



0-606: BC Parks iNaturalist Project



# Conservation Economic Stimulus Initiative (CESI) Completed Project List

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Note: Content of Project Summaries has not been edited in any way; some minor spacing and spelling errors were corrected.

## Approved Projects Taking Place in Multiple Regions

Project #	Project Name	Project Summary	Funding Amount	Project Lead
0-408	Wetlands Restoration for Species at Risk Habitat Enhancement in the CDF	<p>On Lasqueti Island, both John Osland Nature Reserve and Salish View Nature Reserve contain small wetlands within the surrounding forest. Wetlands are a critical and rare habitat in this region. In this project, we developed and implemented first steps of detailed restoration plans to enhance the habitat diversity and quality provided by these rare wetland areas. Activities included invasive species removal, building enclosure fences to prevent browse from both deer and feral sheep, and planting native species. The restoration biologist was on site to put the plan into action with the help of many members of the Lasqueti community. In addition to the restoration specialist, the CESI grant provided funds to hire labourers for fencing, and a carpenter to build owl and bat boxes; Lasqueti Island Nature Conservancy and Nanaimo Area Land Trust coordinated volunteers to receive restoration training, plant native species, and complete many of the management activities.</p> <p>Lasqueti Island contains patches of original old-growth Coastal Douglas-fir forest and also has large areas affected by past logging. There is great conservation potential, however, there is good reason to believe that diversity of understory vegetation on Lasqueti Island has declined substantially over the last century because of elevated populations of both native deer and feral sheep. These herbivores could have a great impact on restoration activities. Lasqueti Island community partners developed an experiment to study the impact of deer and sheep on by comparing plant communities in fenced and unfenced areas in multiple habitats on Mount Trematon Nature Reserve. The first stage of this project was completed in 2021-22 with building a 1 ha fenced area, establishing survey plots, and planting native species. This work was done by fencing labourers hired by CESI funds, and with the help of community volunteers. The plots will have repeat surveys over the life of the research with more enclosures added in additional areas as funding allows.</p> <p>Dragonfly Pond Covenant is a 44-hectare private protected area on Sidney Island in the Salish Sea. The covenant area features Dragonfly Pond and three smaller ponds surrounded by woodland and open fields. The ponds are century-old human-made features which provide locally-scarce freshwater habitat for a diversity of native birds, amphibians, insects, and other wildlife as well as aquatic and riparian plants. Islands Trust Conservancy (ITC), which holds the conservation covenant, has identified two aquatic invasive species as threats to ecosystem health in Dragonfly Pond: parrot's feather and American bullfrog.</p> <p>American bullfrogs were first detected in Dragonfly Pond Covenant by Islands Trust Conservancy in 2016. This species is considered a high priority invasive in British Columbia. With CESI funding, ITC contracted an American bullfrog control specialist to survey Dragonfly Pond and two other suitable ponds in nearby ITC-held conservation covenant areas. At least 25 bullfrogs were detected in Dragonfly Pond during surveys in 2021, with none detected in the other covenanted ponds. Of the bullfrogs detected, eleven individuals were successfully captured and removed. Encouraged by evidence that the pond is still only sparsely populated and with only one generation of tadpoles, ITC hopes to continue bullfrog removals in 2022 and work in collaboration with Sidney Island residents to eradicate American bullfrogs and protect native wildlife from this voracious predator.</p> <p>Parrot's feather, a highly invasive aquatic plant introduced from South America, was first recognized in Dragonfly Pond by ITC in 2020, following rising regional awareness of the threat posed by this species and the difficulties in controlling it by manual or chemical means. With CESI funding, ITC engaged Dr. Catherine Tarasoff, a specialist in the use of the benthic barrier method to treat other aquatic invasive plants, such as yellow flag-iris and Eurasian watermilfoil, to trial the benthic barrier method as an effective treatment of parrot's feather. Unexpected site conditions meant that all barriers had to be removed after 4 months, much earlier than planned. Interestingly, the parrot's feather under the benthic barrier matting was almost 100% dead after 4 months, suggesting that this method could be an effective means of controlling this plant under more suitable site conditions; however, further research is needed to support this conclusion.</p>	\$38,500	Kathryn Martell  Islands Trust Conservancy
0-596	Helping Trappers Reduce Incidental Harvest of Fishers	<p>Fishers (<i>Pekania pennanti</i>) in British Columbia, particularly within the Central Interior (Columbian fisher population; S2, Endangered), are declining and at high risk of extirpation due to habitat loss from logging, salvage logging, oil and gas development, and insect and wildfire killed-forests (BC Conservation Data Centre 2022). It is estimated that by 2032 habitat loss with the additional pressure of unmitigated incidental bycatch will lead to the extirpation of the Columbian fisher population (Fogarty et al. 2021). The Fisher Exclusion Box is a modified marten box that excludes fisher from incidental capture in marten boxes by using a front face plate that excludes fisher from entry by their larger cheekbone diameter. The Fisher Exclusion Box program seeks to reduce incidental bycatch through the use of the Fisher Exclusion Box by increasing its use by trappers by 1) reducing the cost barriers limiting its uptake, 2) evaluating its capture efficiency, and 3) communicating the program and its results widely through extension.</p> <p>BCFisherHabitat Youtube Channel: <a href="https://www.youtube.com/watch?v=CgCU93w33w8">https://www.youtube.com/watch?v=CgCU93w33w8</a></p>	\$195,500	Rich Weir  Ministry of Environment and Climate Change Strategy
0-597	Fishers, Fires and Forests: Understanding How Threatened Fisher Populations Respond to Rapidly Changing Landscapes	<p>Fishers are a mid-sized carnivore in the weasel family that rely on features of mature forests to survive and reproduce. The Columbian population of fishers in central interior BC was recently red listed as "endangered" due to ongoing habitat loss from timber harvest and wildfire. While recent trends suggest this population is declining, little is known about the Columbian fisher population and better information on the status and trend is needed if we wish to recover this population.</p> <p>This project used innovative population monitoring to collect new information on where and how many fishers occur throughout the central interior of British Columbia. Using 'hair-snaggers' that passively collect hair from fishers as they attempt to enter a baited site, we used genetic fingerprinting and new techniques to better understand the habitat factors that affect where fishers occur and what their density in a given area might be. This allows us to focus our conservation efforts in areas where fishers still occur - thereby enhancing our conservation efforts.</p>	\$300,000	Rich Weir  Ministry of Environment and Climate Change Strategy



0-598	Field Guidance for Identification of Old and Ancient Forest Stands to Conserve Biodiversity and Ecosystem Integrity in BC	<p>This project details the compilation, methodology and analysis of available provincial datasets for the purpose of identifying forest stand structural and compositional attributes associated with old growth seral age class at an ecologically relevant scale across the province. This initiative supports the objectives outlined in the Old Growth Strategic Review (Gorley and Merkel, 2020) by increasing the understanding of old forests, specifically in the identification of the functional attributes that contribute to ecosystem services (e.g., wildlife habitat, biodiversity, hydrological regimes, nutrient cycling, and carbon storage). The main accomplishments of this project were as follows:</p> <ol style="list-style-type: none"> <li>1. Compilation of the available provincial datasets and identification of gaps based on ecosystem type for future sampling.</li> <li>2. Testing of the non-purpose collected data for an “old growthness” signal through multiple statistical methods (Principal Components Analysis, Regression Trees, RandomForest, and Univariate methods) at an ecologically relevant scale.</li> <li>3. Development of a template for improved provincial guidance for the retention and recruitment of old forest informed by provincial forest inventory data and current forest ecology science.</li> </ol> <p>The data assessment completed by this project helped address policy gaps by completing the technical data analysis needed to support the development of guidelines and recommendations to ensure that land designation decisions are made based on defensible science relating to the ecological attributes and function of old and ancient forest biodiversity, such as carbon sequestration to mitigate for the effects of climate change. We identified gaps in knowledge of old growth forest and biodiversity within BC and established a methodology for analyzing forest stand attribute data associated with time since last stand replacing event.</p>	\$75,000	Nyssa Temmel  Ministry of Forests, Lands, Natural Resource Operations and Rural Development
0-599	Bull Trout Population Status Assessment	<p>The goal of this larger project is to address data gaps for the conservation and management of Bull Trout within British Columbia. This project aims to deliver a coordinated population monitoring approach for Bull Trout within the province by selecting a few data poor index streams based on the Provincial Bull Trout Management Plan (to monitor with a focus on 3 regions within BC - Southcoast (2), Okanagan (8), and Peace (7B)).</p> <p>The Southcoast region conducted Bull Trout adult and parr snorkel surveys on Gold Creek a tributary of Alouette Reservoir. Partnership and mentoring with the Katzie Development Limited Partnership continued for another year. Results from 2021 showed lower peak adults counts and the parr/fry densities remained similar to previous years, low. The Okanagan region focused on Sugar Lake which provides the only Bull Trout fishery within the region. This project is part of a larger long-term monitoring of the Bull Trout population. CESI funding funded the creel surveys (angler surveys) which were undertaken by the Splatins First Nations and mentoring and training was provided on tagging Bull Trout for the high reward tagging program. Creel studies are still ongoing, but to date (since 2020) 14 of the tagged Bull Trout (13.5%) have been re-captured by anglers. For the Peace, the redd surveys were conducted in 3 tributaries within the Muskwa watershed. Results showed lower redd numbers compared to previous years, thus the need for long-term monitoring is necessary to understand changes within this watershed.</p>	\$72,000	Jennifer Sarchuk  Ministry of Environment and Climate Change Strategy
0-600	Building Resilient Bat Populations: Pilot Project on Engaging First Nations in Local Bat Conservation	<p>This project aims to work with First Nations to raise awareness of bats and bat conservation; identify local concerns, interests, and conservation opportunities; and pilot a bat-friendly community approach to addressing concerns and implementing conservation actions. The project aims to raise community awareness of existing approaches and resources to support bat conservation. Expected outcomes of this project are increased local capacity, protection and enhancement of bat habitats, and increased resiliency of bat communities in the face of climate change, among other emerging challenges.</p>	\$107,340	Katie Calon  The British Columbia Conservation Foundation
0-601	The Nature Trust of BC- Conservation and Land Management Intern Project	<ol style="list-style-type: none"> <li>1. NTBC have used our drone to conduct photo monitoring and inventory of the results of wetland restoration at the southern end of Cherry Creek and used it to take before pictures of the pending Sun Creek Wetland Restoration site. (Photos available upon request).</li> <li>2. NTBC Conservation Field Crews hosted a community shoreline rubbish cleanup event on Savary Island. Local residents came out to help with the project and more broom was removed than ever previously accomplished on-site. The activity was followed by a massive bon-fire (broom as fuel) and get together on the beach.</li> <li>3. NTBC Conservation Field Crews worked closely with the Slocan River Streamkeepers Society (SRSS) to plant 50 additional trees and shrubs at the Walter Clough Wildlife Area. Song bird nesting boxes were also installed as part of a larger project that represents a new partnership with NTBC, SRSS and FLNRORD.</li> </ol>	\$250,000	Jason Emery  The Nature Trust of British Columbia
0-602	Promoting Habitat Conservation and Herptile Awareness Through Online Engagement of BC Citizens	<p>BC residents have shown interest in amphibians and reptiles (i.e. herptiles) and the conservation of their habitats. The goal of this project was to create an accessible website that updates and improves upon existing provincial websites. Such online tools are an effective way to disseminate information and solicit public observations, particularly during the COVID-19 pandemic when individuals are using the internet to connect.</p> <p>This project involved creating a consolidated provincial web page that promotes the conservation of amphibians, reptiles and their habitats. It includes updated ecological information, descriptions of how herpetofauna are important to First Nations communities, current range maps, and species accounts. It contains interactive content such as Frequently Asked Questions, video features, and quizzes that will appeal to a broad age range. In addition to meeting an apparent demand for current and comprehensive information, this project helps engage BC residents in citizen science (i.e. reporting occurrences and monitoring) and this is particularly valuable given that herpetofauna and especially amphibians are sensitive indicators of climate change effects.</p>	\$80,000	Karl Larsen  Thompson Rivers University



