negative physiological side-effects of hibernation (e.g., reduced immunocompetency, oxidative stress, etc.). In contrast, the fenced treatment, which developed deeper snowpack over their hibernation burrows, were relatively unaffected by the addition of snow. Analysis of long-term weather and trapping data confirmed these findings. Overall, female ground squirrels were less sensitive to the effects of winter weather on hibernating conditions than they were to the effects of summer weather on available feeding time and their ability to accumulate pre-hibernation body fat stores. Understanding how climate affects Columbian ground squirrels' hibernation energy budgets will be key to predicting their response in future climate change scenarios.

Combined Effects of Microplastics and Cadmium on the Freshwater Leech

University of Lethbridge

Student (Program): Lauren Zink (M.Sc.)

Supervisor: Dr. Gregory G. Pyle

Project Status: Funded April 1, 2019 – March 31, 2021; Extended

The interactions of microplastics with other contaminants including cadmium, a toxic metal, poses potential threats to the health of aquatic organisms. My research aims to understand what factors govern the interaction of cadmium and microplastics and how cadmium-microplastic complexes influence important freshwater species in Alberta. This component of my research investigated how cadmium and microplastics affect a predatory leech species that is widespread across Alberta and serves as an important food source for many species. Leeches show a high survivability in cadmium-contaminated water, surviving through a four-week exposure to cadmium concentrations at water quality guideline limits and an order of magnitude above. Leeches exposed to microplastic only and cadmium-microplastic mixtures secreted more mucus than those exposed to cadmium only or not exposed to contaminants. Following exposure, I performed behavioural studies to determine whether leeches, which primarily scavenge, could locate food. Leeches that were exposed to cadmium and cadmium-microplastic mixtures were not able to locate food as efficiently as leeches exposed to microplastics only or not exposed to contaminants. Further, leeches exposed to microplastics and cadmium-microplastic mixtures lost significantly more mass over the course of the exposure than other treatments. This work highlights the importance of assessing sensitive sub-lethal endpoints that affect individual and population health. This work suggests that cadmium and microplastics affect the leech in different ways, but that co-contamination of cadmium and microplastics in a system can result in greater deficits to the leech than either contaminant present alone.

Summaries for projects funded April 1, 2020 – March 31, 2022

The project summaries listed here represent the projects funded by GiB from April 1, 2020 to March 31, 2022, as the majority of these projects are completed. For the projects allocated funding from April 1, 2021 to March 31, 2023, please see the listing in Section "Synopsis of Approved Projects for 2021–2023" on page 11.

The Effects of Artificial Light on Habitat use by Common Nighthawks in Alberta

University of Alberta

Student (Program): Carrie Ann Adams (PhD)

Supervisors: Dr. Erin Bayne and Dr. Colleen Cassidy St. Clair

Grant: \$15,870

Project Status: Funded April 1, 2020 – March 31, 2022; Completed

Artificial light at night (ALAN) is increasing rapidly worldwide, as is evidence of its widespread negative impacts. ALAN likely affects common nighthawks (*Chordeiles minor*) because these birds are active at dawn and dusk and prey on flying insects, which are known to be impacted by artificial light. Common nighthawks also travel several kilometers among distinct foraging and nesting sites, increasing their probability of encountering light sources on the landscape. These light sources could benefit nighthawks by concentrating their insect prey but could also harm them by increasing their exposure to predators, particularly at nest sites, and reducing insect populations. I am investigating how artificial light impacts the distribution and timing of activities for both foraging and nesting nighthawks using Acoustic Recordings Units (ARUs). I placed 400 ARUs throughout Alberta and I am also analyzing hundreds of recordings collected for other projects. We focused our deployments on central and southern Alberta, which were under-represented in our existing dataset of recordings. I am analyzing these recordings to determine how artificial light affects the probability that nighthawks will nest or forage in each site and whether artificial light extends their activities later into the night.

Impacts on Long-toed Salamander Habitat in Southwestern Alberta

University of Calgary

Student (Program): Charity Blaney (M.Sc.)

Supervisor: Dr. Steven Vamosi

Grant: \$5,495

Project Status: Funded April 1, 2020 – March 31, 2022; Completed

Amphibian populations are experiencing worldwide declines, occurring at higher rates than for any other taxa. Long-toed salamanders (*Ambystoma macrodactylum*) have been listed as a species of *Special Concern* in Alberta since 1999 when they were considered not at risk. I investigated the effects of potential habitat threats on longtoed salamander populations by comparing historical with present day populations in 13 breeding ponds in southwestern Alberta and assessing indicators of habitat quality as possible population predictors. My central goals were to: (1) determine if historical populations in the study area remain and update

their presence/absence status; (2) identify variation between populations and habitat variables to observe relationships between the two; and (3) discover evidence for metapopulations as possible vectors for species persistence. I observed a 23 percent decrease in populations of the survey area over the past two decades. Increased water turbidity had a significantly negative effect on long-toed salamander population abundances in breeding ponds, while the presence of other amphibians was a strong predictor of increased population abundance. Metapopulations appeared to be an important factor in the survival of longtoed salamanders. This study helps to fill a gap in provincial population data for this species, and points to some variables that should be considered vital habitat characteristics, information that can be used to direct conservation policy and future research.

Influence of Wolf (*Canis lupus*) Predation on Wood Bison (*Bison bison athabasca*) in the Alberta Oilsands

University of Alberta

Student (Program): Lindsey Dewart (M.Sc.)

Supervisors: Dr. Scott Nielsen and Dr. Mark Edwards

Grant: \$10,400

Project Status: Funded April 1, 2020 – March 31, 2022; Completed

Prey selection by predators is a complex process, with acquisition strategies varying between generalists and specialists. Generalist predators with limited selectivity, like wolves, can temporarily specialize on a specific prey in response to increases in abundance or vulnerability. In multi-prey systems that include bison, wolves often select less dangerous prey. However, changes in environmental conditions can influence bison vulnerability and alter wolf prey selection. I evaluated temporal patterns of wolf predation on bison relative to other prey in northeast Alberta, Canada. Specifically, I used summer scat analysis and winter wolf location visits to examine the diets of wolf packs whose territories overlapped a small bison population. I found that wolf packs predominantly preyed on beaver in summer and cervids (deer and moose) in winter, which is consistent with other boreal systems. Although wolf winter diets consisted mainly of cervids, two packs began selecting for bison in late winter. I tested possible mechanisms of this trend and found wolf predation success on bison was driven in part by winter duration and snow depth. Further, I tested whether wolves modify their use of areas frequented by bison relative to the timing of bison vulnerability and found that wolves increased their use of these areas during periods of heightened bison vulnerability. My findings suggest that bison predation risk is limited to conditions that make them vulnerable, and wolves can capitalize on the vulnerability of this profitable, but rarely obtainable, prey source.

Aspen Clone Size and Gender Distribution in Alberta

University of Alberta

Student (Program): Raiany Dias de Andrade Silva

Supervisor: Dr. Barb Thomas (PhD)

Grant: \$8,000

Project Status: Funded April 1, 2020 – March 31, 2022; Completed

Aspen (*Populus tremuloides* Michx.) clone size has been of interest from an ecological and evolutionary perspective for decades. Recently, the species range and overall persistence on the landscape has

been influenced by a decline in aspen health across North America, due primarily to drought. Aspen is a dioecious species. Relatively few studies have examined the role of sex in aspen performance. Generally, males are expected to outperform females in mature stands due to costs associated with reproduction, but females may outperform males in young stages of life. Understanding the causes of sex ratio biases is needed for predicting changes in sex-responses to environmental stresses and climate change, especially if skewed sex ratios already exist on the landscape. This project will contribute to our understanding of the patterns of aspen clone size and gender distribution on the landscape in Alberta and ultimately influence future management decisions designed to maintain sex equity of aspen stands under climate change. I tested the performance of seedlings subjected to drought to determine if there are sex-specific differences in growth and gas exchange rates at an early age. Using of molecular genetic techniques, I explored mature aspen stands and the distribution of clones and the sex of stems within those stands, in addition to the influences of environment, climate, and ploidy on clones and sex. Preliminary results from the greenhouse study showed no significant difference in performance between males and females while mature stands showed larger stems associated with males at most sites studied. Mature stands also appear to be much more diverse than anticipated based on phenotype alone.

Investigating the Sensitivity of Fishes to Polycyclic Aromatic Hydrocarbons

University of Lethbridge

Student (Program): Justin Dubiel (M.Sc.)