0-603	Enhanced Assessment of the Conservation Status and Vulnerability to Climate Change of Species and Ecosystems in British Columbia	<p>Many species and ecosystems in British Columbia are vulnerable to climate change, and, when combined with the cumulative effects of other threats, it increases the risk of population declines and extirpation in BC. Assessing which species and ecosystems are at risk and mapping their distribution is crucial for land-use and conservation planning. The goal of this project is to expand conservation status ranking and mapping of species and ecosystems in BC, to determine which species and ecosystems are at risk of extinction.</p> <p>The BC Conservation Data Centre (BC CDC) uses standardized methods developed by the NatureServe network for assessing conservation status ranks and mapping species and ecosystems at risk. Mapping contracts funded by CESI resulted in 200 species and ecosystem occurrences either being created or enhanced. Priority species (red and blue-listed, SARA/COSEWIC) that were mapped include Coastal Giant Salamander, Vancouver Island Marmot, Long-billed Curlew, Coastal Giant Salamander, Contorted-pod Evening-primrose, Deltoid Balsamroot, Vancouver Island Beggarticks, Columbia Quillwort, Common Bluecup, Coast Microseris, Purple Sanicle, Golden Paintbrush, Macoun's Meadow-foam, Whitebark Pine, and Bear's-foot Sanicle. The BC CDC also worked with Bryophyte experts from UBC to update and refine BC's taxonomic list of moss species. The potential impacts of climate change on the distribution of mosses in BC was also investigated with a focus on Haller's Apple Moss and Rigid Apple Moss.</p> <p>Red and blue-listed estuarine ecological communities were mapped with a focus on their condition to inform restoration. Red-listed high elevation grassland ecological communities in the Elk Valley were also inventoried and mapped. These data are being used to explore the impacts of invasive pant species and over grazing on the long-term persistence and resilience of these grassland communities.</p> <p>The BC CDC updated 300 conservation status ranks and produced 54 range maps for priority plant species. Updated conservation status ranks ensure that conservation efforts in the province are targeted at the highest priority species. Conservation status assessments form the basis for conservation planning, from identifying species and ecosystems at-risk, large-scale prioritization and planning, to defining operation considerations when planning on-site activities. Identification and mapping of species and ecological communities at-risk facilitates multi-scale prioritization and planning, consequently providing tangible benefits for conservation.</p>	\$160,000	Jacqueline Clare (prev: Damien Joly)  BC Conservation Data Centre
0-604	Inventory and Monitoring of Coastal Northern Goshawk	Through the Conservation Economic Stimulus funding, the Ministry of Forests, Lands, Natural Resource Operations and Rural Development employed 27 people to search for the nests of coastal Northern Goshawk across the BC coast in the summer of 2021. This work included partnerships and collaboration with the Haida, Gitanyow, Lax Kw'alaams, and Haisla Nations. This effort identified 34 active breeding areas and provided the basis for developing 22 new breeding area reserves for this threatened species.	\$300,000	Christine Petrovcic  Ministry of Forests, Lands, Natural Resource Operations and Rural Development
0-605	Habitat Inventory, Population Monitoring and Research for the Protection of the Marbled Murrelet	This project supports the BC Implementation Plan for the Recovery of the Marbled Murrelet by improving habitat mapping and assessing murrelet populations across Vancouver Island and the South Mainland Coast. We collaborated with UBC to fund a masters student to develop LiDAR habitat modeling, as well as using traditional methods of habitat assessment (helicopter surveys of habitat) to improve mapping of 38,000 ha of old growth forest. We conducted population surveys with marine radar at 16 watersheds to contribute to long-term monitoring that has been ongoing since 1996. Using these data and historical counts, we conducted power simulations to optimize our survey design to monitor population trends over the next 10 years in BC.	\$180,000	Christine Petrovcic  Ministry of Forests, Lands, Natural Resource Operations and Rural Development
0-606	BC Parks iNaturalist Project	<p>BC has the highest biodiversity of any province or territory in Canada, but where these species are found is poorly studied. The BC Parks iNaturalist Project seeks to close this knowledge gap by bringing together researchers and community scientists to document as many observations of as many species in as many areas of BC as possible and uploading this data to iNaturalist. Since 2019, the BC Parks iNaturalist Project field technicians have travelled the province each summer taking photographs of any wild organisms they can find and encouraging community scientists to do the same. The photographs and their locations are then uploaded to iNaturalist so the open-source data can be used by BC Parks managers, researchers, and ecological enthusiasts who want to learn about the biodiversity around them.</p> <p>Since the project began in 2019, the number of iNaturalist observations in BC Parks has climbed from 30,000 to over 470,000 and the number of species observed has more than doubled from 4,000 to 8,800, including many species-at-risk and invasive species. Collecting this data has furthered our understanding of small, understudied species, such as grigs (cricket-like insects) and jumping spiders and has led to the discovery of a new species.</p> <p>Want to join this community science initiative? Head on over to <a href="http://www.bcinat.com">www.bcinat.com</a> to get started.</p>	\$68,000	Brian Starzomski  University of Victoria
0-607	Spartina Program FY22	<p>The Spartina Eradication program started in 2004 to address the growing concerns about Spartina species in BC and the threat posed to our coastal ecosystems. Spartina is a type of cordgrass non-native to BC which originally migrated here from Southern California through ocean currents. There are four known species of Spartina, three of which are present on BC shores.</p> <p>Spartina threatens to eliminate large amounts of coastal mudflats through its ability to build up the areas where it grows. The loss of this habitat would have crucial effects on the fish, waterfowl, and other wildlife that depend on these ecosystems for food and shelter. The Fraser Delta is a very important stopping point for waterfowl on their migration South during the winter. If left unattended, Spartina would destroy the coastal mudflats where it is present, causing massive disturbances in the coastal ecosystem.</p> <p>The Spartina Eradication program works each year to inventory and treat every Spartina plant found on BC coastlines. A team of surveyors, equipped with GPS tracking units, comb the coastline on foot looking for these plants. A crew of trained herbicide applicators then applies a water-safe herbicide mixture as a direct application to each plant individual. Since 2016, the BC Spartina Working Group has managed to reduce the population of two spartina species by 95%.</p>	\$50,000	Richard Topp  Ducks Unlimited Canada



0-608	Sorting, Pinning, Labeling, Databasing and Identifying Invertebrate Specimens	Most invertebrate species are challenging to survey, and survey techniques for one target species involve broad-scale methods that result in specimen bycatch. Trapping methods such as pitfall traps, malaise traps, blue-vane traps, pan traps and moth light traps, can result in the collection of hundreds of other specimen bycatch. The target species is extracted from this bycatch, and identified, but the time, skills and workload involved in processing the bycatch is beyond the available funding. Processing invertebrate bycatch involves both taxonomic knowledge and skills; because taxonomists are in demand or there is no local expert, following the pinning stage, specimens often are sent to museums where they are held until they can be identified. This project focused on processing unsorted invertebrate samples and preparing them such that taxonomists can identify them in the future. These samples are part of bycatch that has been collected as part of other projects (projects that have targeted other invertebrate species at risk), and contains valuable information/ specimens for S1 - S3 species in BC. Many of the specimens have been collected from BC Parks over the past ten years, while others are in wildlife management areas and crown land. Over the course of this project, approximately 138,850 specimens were processed and are in various stages of the processing timeline described above.	\$150,000	Jennifer Heron  Ministry of Environment and Climate Change Strategy
0-609	GIS Habitat Mapping and Modeling Habitat for Invertebrate Species at Risk, Including Ground-Truthing Some Sites	Spatial habitat mapping and analysis for numerous high priority invertebrate species at risk, including Western Bumble Bee, Behr's Hairstreak, Nuttall's Sheep Moth, Half-moon Hairstreak, Hotwater Physa, Johnson's Hairstreak, Pygmy Slug, Magnum Mantleslug, Sheathed Slug and Audouin's Night-stalking Tiger Beetle; and some of the ecosystems that support these species (e.g., Coastal Sand Ecosystems). Spatial habitat mapping was completed with the following in mind: 1) high priority probability of encountering these invertebrates, and this information can be used as priority inventory sites; and as guidance to conservation practitioners and decision makers when/if advising on development; 3) the type of best management practices (BMP)/stewardship guidance that should be recommended.	\$75,000	Jennifer Heron  Ministry of Environment and Climate Change Strategy
0-610	Setting Habitat Objectives for Species at Risk - Spatial Analysis of Recovery Goals and Current Status.	Since 2004 under the Forest and Range Practices Act, and previously under the Forest Practices Code, habitat for species at risk has been conserved to sustain wildlife populations that are endangered, threatened or of special concern. The purpose of the review was to quantify the amount of habitat protected under the current program, specifically the Government Actions Regulation. The results of this assessment will guide updates to the objectives set for habitat protection and on-going discussions among wildlife managers.	\$50,000	Jeff Shatford  Ministry of Forests, Lands, Natural Resource Operations and Rural Development
0-612	Algal Blooms in BC Lakes	Many scientists have concluded that climate change will likely increase the magnitude, frequency, and extent of harmful algal blooms in freshwaters. This is alarming because harmful algal bloom are one of the most prevalent emerging threats to freshwater biodiversity, they may produce taste and odor issues and potent toxins that are a threat to humans and other animals and they may lead to changes in community structure and trophic shifts. There are significant costs associated with cyanobacteria blooms including those associated with drinking water treatment, loss of recreational opportunities impacting local economies and general deteriorating ecosystem services. We are already seeing indications of rising temperatures and changing rainfall patterns in BC and that is why it is imperative to develop monitoring programs to identify water bodies at risk and to use historical information to identify lakes most susceptible to harmful algal bloom development.	\$150,000	Shannon Harris  Ministry of Environment and Climate Change Strategy



## Approved Projects in the Vancouver Island Region

Project #	Project Name	Project Summary	Funding Amount	Project Lead
1-602	Restoration and Stewardship of Greater Victoria Small Watersheds	Colquitz River, Craigflower Creek, Gorge Creek, Bowker Creek and Hospital Creek are urban watersheds located in Greater Victoria that offer remarkable conservation and human health benefits. The Restoration and Stewardship of Greater Victoria Small Watersheds project built on years of dedicated efforts by Greater Victoria NGO's and stewards doing instream, riparian and estuarine restoration and monitoring. An objective was to assist these NGO's and stewardship groups in reaching their overarching goal of improving the natural environment for local communities and wildlife while aligning with local First Nations habitat restoration goals. We put a strong focus on climate change adaptation, mitigation, and conservation. Work in Colquitz River, Craigflower Creek and Bowker Creek focused on their urban salmon runs through instream and/or riparian restoration. Work in the upper Colquitz focused on wetland, amphibians, and Garry oak meadow restoration while work in Gorge and Hospital Creeks focused on improving estuarine conditions. Riparian restoration focused on the removal of invasive species and planting of native species adaptable to climate change. Improved stream channel function was designed to adapt to climate change impacts of higher and lower flows, flooding, increased sediment load and improve habitat quality for salmonids of ecological and cultural importance. With the help of our project partners, we improved 815 meters of stream, removed invasive species from 6194 m <sup>2</sup> of land, planted 2446 native plants and spread countless native seeds over 5042 m <sup>2</sup> land. We hired and trained seven early career scientists in the restoration and stewardship of urban watersheds. Four Interns were hired and were involved in the design and implementation of restoration plans, including invasive vegetation control, native species planting, in-stream restoration design and implementation, and environmental monitoring and assessment of streams to determine their health and restoration potential. This project supported a total of 9422 person hours were supported for this project, including 6055.5 for Women, 3162 for Young Adults and 1387.5 for Indigenous Persons. Through this project we worked with roughly 97 volunteers who put in a total of 1536.5 hours.	\$391,000	Heather Wright  World Fisheries Trust
1-627	Coastal Experimental Watersheds (CEWs) – Active Adaptive Management for Ecological Integrity and Climate Change Resilience in the Great Bear Rainforest	Within the territories of the Mamalilikulla, Tlowitsis, Wei Wai Kum, K'ómoks, and Da'naxda'xw Awaetlala First Nations, we initiated an experimental research and monitoring program in the ecologically significant southern Great Bear Rainforest. Partners in this project were Nanwakolas Council, the Province of BC, forest licensees, University of British Columbia, Simon Fraser University, and Hakai Institute. Our project not only began collecting important baseline data on the health of ecosystems, fish, and wildlife, but it also provided cross-cultural learning opportunities between the partners and the Ha-ma-yas Stewardship Guardians and funded meaningful employment and hands-on training for the Guardians in science-based forest stewardship methodologies. We further developed our own materials to strengthen Guardian-led stewardship in their territories, including a plant identification guide of species of cultural importance to Nanwakolas-member First Nations. Our work is contributing to cutting-edge experimental research in ecosystem-based management, the findings from which will directly inform new and revised policies for upholding ecological integrity and human well-being in the southern Great Bear Rainforest.	\$133,000	Jordan Benner  Nanwakolas Council
1-781	Garry Oak Ecosystems - Restoring an Endangered Ecosystem	Garry oak ecosystems are some of the rarest and most threatened habitat types in Canada, with less than 3% of their original extent remaining in a natural condition. These ecosystems are critical to many at-risk species that depend on intact habitat for their survival. One of the most pressing threats to Garry oak ecosystems is the encroachment of invasive species such as Scotch broom, laurel-leaved daphne and Himalayan blackberry. Under this project, Habitat Acquisition Trust (HAT) employed a 5-person restoration crew for 8 months to remove invasive species and enhance habitat over more than 12 hectares of Garry oak habitat in multiple conservation areas. The project also involved multiple partnerships and supported student research and Indigenous-led restoration projects.	\$160,000	Katie Blake (prev: Wendy Tyrrell)  Habitat Acquisition Trust
1-782	Western Painted Turtle Habitat Creation, Mitigation and Enhancement	<p>This project saw the creation and enhancement of habitat for a unique population of Provincially red-listed Western painted turtle, Pacific Coast population (<i>Chrysemys picta bellii</i>) that exists in a wetland complex near the airport in Port Alberni, BC. Nest sites for these turtles were either created or enhanced, basking logs were added to existing wetlands to provide habitat complexity, and barriers were introduced to protect the turtles from threats such as road mortality.</p> <p>A committed working group of biologists, First Nations, Provincial and Regional Governments, local landowners and Crown tenure holders, and volunteers have collaborated on this project to improve outcomes for this species. The project team is monitoring the effectiveness of this habitat work and will apply the lessons learned here to other populations of Western painted turtle on Vancouver Island, or across the province.</p> <p>To get involved, if you find a turtle or a suspected nest please take a photo, location information, turtle size estimate, and submit information to <a href="mailto:WCR.WildlifeData@gov.bc.ca">WCR.WildlifeData@gov.bc.ca</a> (species name in subject line). To contact a MFLNRORD biologist, call FrontCounterBC at 250 751-7220 and ask to be directed to West Coast Region Ecosystems or South Island District biologist.</p>	\$21,360	Jennifer Sibbald (prev: Mary Toews)  Ministry of Forests, Lands, Natural Resource Operations and Rural Development