Supervisor: Dr. Steve Wiseman

Grant: \$4,335

Project Status: Funded April 1, 2020 – March 31, 2022; Completed

Emissions of polycyclic aromatic hydrocarbons (PAHs) have increased in recent decades primarily due to human activities, with the greatest environmental concentrations found close to urban areas or industrial sites. These compounds can have adverse effects on the health of fish. Additionally, in environments impacted by fossil fuel development and extraction, many of these compounds are alkylated which could increase toxicity. However, most research to date has focused on a standardized group of non-alkylated compounds so little is known about their toxicity or the potential effects of alkylation. To begin addressing this question, I exposed embryos of zebrafish, a laboratory model species, to these compounds by embryo microinjection and found that alkylation could increase the toxicity of these chemicals in zebrafish. To determine if similar effects could be observed in species found in Alberta, I ran a standardized cell-based assay using an important gene from several species of fish and found that alkylation could have similar effects on potency in each species. My results suggest each species has a unique sensitivity to PAHs, with some native species being upwards of 50-fold more sensitive than others, but more research is needed to strengthen these predictions. However, performing studies across multiple species has practical limitations making the development of predictive tools crucial, particularly for rare, threatened, or endangered species where traditional toxicity testing is not practical. My project represents the early stages of development of a 21st century predictive tool to help better assess the risks facing Alberta's fish species.

Survival Consequences of Sampling Strategies in Black-capped Chickadees (*Poecile atricapillus*)

University of Alberta

Student (Program): Èlène Haave Audet (M.Sc.)

Supervisor: Dr. Kimberley Mathot

Grant: \$12,615

Project Status: Funded April 1, 2020 – March 31, 2022; Completed

Organisms live in an environment that changes frequently. For example, the resources that are essential for survival can change location or in quality. Animals must manage the uncertainty that is caused by these changes and can do so by sampling the different options of a particular resource. This allows them to track changes in the environment and exploit the best option at a given time. Sampling the environment is thus expected to increase an individual's probability of surviving compared to individuals that do not sample; however, this has not yet been studied in the wild. I conducted a study on individually marked black-capped chickadees in the winter, when natural food resources are scarce and birds face increased risk of starvation due to below-freezing temperatures, and looked at the relationship between sampling and survival. I manipulated food availability at bird feeders that recorded individual bird visits and determined which birds in the population tracked changes in food availability by returning to feeders that were empty during the previous visit, meaning birds were "sampling" the feeder to gain information about its profitability. I found that chickadees displayed consistent sampling strategies: individuals that engaged in sampling behaviour did so repeatedly throughout the study, while those that did not sample also did so consistently. I also found that overall, individuals that consistently sampled had a higher probability of surviving to the following winter, as predicted, demonstrating that sampling is an important strategy that allows organisms to manage uncertainty in a changing environment.

Disentangling the Causes of Population Variation in Columbian Ground Squirrel Hibernation

University of Saskatchewan

Student (Program): Gabriela P. Heyer (M.Sc.)

Supervisor: Dr. Jeffrey E. Lane

Grant: \$14,820

Project Status: Funded April 1, 2020 – March 31, 2022; Completed

Understanding the roles of genetic variation and plasticity in hibernation traits can be crucial to predicting population resiliency of hibernators in our changing climate. Using a combination of field data and a common garden experimental design, I set out to partition the sources of variation in multiple hibernation traits of Columbian ground squirrel populations across elevations. I measured body temperatures (a proxy for hibernation expression), body composition (fat is an important energetic resource for survival and reproduction in ground squirrels), and metabolic rates (a measure of energy expenditure) during the hibernation season to determine the degree of variation between populations and the plasticity of these traits. My preliminary analyses of body temperature traces indicate that Columbian ground squirrel populations can exhibit vastly different hibernation expression in their native environments, but express hibernation traits very similarly under common environmental conditions, suggesting a high

degree of plasticity in these hibernation traits. I will then analyze the body composition and metabolic rate data to assess the potential energetic consequences of differential hibernation expression. The information obtained from my research will help fill in the gaps in understudied aspects of hibernation research and will provide important insights into the potential responses of different hibernating populations to changes in climate.

Causes and Consequences of Multiparasitism in Wild and Experimental Populations of Fathead Minnows

University of Lethbridge

Student (Program): Sarah Hirtle (M.Sc.)

Supervisor: Dr. Cam Goater

Grant: \$9,165

Project Status: Funded April 1, 2020 – March 31, 2022; Completed

Individual hosts are often infected simultaneously with multiple parasite species. In cases where multiparasitism is common, for instance in humans that are coinfecting with HIV and malaria, the co-occurring parasites can profoundly impact each other and their hosts. To further our understanding of multiparasitism in wildlife hosts, I censused the parasite communities of 755 fathead minnows from ponds in southern Alberta over three years. Nearly all minnows were co-infected. Two species of larval trematodes, one that encysts in the hundreds in the brain of minnows, and another that encysts in the liver, dominated the 15-species parasite assemblages in these minnows. This species pair co-occurred in 97 percent of minnows and they co-occurred more frequently than expected by chance. I exposed minnows to larvae of these two species to evaluate if parasite development was influenced by conspecific or heterospecific worm burdens. Whereas negative density-dependent growth occurred for the brain-encysting species, rates of development of both species were significantly reduced in co-infections compared to those in mono-infections. Thus, larval parasite development was influenced by both conspecific and heterospecific worm burdens. My results show that naturally co-occurring parasites that reside in contrasting locations in a host influence one another's development within their shared intermediate hosts.

Trait Similarity's Impacts on Plant Establishment: General effects among communities

University of Alberta

Student (Program): Emily M Holden (M.Sc.)

Supervisor: Dr. J.C. Cahill

Grant: \$17,200

Project Status: Funded April 1, 2020 – March 31, 2022; Completed

There are opposing views about the impact of similarity among plants. Limiting similarity suggests that to minimize competition, a plant should differentiate itself from neighbours. However, if environmental conditions filter for certain types of plants, only similar species could possibly coexist in a given community. Here, I directly tested the limiting similarity hypothesis by asking how trait similarity with neighbours affects the competition experienced by an individual plant. I added seedlings of five species to pots of plant communities taken from a local grassland, then followed the

seedlings' performance over the summer. To examine competition at high productivity, I fertilized half of the pots. I collected detailed trait data from focal plants, then calculated community average trait values for neighbours using trait values previously collected at the field site. To calculate overall and trait-by-trait similarity, I calculated the difference between individual and community trait values. If similarity influences the strength of competition among plants, I expected to see a positive relationship between competition and similarity.

Overall similarity between a colonizing plant and the resident community had no impact on the strength of competition experienced at both levels of fertilization. For single traits, there was no broad support for the concept of limiting similarity. Interestingly, although competition was generally stronger with fertilization, in two models where single-trait similarity influenced competition, fertilized plants experienced less competition with increased similarity. I suggest these findings challenge longstanding assumptions about the mechanisms of plant interactions, with implications for modern understanding of community assembly.

The Impact of Long-term Artificial Removal Experiment on the Genetics and Dispersal of an Alpine Butterfly

University of Western Ontario

Student (Program): Keon Young (Kevin) Park (M.Sc.)

Supervisor: Dr. Nusha Keyghobadi

Grant: \$13,000

Project Status: Funded April 1, 2020 – March 31, 2022; Completed, administrative extension until Aug. 31, 2022

In the current age of widespread human land-use change across the globe, more and more organisms are left existing in a fragmented landscape, where they are vulnerable to localized decline or even extinctions more than ever before. In these fragmented landscapes, between-patch dispersal of individuals play an important role in the recovery and persistence of patches that face the risk of periodic extinctions or population bottlenecks. Additionally, dispersal is a trait that can be affected by the genetics of an individual, and these types of local disturbances that encourage the arrival of dispersers could allow me to explore the genetic basis of dispersal in my study species. In my project, I investigated the genetic characteristics of an alpine butterfly species, the Rocky Mountain apollo, within a regional population network located in the Canadian Rockies. Two of the patches in this system experienced an eight-year long localized population removal experiment, where all butterflies were annually captured and removed from 2001 to 2008. I tracked the impact of this long-term removal on the genetic characteristics of these patches throughout the experiment, assessed the origin of the dispersers coming into them, and explored the genetic basis of dispersal. Overall, while my results for the genetic basis of dispersal in this species were inconclusive, genetic metrics across the experiment demonstrated this system's resilience against localized and devastating population reductions, as both available genetic diversity and influx of migrants remained consistent within these local populations even in the face of the prolonged removals.

The Reassembly of Plant–Pollinator Interaction Networks Following Wetland Habitat Restoration in Alberta Croplands

University of Calgary

Student (Program): Emily Purvis (M.Sc.)