1-783	Salmonid Habitat and Flow Requirements in the Koksilah and Chemainus Rivers - A Twinned Watershed Proposal	<p>The Koksilah and Chemainus Rivers, on Eastern Vancouver Island, BC, have been similarly and severely impacted by climate change and land use. In both rivers, low summer water flows and degraded stream habitats are a threat to salmon and salmon communities, including the indigenous people who have lived in balance with salmon in these watersheds since time immemorial.</p> <p>The Twinned Watersheds Project, co-lead by Cowichan Watershed Board, Cowichan Tribes First Nation and Halalt First Nation, is an innovative and efficient way of sharing resources to give decision-makers the best information possible to turn this situation around. The first phase began in 2021 with local field crews gathering previously unavailable data about water flows, fish habitat, and riverbank ecology under the direction of subject matter experts in geomorphology, forest ecology, and fisheries biology.</p> <p>The project involved the following components:</p> <ul style="list-style-type: none"> <li>- EFlow developments and Fish Habitat inventory and analysis, including field studies and desktop analysis, a peer-reviewed report, and presentations to key audiences (indigenous governments, local governments, Cowichan Watershed Board (including watershed stewardship community) agricultural producers, local residents)</li> <li>- Riparian Plant Assessment, including field studies and desktop analysis, a report, riparian restoration projects on farms, with youth and with indigenous elders, and a video production "Why Fish Need Trees".</li> <li>- Indigenous Flow Needs interviews with elders and knowledge keepers to compare to study findings.</li> <li>- Communications including the Big Dancing Fish mascot with the "Roving River Reporters" who shared brief interviews and imagery from the field, featuring watershed science and restoration projects, and an overview video from Salish Eye Productions about the Twinned Watershed project approach.</li> </ul> <p>The results of this work will provide foundational information, understanding and direction to BC's first Water Sustainability Plan, currently underway in the Koksilah watershed. Over the next two years, the Twinned Watersheds Project will continue under the leadership of Cowichan Tribes and Halalt First Nation to also assess how many salmon are currently dependent on these river habitats.</p>	\$510,000	Tom Rutherford  Cowichan Watershed Board
1-784	Quatse Estuary Restoration Project	The Kwakiutl First Nation, The Nature Trust of BC and partners of the West Coast Conservation Land Management Program worked collaboratively to restore coastal processes and improved fish and wildlife habitat in the Gwa'dzi River Estuary. By breaching an old logging road the partners successfully reconnected over 2 ha of estuarine habitat to tidal inundation and both aquatic and terrestrial vegetation communities. Interpretive signs as well as a Kwakiutl carving were also installed to highlight the success of the project and to celebrate the partnerships created.	\$50,000	Tom Reid  The Nature Trust of British Columbia
1-786	Reconciliation Through Investment in Natural Resources: Shoreline Petroleum-Product Cleanup and Evaluating Marine Plant Carbon Sequestration in the Gwa'sala-'Nakwaxda'xw Traditional Territory, Central Coast BC	<p>The GNN have extensive ocean coastline habitat for a diverse array of marine life. With climate change and concern around declining fisheries resources, as well as stalled development around green and alternative technologies, the GNN are increasingly engaging in active environmental monitoring across their traditional territory. In 2021, the Nation began mapping critical habitat for juvenile fish using drone technology to map kelp beds. The Nation's Coastal Guardian Watchmen were trained as drone pilots and obtained new skills of environmental data collection in order to collect this baseline data. This project also enabled five youth from the Nation to join the CGW and learn about their Nation's conservation plans that will benefit theirs and future generations.</p> <p>The CGW and their local marine services company also were able to do a significant beach and shoreline cleanup across the southern territory. With increasing concern around microplastics and petroleum-based products that may take many human lifetimes to degrade, the Nation was able to use a large commercial vessel to haul away significant garbage larger than what might have been picked up by beach walkers.</p> <p>This project has contributed directly to capacity building for the Nation's conservation and stewardship obligations and increased work opportunities for our community.</p>	\$238,810	Erin Latham  Gwa'sala-'Nakwaxda'xw First Nation
1-787	Chemainus River Stabilization and Restoration Project	The objective of this project was to engage in "low input, high output" mitigation projects to improve fish habitat conditions related to low flows and high water temperatures in the lower Chemainus River. Project activities included operating the Rotary Screw Trap to collect baseline juvenile salmonid data to inform future monitoring of project sites, selection of specific project sites within the general project area in late June, and implementing sediment control and erosion control pilot projects. Sediment control projects focused on gravel removal; erosion control projects focused on bioengineering of banks and anchoring/strapping large woody debris (LWD) in high erosion locations. LWD was anchored primarily using ballast. A test patch of live willow staking in a gravel bar was also implemented. Opportunistic removal of invasive plant species and garbage removal occurred throughout the works.	\$250,000	Caitlin Kenny  Halalt First Nation



## Approved Projects in the Lower Mainland Region

Project #	Project Name	Project Summary	Funding Amount	Project Lead
2-726	Using Bioenergetics Models to Determine Changes in Food Availability and Consumption for White Sturgeon	Our aim was to evaluate growth and feeding variation in lower Fraser River white sturgeon and examine correlation with food availability patterns across prey species (e.g. salmon and eulachon). Our intent was to explore this relationship using length data collected for many years by guides and anglers. However, upon examination of the data, we found that inaccuracies in length measurement inherent in field collection of information from large, strong fish, made it impossible to detect changes in individual or population-level growth from year-to-year. This analysis serves as a warning for some citizen-science data collection programs, namely that although these programs may be incredibly valuable for their intended purpose when well designed and implemented, using these data beyond their intended means may be problematic or virtually impossible.	\$66,000	Brett van Poorten  Simon Fraser University
2-727	Nature Stewards Program: Habitat Restoration and Nature-based Solutions to Climate Change	This project inspires Fraser Valley landowners to become stewards of their land. We help them identify important habitat types on their property along with what wildlife and species at risk may be using that habitat. With our CESI funding, we worked with eight eager landowners to improve and enhance the habitat on their properties. This included things like suppressing invasives species, adding native plants to riparian areas along headwater streams and ponds, creating underwater breeding habitat for frogs, and installing nest boxes for Western Screech-owls. We accomplished this work through two of our existing programs; Nature Stewards and the Ryder Lake Amphibian Protection Project (RLAPP). Nature Stewards focuses on individual property owners while the RLAPP engages the entire community of Ryder Lake. Both programs focus on caring for the land through stewardships actions. These programs help enhance and protect habitat for over 12 federally listed species at risk, as well as all native wildlife species. The Fraser Valley is a biodiversity hotspot; recognized as one of only eleven Priority Places across Canada. This means it has been identified as an area of high ecological diversity and conservation importance. With the ongoing development pressures, it is critical that we all work together to ensure this unique biodiversity can persist on the changing landscape. Every stewardship action, no matter how small, helps. These programs provide a variety of ways that valley residents can get involved in conservation and help make a difference.	\$110,000	Joanne Neilson  Fraser Valley Conservancy
2-728	Photographic Recording of Breeding Cormorants to Support Effective Population Management in the Salish Sea	Cormorants are indicators of ecosystem health in marine and near-shore ecosystems that track ecosystem change, including environmental pollutants, prey abundance and human disturbance. Double-crested Cormorant (Blue-listed) populations in the Salish Sea have declined in recent years. We developed new monitoring methods at large, vulnerable colonies to inform decisions on how to curtail human activities that have the potential to disrupt these important colonies. This project improves our understanding of conservation outcomes for the largest remaining colonies in the Salish Sea. We photo-documented the complete failure of this species colony on Mittenatch Island compared to the successes observed on the Ironworkers' Memorial Bridge, an anthropogenic structure with beams ideal for nesting that also provide safety from terrestrial and aerial predators.	\$52,000	Ruth Joy  Simon Fraser University
2-729	Tom Berry Gravel Pit - Transforming a Gravel Pit into Functional Fish and Floodplain Habitat as Protected Park-Conservation Space	Five years of restoration and construction activities have paid off for wild pacific salmon, sturgeon, steelhead and the Southern population Orca Whales!  The challenge: Fish stranding The Tom Berry gravel pit was used to construct the Coquihalla Highway in the 1980's. It was built adjacent to the Fraser River. Once the active gravel extraction stopped, this pit was left as a relic. Unfortunately, its geographical location on the floodplain meant that during Fraser River flooding, the pit would fill with water and salmon from across BC. But, as water-levels dropped, the pit was disconnected, leaving fish stranded in disconnected pools of water. This also meant fewer salmon were available as food source for the orca whales (who depend on this for marine survival).  The Opportunity: Taking action to restore aquatic connectivity and stop fish stranding Lead by the Fraser Valley Watersheds Coalition, Funded by Habitat Conservation Trust Foundation, DFO Coastal Restoration Fund, TD Friends of the Environment and BC Wildlife Federations Wetland Workforce project, and supported by many partners, the disconnected and highly fragmented pit that only had pockets of water was restored and now supports lake-like conditions comparable in size to 57.5 hockey rinks!  How? Permanent outflow channels were constructed, the pit was contoured and enhanced to support floodplain ecology. The outlet channel also supports Bristol Slough with freshwater and supports mainstem aquatic species including the white sturgeon. Beyond the physical construction efforts, there was a need to value and better understand the archaeological and ethnographic context of this site, which resulted in the analysis of over 5000 artifacts! What was learned is that this site was once a place pre-contact First Nations used to make stone tools!  As restoration efforts slows and shift to enhancements, monitoring and maintenance, the next phase is to share on the results and observations and identify opportunity to conserve the past and future ecological, social and cultural values on this landscape. To learn more about this project visit: <a href="https://fvwc.ca/our-work/tom-berry-starrets-pond-trail/">https://fvwc.ca/our-work/tom-berry-starrets-pond-trail/</a>	\$251,800	Natashia Cox  Fraser Valley Watersheds Coalition
2-730	Developing Genetic Primers to Identify Agricultural Pests in Bat Guano	Bats are incredibly important species that shape the health of our ecosystems and the functioning of our economies. Through their consumption of insect pests, bats make significant contributions to agricultural systems, reducing the need for pesticides. However, understanding the full extent of the services that bats provide is difficult because identifying the insect species that bats eat is challenging. Before the advent of genomic technologies, describing bat diets required sifting through bat guano to look for evidence of insect species. But, environmental DNA (eDNA) has revolutionized our ability to understand bat diets. eDNA is the collection of genetic material of the organisms of interest from environmental samples rather than needing to actually "see" the organisms themselves. It provides a "genetic fingerprint" of a sample, by detecting numerous genetic sequences in a single sample. To enhance our ability to understand bat diets in British Columbia, we developed a genomics approach to identify insect species in bat guano using eDNA.  Working with community bat roost stewards, we collected bat guano from 25 roosts throughout British Columbia. These samples were analyzed using a genomic approach that sequences genetic information from the bat guano and then matches these sequences to known genetic sequences. To facilitate this process, we compiled a large reference database of genetic information obtained from insects and mammals. This will allow us to explore not only which species bats are eating, but also how bat diets vary over space and time. Together, this information will be instrumental in shaping our understanding of bat ecology in the province and the role they play in consuming insect pests. In turn, this knowledge will be shared with agriculturists and conservationists in the province to inform policies and practices to promote healthy bat-agricultural relationships now and in the future.	\$75,000	William Hsiao  Simon Fraser University





2-731	South Coast Conservation Land Operation & Maintenance Field Teams	Ducks Unlimited Canada and the South Coast Conservation Land Management Program hired teams of early career young adults to conduct high priority operation and maintenance activities throughout 15 provincial conservation lands throughout the BC South Coast. Conservation lands require ongoing active management to support the ecological integrity of critical habitat for regionally to internationally important fish and wildlife. Field teams gained hands-on experience with conservation land management by conducting important activities, such as invasive plant management, public education and outreach, maintenance of infrastructure, and wetland restoration.	\$140,000	Eric Balke  Ducks Unlimited Canada
2-732	Wetland Creation and Enhancement in the Little Campbell River Watershed	Streamside forests are critical biodiversity and climate change mitigation. In 2021, A Rocha was able to enhance over 2000 m2 of important streamside habitat, improving conditions for fish and wildlife as well as improving filtration resulting in a cleaner healthier river. Over 1000 native trees and shrubs were planted with the help of 200+ volunteers, now inspired to continue conservation efforts in their particular places. Habitat restoration work continues to be a focus of A Rocha's work alongside many partners including Semiahmoo First Nation towards the flourishing of the TATALU (Little Campbell River) and receiving waters of Boundary Bay.	\$55,500	Christy Juteau  A Rocha Canada
2-733	Sumas/Lower Fraser Fisheries Alliance Bank Stabilization Fish and Fish Habitat Survey	<p>Naturally occurring back-eddies are important holding areas for terminally migrating adult salmon, out-migrating smolts as well as feeding and spawning sites for non-salmonid species, such as eulachon and white sturgeon. While they serve as important habitat, they may also erode banks leading to issues with bank stabilization. This has occurred to the bank adjacent to the Matsqui Dike (Ridgedale, East of the Mission Bridge), which has triggered the Dike Maintenance Act and emergency stabilization initiatives by the Province and City of Abbotsford. While the dike was secured, this non-consulted work resulted in the destruction of various traditional fishing sites of the Sem:ath First Nation. As this portion of the river succumbs to increase flows along the bank, newer bank stabilization initiatives have been proposed and collaboratively discussed with the Sem:ath Nation, City and Province to ensure that the dike is secured whilst protecting fish species, habitat and traditional fishing sites. Therefore, given the importance of the traditional site, the Lower Fraser Fisheries Alliance (LFFA) in collaboration with Sem:ath First Nation have developed and implemented a hydroacoustic fish and habitat monitoring study, to understand how bank stabilization initiatives may affect migrating and resident fish species within the area. To do so, data from before, during and after stabilization construction will be compared.</p> <p>The CESI funding provided by the HCTF has allowed for the LFFA to hire two field technicians and accommodate biologist time to the project. With this increased capacity we continued deploying our ARIS Explorer 1800, a hydroacoustic sonar, in six equidistant monitoring sites along the proposed construction area for 6-8 hours a day (1-2 days a week) as well as targeted 24-hour surveys during Food, Social and Ceremonial Fisheries (FSC). Sites within the construction area were selected based on their proximity to one another, bathymetry and accessibility. Basic habitat variables were taken during all surveys and boat traffic was noted. A database with fish detections has been established. In 2021/22, we deployed the ARIS for 55 days, collected over 800 videos and have counted approximately 73,200 fish detections (resident species, suspected salmon and white sturgeon). In mid-August and early September, there was an increase suspected salmonid species as large numbers of fish were observed in videos and real time (while the ARIS was deployed). Additionally, over the course of the surveys, 63 sturgeons have been detected.</p> <p>This work is extremely important as it is a long-term monitoring project that aims to determine how bank stabilization will affect fish and habitat use before, during and after construction. While construction has not taken place yet, we have collected a great deal of "before" data that can aid with planning and implementation. This program has also aided Sem:ath First Nation in acquiring information on important fish species within their territory and with the implementation of additional ARIS programs. They can use the information to ensure that the conservation of the fish, habitats and traditional fisheries are considered a top priority throughout the entirety of the project amidst anthropogenic changes.</p>	\$90,000	Ashlee Prevost  Lower Fraser Fisheries Alliance Society
2-735	Developing Tools to Anticipate Instream Flow Needs for Fish Under Climate Change	<p>Salmon and trout in streams depend on adequate flow for juvenile and adult rearing, and to maintain cool temperatures. Many fish populations in BC are stressed by low summer flows, which is compounded by human demands for water for irrigation, industrial use, domestic water supplies, as well as climate change. Climate change is decreasing snow packs, extending the duration and severity of the summer low-flow period, and increasing stream temperatures (e.g., 2021 heat dome). Although guidelines exist for managing low flows in B.C., there is considerable uncertainty around the actual response of fish populations to reduced flows, and the specific flow thresholds that may trigger negative impacts of flow reduction, either in the present or under future climate change scenarios.</p> <p>The goal of this project was to perform a literature review and meta-analysis of fish-flow relationships from the primary literature and BC Hydro Water Use Plans to see if there was consistent quantitative support for current flow guidelines intended to trigger concerns for high risk of negative impacts of water withdrawals to salmonid productive capacity in streams; and to see if quantitative generic relationships could be derived to help guide flow management in data-deficient systems, or to predict future responses to flow reduction under climate change scenarios.</p> <p>Our literature review and meta-analysis provides strong support for a high risk of reduced salmonid productive capacity at flows below a 20% mean annual discharge threshold during both summer and winter. It also provides strong evidence for positive effects of increased flows well above a 20% mean annual discharge threshold in many streams, which should therefore be viewed as a floor on target habitat capacity rather than a ceiling. This information, and ongoing additional analysis and publication in the primary literature will help refine application of current instream flow guidelines, contributing to better instream flow management in B.C. and better protection of salmonid habitat capacity, while also helping to inform projected impacts of climate-related changes in streamflow.</p>	\$43,000	Jordan Rosenfeld  University of British Columbia



2-736	Pilot Program: Supporting Local, Small-Scale Hobby Farmers and Horse Farmers	<p>This project explores the application of beneficial practices and infrastructure options, mainly focusing on horse owners, and implemented a site visit/farm report for one farm. The goal was to establish healthier farms for the future by shifting knowledge into beneficial practice. The farm report uses transferable ideas and communication aids already adopted in the Environmental Farm Plan. Specifically, the report categorizes opportunities to enhance farm practices under three pillars: Waste Management, Pasture Management and Water Management.</p> <p>FVWC targeted horse owners for this project, as Horse owners often do not qualify for programs like the Environmental Farm Plan because they do not have farm status. Yet, they own acreages and need to manage them appropriately, often with little support or experience. With limited equestrian farmland operational knowledge, and with limited to no resources to help improve land and water management practices, large areas of land are exposed to environmental risk. We refer to this as the gap in the system.</p>	\$15,000	Rachel Drennan  Fraser Valley Watersheds Coalition
2-737	STSA Environmental Remediation Priorities Inventory and Planning	The S'ólh Téméxw Stewardship Alliance (STSA) Environmental Remediation Priorities Inventory and Planning Project supported the STSA and member First Nations in identifying environmental sites of concern and priority restoration needs throughout S'ólh Téméxw (Stó:lō traditional lands). The project supported the hiring of three staff within the STSA's S'ólh Téméxw Guardians program and supported their training as a BC Wildlife Federation Wetlandkeeper and in Stó:lō Cultural Heritage. The project inventoried and mapped priority sites for restoration. Monitoring process and protocols were designed and developed to collect data on these sites. This project provides a solid foundation for future environmental restoration work.	\$75,000	Jillian Spies  S'ólh Téméxw Stewardship Alliance (STSA)
2-738	Climate Corridors from Cascade to Coast Mountains of Southwestern British Columbia	This project was a partnership of St'at'imc Eco-Resources and UBC that established 13 long-term wildlife survey sites in the lower Lillooet Valley and Duffy Lake Road in southwestern British Columbia. These remote cameras sites were lure with a automated scent dispenser that allowed long-term operation of the site. Data are help by St'at'imc Eco-Resource and enter into a synthesis project assessing structural and functional connectivity of protected areas in southwestern British Columbia.	\$150,000	Bill Harrower (Ministry of Forests, Lands, Natural Resource Operations and Rural Development)  St'at'imc Eco-resources