Supervisor: Dr. Paul Galpern

Grant: \$7,710

Project Status: Funded April 1, 2020 – March 31, 2022; Completed

Global wild bee declines have been well documented in recent decades, with a regularly cited driver being habitat loss and the associated reduction of food and nesting resources. In North America's Prairie Pothole Region (PPR), habitat loss is largely attributed to agricultural intensification, resulting in the loss of once common native grasslands surrounding wetlands. Although restoration of these grassland-wetland complexes has been implemented across the region, wild bees are not often the primary target for recovery. Restoration efforts may better support wild bee recovery by including specific flowering plants (i.e., bee food resources) intended to provision the highest diversity of taxa. However, very little information is available specific to this region, which covers over 700,000 km² in Canada and the United States. I observed bee-plant interactions in remnant PPR grassland-wetland complexes and used a model-based approach to select top plants. I identified 16 key flowering plants that are highly visited by diverse wild bee species, as well as by *Bombus terricola* Kirby (the yellow-banded bumble bee), which is a species of conservation concern in this region. The key plants represented eight families and supported approximately 82 percent of all visits from 69 out of the 75 observed bee species. By reinstating targeted food resources in the PPR, or more broadly throughout the Great Plains, restoration practitioners can more efficiently mitigate the habitat loss that is thought to be a major driver of wild bee decline.

Glacial Melt Impact on Freshwater Quality and Riverine Food Webs

University of Alberta

Student (Program): Jessica Serbu (PhD)

Supervisor: Dr. Vincent St. Louis

Grant: \$12,740

Project Status: Funded April 1, 2020 – March 31, 2022; Completed

The headwaters and immediate downstream freshwaters of many major Albertan rivers are hydraulically fed by snow and glacial melt and are therefore under threat due to climate change. The headwaters of these rivers are hotspots of biodiversity, hosting unique algal and microbial communities that form the base of climatically-sensitive riverine food webs. As such, documenting the changing chemical and biological diversity of these freshwaters is crucial for understanding their response to climate change. The ACA Grant in Biodiversity supported two research objectives of my PhD: 1) Quantification of seasonal, interannual, and spatial patterns in glacial melt freshwater *biogeochemistry* (biology + geology + chemistry), and 2) Characterization of *metabolism* (productivity + respiration) across these same riverine gradients.

Preliminary results from Objective 1 indicate that while concentrations of over 40 physicochemical parameters remain low in our pristine headwater sites, the amount of biogeochemical constituents exported out of the system may be especially high in summer due to pronounced

snow and glacial contributions to flow. This result relates directly to Objective 2, where organisms at the base of riverine food webs, such as microbes and algae that define the metabolism of the in-river system, are especially sensitive to freshwater biogeochemistry. Results for Objective 2 suggest that respiration exceeds productivity across our mountain system, though this is expected to change from increased terrestrial inputs and warmer temperatures associated with climate change. Overall, my PhD research provides evidence of how increasing glacier melt contributions are affecting the base of food webs in Alberta's primary watersheds.

Effects of Oil Well Drilling Noise on Parental Breeding Behavior of Chestnut-collared Longspurs (*Calcarius ornatus*)

University of Manitoba

Student (Program): Lee A. Sutcliffe (M.Sc.)

Supervisor: Dr. Nicola Koper

Grant: \$13,615

Project Status: Funded April 1, 2020 – March 31, 2022; Completed

Chestnut-collared longspurs (*Calcarius ornatus*), a grassland songbird and species at risk, breed on mixed-grass prairie in northern United States and southern Canada. Their limited habitat in southern Alberta, our study site, overlaps with oil well infrastructure. Oil wells and the associated infrastructure and constant running noise present proven threats to parental care in chestnut-collared longspurs. However, drilling of new oil wells produces a noise that is louder and inconsistent, suggesting it may also have an impact on the feeding rates of adult chestnut-collared longspurs and the number and condition of fledglings per nest. In May to August of 2019 and 2021, across nine plots divided among three treatments (drilling, silent with infrastructure, and control without infrastructure), I set nest cameras on 63 chestnut-collared longspur nests to record feeding behaviors. When possible, I also measured the nestlings in these nests. I watched 796 hours of video and recorded the arrival and departure of adults to determine total number of visits and total and average length of visit for each adult per hour. Using generalized linear mixed models, these data will allow me to model the effects of treatment type on parental feeding rates (by sex) and the effects of male and female feeding rates on nestling condition and number of fledglings per nest, while controlling for treatment. In the case of oil well drilling, steps can be made to minimize noise. However, to develop effective and efficient conservation strategies, we must first determine if, and how, species at risk such as chestnut-collared longspurs are affected.

A New and Emerging Myxozoan Parasite of Fathead Minnows: Species description, life cycle, and effects to the host

University of Lethbridge

Student (Program): Molly Tilley (M.Sc.)