## Approved Projects in the Thompson–Nicola Region

Project #	Project Name	Project Summary	Funding Amount	Project Lead
3-443	Whitebark Pine Seed Orchard Development	<p>Whitebark pine is an endangered tree species threatened by a number of stressors, predominantly a forest pathogen called white pine blister rust, but also mountain pine beetle, changes to historic fire regimes and global climate change. This project demonstrates one strategy to alleviate this decline through the establishment of a cooperative tree improvement program, and the establishment of seed orchards to produce white pine blister rust-resistant seed and seedlings. The landscape level goal of the project is to promote conservation and restoration of whitebark pine and its associated ecosystems by increasing the prevalence of blister rust resistant genes on the landscape.</p> <p>Tree improvement programs are used by forest managers and geneticists to select superior individuals from the wild for specific traits (e.g. disease resistance) and put them through a testing process that allows for selection and reproduction of superior trees. Whitebark pine are found at high elevations and difficult to access locations, they grow incredibly slowly and have low healthy population numbers across most of their natural range. The seed orchards that are being established allow us to breed for blister rust resistant genes and supply blister rust resistant seeds and seedlings in order to support restoration and reforestation efforts across Western Canada. This has implications for climate change in terms of carbon sequestration, but also ecosystem restoration and conservation of this keystone species.</p> <p>The key accomplishment of this project is establishing one of the first whitebark pine seed orchards in Canada in the Okanagan near Elkhart on the Coquihalla connector. Although more work is required to complete the orchard, this project will result in tangible benefits by providing a long-term secure disease resistant seed supply that will be used to restore sensitive alpine ecosystems and ensure the continuing presence of a keystone species and the ecosystem services it provides.</p>	\$40,000	<p>Kendra Bennett</p> <p>The Whitebark Pine Ecosystem Foundation of Canada</p>
3-444	Species at Risk Management in Skeetchestn Traditional Territory	<p>Work in 2020 and 2021 involved many species at risk and habitat at risk. Field work showed an expanded ranges and habitat health that ranged from excellent to highly at risk in the project area, allowing a focused restoration plan to be developed for 2022 to increase species at risk habitat quality in the Skeetchestn Traditional Territory. This work is guided by the Skeetchestn Species at Risk Management Plan, and supports on-the-ground actions to increase healthy habitats, knowledge, and capacity within the community.</p>	\$100,000	<p>Mike Anderson</p> <p>Skeetchestn Natural Resources LLP</p>
3-445	Secwepemc Collaborative Stewardship Project	<p>Guardian Programs go by many names including Watchman, Rangers, Wardens, Stewards and Beach Keepers. Guardian Programs around the world have a reputation for advancing recognition and reconciliation with indigenous people as stewards of their traditional territory for the benefit of fish, wildlife, and ecosystems.</p> <p>Many guardians have university degrees in the environmental field and marry the ‘western’ economic and science approach to stewardship with their community’s traditional ecological knowledge (TEK) so that stewardship “Walks on Two Legs” for the benefit of fish, wildlife, and ecosystems, while advancing recognition and reconciliation.</p> <p>The goal of the HCTF Secwepemc Collaborative Stewardship Project (The HCTF Project) was to advance the Secwepemc Territorial Stewardship Program (Secwepemc TSP) by providing funding to Secwepemc communities to employ Territorial Stewards to receive training and advance collaborative stewardship providing benefits to fish, wildlife, and ecosystems, as well as advancing recognition and reconciliation:</p> <ol style="list-style-type: none"> <li>1. Advance the Secwepemc Territorial Stewardship Program;</li> <li>2. Employ qualified Secwepemc community members as Territorial Stewards;</li> <li>3. Collaboratively deliver stewardship training for Territorial Stewards to enhance their knowledge and skills;</li> <li>4. Undertake general Territorial Stewardship activities that benefit fish, wildlife and ecosystems;</li> <li>5. Support the advancement of recognition and reconciliation with Secwepemc.</li> </ol>	\$375,000	<p>Bhupendra Khadka (prev: Rob Purdy)</p> <p>Ministry of Forests, Lands, Natural Resource Operations and Rural Development</p>



3-446	Snake Den Movement and Temperature Monitoring	<p>The Southern Interior of British Columbia is home to seven snake species and four of those are species at risk. Great Basin gophersnake, Western rattlesnake, and North American racers have all been assessed as Threatened by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) with Great Basin gophersnake and Western Rattlesnake listed as Threatened in the federal Species at Risk Act (SARA) and racers are being considered for listing under SARA. All snake species in BC hibernate in denning sites in the winter from approximately September/October to April/May. Rattlesnakes are well known to den communally, meaning that a population in an area shares a denning site in the winter. In addition, gophersnakes, racers and rattlesnakes have all been observed denning together though there is recent evidence that gophersnakes also den on their own including individual snakes denning in soil dens.</p> <p>There are hundreds of known rattlesnake dens across BC because of years of inventory work and recent research has informed how far and what habitats rattlesnakes use in the spring and summer after they move from their dens. There are gaps in our knowledge of when rattlesnakes move to dens in the fall and leave dens in the spring, whether this varies across the southern interior, and if these movements are related to temperature. The relationship to temperature is also important for understanding how rattlesnakes may adapt to and how vulnerable they are to future climatic change. Finally, as noted above, there is a gap in our knowledge of how often gophersnakes and racers use rattlesnake dens.</p> <p>This current project deployed remote cameras and temperature loggers and 6 known rattlesnake dens across the species range in BC from the Fall of 2018 to the Spring of 2021. Cameras were set to record photos every 1 minute in 2018 and every 5 minutes in the following years and were pointed at the den entrances. Temperature loggers recorded temperatures every 2 hours and recorded ground and air temperature. Photos were reviewed manually for snake presence, the number of snakes and the species. Overall, snake presence at hibernacula during the spring was related to temperature. In the fall, snake presence was related to temperature at night and related to daytime temperature in some seasons and not others. In general, the relationship with snakes and temperatures in the fall was not as clear. Racers were seen in multiple seasons at multiple of the rattlesnake dens sites while only one gophersnake was caught on camera at one of the six den sites over all the years of data. Rattlesnakes bask outside den sites for long periods of time in the spring and fall while gophersnakes and racers are not known to bask at den entrances. Therefore, remote cameras may not be as useful for determining den locations for racers and gophersnakes and this project can also provide advice on use of remote camera technology in snake inventory and research. However, this project had such a low detection rate for other snake species and suggests that gophersnakes may not use rattlesnake dens on a in large numbers and is consistent with recent telemetry research on gophersnakes in the Okanagan.</p>	\$30,000	Karl Larsen Thompson Rivers University
3-448	Inventory for Late-Season Southern Interior Invertebrate Species at Risk	<p>Western Bumble Bee (COSEWIC Threatened) was once considered one of the most common and widespread bumble bees in Western Canada, and has experienced a significant (&gt;30%) decline the past decade, and it has been lost from a number of sites in the southern portions of its range where it was once abundant. This bumble bee (all bumble bees) were one of the focal species of this CESI project. The species was recorded from at least 40 sites in the southern interior. These sites included Christina Lake Provincial Park, E.C. Manning Provincial Park, Kikomun Creek Provincial Park, Mount Fernie Provincial Park, Elk Valley Provincial Park, Wasa Lake Provincial Park, Premier Lake Provincial Park, Monk Provincial Park, Juniper Beach Provincial Park, and Lac Du Bois Grasslands Protected Area.</p>	\$76,000	Katie Calon The British Columbia Conservation Foundation
3-449	Protecting Ecosystem Integrity at Menzies Lake	<p>This project completed a desktop exercise groundtruthed by field site visits to access wildlife and ecosystems and plants, with particular focus on species at risk to determine the conservation values of this Conservation property. This information is necessary to fully understand the current environmental values for consideration in conservation planning exercises. Some progress was made to protect Menzie Lake from unauthorized access and use.</p>	\$50,000	Robert Land British Columbia Conservation Foundation
3-450	Adams Lake Restoration Project	<p>Adams Lake Indian Band (ALIB) is leading a salmon restoration project on Adams Lake to address the degradation of lake rearing habitat and to restore the Upper Adams early summer run Sockeye (Sḡlelten7úw' i in Secwepemctsin; <i>Oncorhynchus nerka</i>). The lake restoration involves the addition of limiting nutrients, nitrogen and phosphorus, to increase phytoplankton and zooplankton production, and lead to increased Sockeye fry/smolt growth and survival. This is a 4-year project with baseline data collection completed in 2020 and nutrient restoration/monitoring from 2021-2023. CESI funding supported some of the primary productivity (extra site and an additional month), monitoring for invasive perch within the lake and monitoring other fish species within the watershed, Bull Trout (as well as providing valuable training opportunities to the Adams Lake Indian Band technicians). Primary Productivity and perch monitoring work was completed as proposed. Due to the wildfires and field conditions the Bull Trout program wasn't completed as proposed.</p>	\$125,000	Shannon Harris Ministry of Environment and Climate Change Strategy



## Approved Projects in the Kootenay Region

Project #	Project Name	Project Summary	Funding Amount	Project Lead
4-644	Forsyth Creek/ Cadorna Creek Ecosystem Restoration	The Forsyth Creek Enhancement Project aims to enhance habitat for moose, bighorn sheep and mule deer spring, summer and fall ranges. The final stage of this enhancement project is prescribed burning to open forests to increase movement and forage. This site currently lacks ground material to carry the fire across the enhancement area. Slashing work completed this year is intended to provide downed material for the fire to consume and move to higher elevations. This fuel loading will increase the success of prescribed burn application, which is planned for the upcoming fall.	\$140,000	Larry Ingham  Ministry of Forests, Lands, Natural Resource Operations and Rural Development
4-645	Highway 3 Safe Passage Wildlife Mitigation	<p>This project aims to improve winter and transitional habitat for ungulate species including bighorn sheep, mule deer and elk. These sites have been selected as high priority sites for multi-species habitat enhancement. Invasive plant management is a critical component to enhancement activities, as invasive plants can challenge site suitability for ungulate species as they do not provide productive forage. Best Management Practices for invasive plant management and ecosystem restoration recommends the pre- and post-treatment of invasive plants. The Lizard/Galton restoration sites are at varying stages of project implementation. Some sites have been burned and invasive plant (post-treatment) management is underway, and some sites are undergoing invasive plant treatments to prepare sites for burning (pre-treatment).</p> <p>This ungulate winter range restoration project includes an intensive monitoring portion to track the effectiveness of both herbicide and prescribed burn treatments, and plant response to each. This data will be specific to our region and will help guide and inform future management and restoration activities for the area.</p>	\$510,000	Emily Chow  Ministry of Forests, Lands, Natural Resource Operations and Rural Development
4-646	Galton/ Lizard Mountain Ungulate Winter Range Restoration	<p>This project aims to improve winter and transitional habitat for ungulate species including bighorn sheep, mule deer and elk. These sites have been selected as high priority sites for multi-species habitat enhancement. Invasive plant management is a critical component to enhancement activities, as invasive plants can challenge site suitability for ungulate species as they do not provide productive forage. Best Management Practices for invasive plant management and ecosystem restoration recommends the pre- and post-treatment of invasive plants. The Lizard/Galton restoration sites are at varying stages of project implementation. Some sites have been burned and invasive plant (post-treatment) management is underway, and some sites are undergoing invasive plant treatments to prepare sites for burning (pre-treatment).</p> <p>This ungulate winter range restoration project includes an intensive monitoring portion to track the effectiveness of both herbicide and prescribed burn treatments, and plant response to each. This data will be specific to our region and will help guide and inform future management and restoration activities for the area.</p>	\$100,000	Larry Ingham  Ministry of Forests, Lands, Natural Resource Operations and Rural Development
4-647	Wildlife Monitoring in Wildfires	<p>Salvage logging is the harvesting of the timber in a site that has been affected by a natural disturbance, such as fire. There is strong evidence that post-fire sites are important for wildlife, with many studies showing greater use by bears and ungulates compared to unburned sites. However, there exists little to no research on the effects of salvage logging on wildlife and their habitat. Our study aims to compare wildlife densities in intact-burnt sites versus wildfire salvage log cutblocks. To do this we set up 60 wildlife cameras across 19 fires in the Kootenays, 10 that had been salvage logged and 9 that had been left untouched. The cameras took pictures throughout all four seasons and snow depths were recorded at each camera every day for 9 months. We wanted to measure differences in snow depths between unlogged and salvage logged sites to see if there was a difference in the amount of energy an animal would need to expend in order to cross that site, with deeper snow being harder to travel through for most animals.</p> <p>We were successful in collecting all of our data from the field sites and we classified 100,423 images containing wildlife. Species seen included: grizzly bear, black bear, coyotes, wolves, red foxes, wolverines, cougars, bobcats, lynx, elk, moose, white tail deer, mule deer, snowshoe hare, short-tailed weasels, squirrels, and chipmunks.</p> <p>Our next steps are to calculate the density of each species of interest (grizzly bear, black bear, wolves, coyotes, cougars, elk, moose, white tail deer, and mule deer) and analyze the data to determine if there are differences between salvage logged and unlogged treatments. This information can then be used in determining forestry practices in burned areas based on wildlife needs.</p>	\$25,000	Samantha Mertens  Ministry of Forests, Lands, Natural Resource Operations and Rural Development
4-648	Road Deactivation and Restoration in the East Kootenays	<p>In the Elk Valley, roads contribute the highest hazard to the well-being of grizzly bears, bighorn sheep, and aquatic habitat. Roads increase the ease with which predators and humans can access otherwise secure wildlife areas often leading to encounters and actions that harm wildlife and their habitat. Road densities in the Elk Valley are very high, 88% of watersheds currently exceed the maximum densities of roads grizzly bears can tolerate, and 91% exceed the high hazard levels near fish-bearing streams. Road rehabilitation has been identified as a beneficial management action to reduce harm on wildlife and habitat in this region.</p> <p>Our goal is to rehabilitate 70-90 km of resource roads for habitat restoration in the Elk Valley over a 3-year period. Restoration will provide multiple ecosystem benefits: reduced invasive species spread, restored stream flow, reduced erosion, and carbon sequestration. Habitat quality will be improved, and risk of wildlife mortality will be lowered. We will achieve this by digging up the roads, de-compacting the soil, restoring stream crossings, returning the hillslope to its natural shape, and planting trees.</p> <p>Within the last two years we have already rehabilitated 46.5 km of old roads in the Elk Valley. To date we have reduced road densities in 9 watersheds, thus enhancing habitat for both terrestrial and aquatic species. One of these watersheds was converted to a secure grizzly bear watershed since the road density was reduced to levels less harmful to grizzly bears. We are now in the process of choosing the roads to be rehabilitated in 2022.</p>	\$150,000	Samantha Mertens  Ministry of Forests, Lands, Natural Resource Operations and Rural Development



4-649	McDonald Prescribed Burn	Prescribed burning will enhance winter habitat to support Rocky Mountain bighorn sheep populations in the Galton Range. This project builds upon ongoing efforts and aims to enhance forage and restore ecosystem function, diversity and resiliency on bighorn sheep ranges. Prescribed burning will enhance sightlines for predator avoidance through opening forest structure, and rejuvenate browse species through increasing the cover and biomass of bunchgrasses and shrubs. Forage will also be enhanced through the project's invasive plant management plan that will reduce the establishment and spread of invasive plants, and promote native plant growth. Enhancement efforts will benefit other ungulates that use the area for winter range, including elk, mule deer and white-tailed deer. This will be the first prescribed burn applied to the site, as some objectives will require additional "maintenance" burns to achieve the desired state. Although the weather indices were not favourable for burning and the prescribed burn was not implemented this past year, site preparation is complete and the burn is shelf-ready for the next burn window!	\$30,000	Larry Ingham  Ministry of Forests, Lands, Natural Resource Operations and Rural Development
4-650	Evaluating and Improving Critical Habitat of Species-at-Risk in Southeast BC	Critical Habitat for Western Rattlesnake, Gophersnake, Tiger Salamander, Great Basin Spadefoot, and Williamson's Sapsucker in the Boundary region was assessed on public lands. Current habitat condition, disturbance and species occupancy was evaluated through desk-top and field studies to determine if Critical Habitat is functioning, functioning but at-risk, or non-functioning. Results from the project have informed recommendations for habitat and species management.	\$210,000	Lindsay Anderson  Ministry of Forests, Lands, Natural Resource Operations and Rural Development
4-651	Peckham's Ecosystem Restoration & Seeding Refurbishment	The Peckham's Ecosystem Restoration and Seeding Refurbishment project led to the improvement of 464 acres (or 188 Ha) of Crown lands. Sites that were historically cleared and converted to domestic fields in the 1970's and 1980's had become degraded. These sites hosted a variety of invasive plants, patches of bare ground and a highly reduced capacity to support the habitat/ foraging needs of elk, deer and other resource users such as livestock. By treating these historic sites using herbicide treatments, scarification of the land, and applications of seed and fertilizer, edible forage for wildlife was increased while the ecosystem's resiliency to disturbances, such as climate change, were improved. This project will help to benefit a variety of resource users such as wildlife, recreationists and livestock grazers and will serve as an example for how to restore these damaged and degraded sites into the future.	\$100,000	Hanna McIntyre  Ministry of Forests, Lands, Natural Resource Operations and Rural Development
4-652	Peckham's Range Unit Restoration Plan	The Peckham's Restoration Plan is a coordinated resource management plan developed for the improvement of ecosystem health in the Peckham's range unit. With a focus on primary land use values such as wildlife and wildlife habitat (primarily elk and ungulate winter range), ecosystem health, and range management, the plan provides a path forward for investments in the land base. The plan defines the current health of the ecosystem through the compilation of existing datasets, the collection of new data and the development of a forage assessment estimate based on current rangeland health conditions. A land use values assessment provides a closer look at the overlapping values on the landscape and identifies the areas of high value/ significance. The plan then provides enhancement project and management recommendations based on highest returns for investments and greatest ecological need. The Peckham's Restoration Plan is the first of its kind and will help to inform habitat and rangeland enhancement in the Peckham's Range Unit while informing resource management and allocation decisions into the future.	\$70,000	Hanna McIntyre  Ministry of Forests, Lands, Natural Resource Operations and Rural Development