Supervisor: Dr. Cameron P. Goater

Grant: \$8,665

Project Status: Funded April 1, 2020 – March 31, 2022; Completed

The goal of my study was to characterize a newly emerged species of parasite infecting fathead minnows in several waterbodies in southern Alberta. The parasite, a myxozoan, uses special and

distinctly recognizable structures called polar capsules which contain a needlelike polar filament to pierce host tissues and lead to infection. *Myxozoans* typically must infect two different hosts to complete one life cycle, usually a fish intermediate host and a worm final host. The new minnow parasite that we explored causes severe lesions, swelling of tissues of the head, and bulging of the eyes, nostrils, and mouth. Early on, observation of polar capsules identified the genus, *Myxobolus*, of this parasite: however, it could not be physically matched to any known species. I then used imaging techniques to report the specific structure of the parasite at various life cycle stages, its development within the fathead minnow host, and DNA sequencing to establish its taxonomic relationships to other species within the *Myxobolus* genus. As part of these investigations, I also identified the final host of this parasite as the aquatic worm, *Tubifex tubifex*. Based upon the observations of the lesions on infected minnows, I used a combination of approaches to demonstrate that lesion-bearing minnows have reduced physiological performance and poorer survival than non-lesion bearing minnows. Ultimately, the results of my study suggest that this new myxozoan parasite is pathological to individual fathead minnows and is an emerging infectious pathogen of fathead minnow populations in southern Alberta.

Local Adaptation of Plains Rough Fescue (*Festuca hallii*) to Kentucky Bluegrass (*Poa pratensis*) Invasion

University of Alberta

Student (Program): Zoey Zapisocki (M.Sc.)

Supervisor: Dr. Viktoria Wagner

Grant: \$2,430

Project Status: Funded April 1, 2020 – March 31, 2022; Completed

Non-native plant invasions are a prominent threat to the integrity of native grasslands. My research aim was to identify patterns of non-native plants among Alberta's native grasslands. I collected and analyzed species composition, environmental, and anthropogenic data from 86 plots across the Dry Mixedgrass, Central Parkland, and Peace River Parkland Natural Subregions of Alberta. Non-native plants were strongly associated with moisture and nutrient availability. Mesic grasslands on nutrient-rich soils had higher levels of invasion than dry grasslands on less fertile soils. Within the mesic grasslands, loamy soil and gentle slopes had higher levels of invasion than sandy soil and steep slopes, respectively. Kentucky bluegrass (*Poa pratensis*) was the most frequent and abundant non-native plant. Other common species include crested wheatgrass (*Agropyron cristatum*), smooth brome (*Bromus inermis*), dandelion (*Taraxacum officinale*) and goat's beard (*Tragopogon dubius*). My results suggest that environmental conditions, agricultural history, and individual species adaptations may all explain patterns of non-native plants among Alberta grasslands. Future avenues of research include exploring soil fertility, topography, and soil texture effects. The patterns identified in this study could be beneficial for prioritizing conservation efforts on grassland landscapes.

The following four 2020/2022 GiB projects were granted extensions due to the COVID-19 pandemic.

Adapt, move, or go extinct: Will species on the tops of mountains survive climate change?

University of California, Riverside

Student (Program): Jared Anderson-Huxley (PhD)

Supervisor: Dr. Marko Spasojevic

Grant: \$11,450

Project Status: Funded April 1, 2020 – March 31, 2022;

Extended grant to Mar. 31, 2023

Division of labour in trematode parasites and its effects on trematode ecology

University of Alberta

Student (Program): Monica Ayala-Diaz (PhD)

Supervisors: Dr. Heather Proctor and Dr. Clement Lagrue

Grant: \$11,555

Project Status: Funded April 1, 2020 – March 31, 2022;

Extended grant to Nov. 30, 2023

Environmental, genetic, and social influences on sex ratio in the boreal ant *Formica podzolica*

University of California, Riverside

Student (Program): German Lagunas-Robles (PhD)

Supervisor: Dr. Alan Brelsford

Grant: \$15,460

Project Status: Funded April 1, 2020 – March 31, 2022;

Extended grant to Mar. 31, 2023

Winter responses in wood bison (*Bison bison athabasca*) to seasonal dynamics in water and factors influencing forage availability in wetlands

University of Alberta

Student (Program): Garrett Rawleigh (M.Sc.)

Supervisor: Dr. Scott Nielsen

Grant: \$12,475

Project Status: Funded April 1, 2020 – March 31, 2022;

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