## Approved Projects in the Skeena Region

Project #	Project Name	Project Summary	Funding Amount	Project Lead
6-122	Guardian Program to support Conservation in the Meziadin Watershed – Assessing Climate Resilience	<p>The Meziadin Indigenous Protected Area (MIPA) contains critical habitat for spawning Nass sockeye, chinook and coho salmon, as well as other freshwater species, moose, grizzly, mountain goat and numerous other species of cultural and ecological significance. Climate change threatens to tip the balance that has existed here for thousands of years, in addition to the recent increase in interest from mineral exploration companies, and some past damage from logging in the now-protected Hanna Tintina Conservancy.</p> <p>The Gitanyow Lax'yip Guardians and the Gitanyow Fisheries Authority are leading integral stewardship activities in the MIPA, supported by CESI and other funders. Gathering hydrology and water quality data, assessing health of moose habitat, and monitoring moose and salmon harvest provides much-needed trusted data for Wilp Wii Litsxw to continue to steward the area in a sustainable manner from generation to the next.</p> <p>In partnership with the Skeena Fisheries Commission, the Gitanyow have installed water quality instruments in Meziadin Lake to monitor temperature, PH, turbidity, and total algae measurements. This data will help inform fisheries management, as the lake is critical spawning and juvenile rearing habitat for 3 species of salmon, as well as bull trout and steelhead. Ongoing stewardship and monitoring is essential for the sustainable management of the human activities affecting the MIPA.</p>	\$110,000	Tara Marsden  Gitanyow Hereditary Chiefs
6-123	Lower Otter Creek Wetland Restoration	<p>Taku River Tlingit First Nation (TRTFN) worked with SLR Consulting to restore aquatic and terrestrial habitat on the lower part of Otter Creek, an area damaged by historic placer mining. The main goal was to create healthy ecosystems in the water and on land. This was done in a way that engaged the TRTFN and Atlin communities.</p> <p>The creek, which still has active placer mining upstream, was carrying silt to Surprise Lake, affecting water quality, and fish habitat in the area. In 2021, we worked with a local placer mining company to construct a stable, low slope channel to divert the creek so it moved slower and would flow through two repurposed settling ponds. The design included construction of fish habitat, and arctic grayling were found throughout the system the following year.</p> <p>In 2021 and 2022, we worked with a local crew from the Atlin Tlingit Economic Limited Partnership (ATELP) on revegetation of the area. We transplanted young plants and collected seed from local species, including pine, poplar, soapberry, lupine, locoweed (oxytropes), and many other local, native species. Traditional Tlingit knowledge was considered in choosing the plant species.</p>	\$800,000	Jackie Caldwell  Taku River Tlingit First Nation
6-308	Provincial Whitebark Pine Data Collection, Analysis and Conservation Management	<p>Whitebark pine is a keystone species occupying high elevation and sub-alpine environments. Known for pioneering harsh environments these old-aged slow growing trees are expected to decline in British Columbia at an annual rate of 1.5%, which over 100 years is 78%. Causes of this decline are attributed to a pathogen called white pine blister rust, mountain pine beetle, fire and climate change. The loss of this species will be detrimental to the many wildlife species, such as grizzly bears, that utilize nuts as a source of forage and impair ecological functions, such as moderating snow pack run off. In consideration of the expected decline, whitebark pine is the only designated tree under the federal Species at Risk Act in western Canada. Occurrence of whitebark pine populations within Tweedsmuir Provincial Park represent the current northern range limit of the species in British Columbia. Difficult access has resulted in limited information being acquired about species distribution and habitat associations within Tweedsmuir Provincial Park. The primary intent of this project was to complete ecosystem classification mapping of whitebark pine, acquire genetic material for rust screening and vegetation material for propagation to assist with species recovery. This project also supported the development of sector based best management practices and loading of provincial whitebark pine occurrence data into the species inventory database. This information will serve as an important foundation for future conservation planning. This project provided meaningful employment opportunities for regional biologists and furthered the provincial understanding of an endangered species at the northern limit of its range.</p>	\$55,000	Kendra Bennett  Ministry of Forests, Lands, Natural Resource Operations and Rural Development



## Approved Projects in the Omineca/ Peace Region

Project #	Project Name	Project Summary	Funding Amount	Project Lead
7-559	Saik'uz Restoration Plan	<p>The Saik'uz Ecosystem Restoration project arose to address cumulative impacts effecting the Saik'uz First Nation. It highlights many different values: hydrological and riparian, wildlife, fisheries, economic opportunities, and First Nations values – both traditional and contemporary. The project focused on the development of an Ecosystem Restoration Plan (ERP) to guide restoration activities within Saik'uz First Nation's territory. This was a large collaborative planning effort between Saik'uz First Nation and the Province that was led by Dave Daust and Karen Price Consulting. Two implementation projects were also developed and delivered within Saik'uz First Nation's territory to address the declining moose population observed in the Omineca region. The first was a moose habitat enhancement project designed in collaboration with the Province, Saik'uz First Nation, and SERNbc. The purpose was to modify the stand structure of dense pine plantations to provide forage and movement opportunities for moose and provide additional habitat features for other wildlife. The second was a road rehabilitation project to reduce linear feature densities shown to negatively impact moose populations and biodiversity as a whole.</p> <p>The moose habitat enhancement treated four treatment areas that were 1400ha in size. Within these treatment areas the stand structure of pine plantations were modified to produce variable density spacing and small openings to re-establish habitat features that are not found in a typical plantation. Stand structure modifications were intended to promote forage and movement opportunities for moose as well as to increase overall biodiversity in a monoculture plantation. Road rehabilitation activities were planned and implemented to address the impacts of high linear feature densities negatively effecting moose, other wildlife and fisheries. Saik'uz First Nation's territory has linear densities up to 8 times the generally accepted threshold of 0.6km/km<sup>2</sup> above which wildlife is no longer self-sustaining and begins to decline. This project resulted in the removal of 88 km of resource roads in Saik'uz First Nations territory.</p> <p>The Saik'uz ERP was developed to identify where and how future restoration is invested in by identifying Saik'uz First Nations values and priorities within their territory. Values are prioritized through zones to identify key areas for wildfire risk reduction, restoration activities and resource development. It is expected that this will become an overall plan for landscape planning, enact zonation, and give direction to government programming. Since the initial development of the ERP its scope has increased and may also provide guidance to industry operating within Saik'uz First Nations territory in the future.</p>	\$780,000	<p>Brandon Geldart (prev: Mark Steynen)</p> <p>Society for Ecosystem Restoration in Northern BC</p>
7-560	Using Large-Scale Functional Habitat Restoration Tools to Enhance Moose Populations in Northcentral British Columbia	<p>The purpose of this restoration project is to judiciously modify the structure and spacing of young lodgepole pine stands while minimizing long-term costs to timber supply. Specific restoration actions will include the use of variable-density spacing and the creation of small openings capable of supporting diverse species and structure currently missing from the successional trajectory of young pine stands. These actions are intended to increase future forage availability in proximity to cover and to improve the ability of some regenerating stands to serve as winter range for moose. The project is a collaboration between the Province, Saik'uz First Nation, and SERNbc.</p> <p>The objectives of the project are to treat as large of an area as possible; commensurate with the scale of the disturbance as outlined in our original project proposal. We have completed the design phase of the project and selected 4 hexagons (each hexagon is 1400 ha) for treatment in an area south of Vanderhoof, BC. A combination of machines including a mini feller buncher, remote tracked chipper, two small excavators with a shear head and mulching head (each), a hydro-axe, and excavator mower have been trialed. During the winter months of 2021, we treated 143 ha in the initial trial hex AA-11 and during the winter of 2022, we treated an additional 46.8 ha in the second hexagon Z-12. The full range of gap sizes and thinning densities have been trialed and plans are in place to initiate and complete treatment activities in a third hexagon (Z-11) in the fall of 2022.</p>	\$144,000	<p>Mark Steynen</p> <p>Society for Ecosystem Restoration in Northern BC</p>
7-561	Nechako White Sturgeon Restoration Action	<p>Nechako white sturgeon are endangered due to ongoing recruitment failure that has persisted for decades. The multiple partners that work together on the Nechako White Sturgeon Recovery Initiative are implementing multiple projects to understand the links between habitat conditions and recruitment limitations, as well as methods to restore natural recruitment. The current CESI funding provided some key opportunities to advance recovery actions for this population through work in three main areas: substrate restoration, juvenile predation, and juvenile winter habitat. The substrate restoration component developed a habitat restoration plan included involvement of specialists from outside the basin and that provides a long-term outlook on what will be needed for habitat restoration. Addition work in 2021 installed substrate monitoring grids on the bottom of the Nechako River. Ongoing virtual monitoring of these grids will provide information about how sand moves through key locations on the river bottom and the relationship between river discharge and sand infilling/removal. Other project components focused on the juvenile life stage. This included evaluating measures that could improve the survival of both wild and hatchery origin juveniles. A review of potential juvenile predators was followed by an evaluation of potential mitigation measures for various predator species. Since otters are a known predator, ongoing monitoring of otter feeding and latrine sites was conducted as well as evaluations of juvenile survival in different areas. A final component focused on monitoring juvenile white sturgeon habitats that are used during winter. Decreased winter discharge due to flow regulation, and/or other factors, could lead to decreased habitat quality, potentially increasing winter mortality. This collection of projects focused on advancing the recovery of white sturgeon was delivered in collaboration with multiple partners including the Provincial Government, First Nations and academic researchers.</p>	\$250,000	<p>Steve McAdam</p> <p>Ministry of Environment and Climate Change Strategy</p>





## Approved Projects in the Okanagan Region

Project #	Project Name	Project Summary	Funding Amount	Project Lead
8-481	Bighorn Sheep and Mountain Goat M. ovi and psoroptis Response Monitoring and Management Planning	<p>This project worked to collaboratively monitor and document the ongoing M.ovi disease outbreak in the South Okanagan. During this time ONA Wildlife biologist, BC Provincial Wildlife biologist and members of the public continually monitored and documented lamb recruitment, adult survival and movement of GPS Collared individuals. During this time public engagement, First nation working groups and international working groups all worked to develop a long term disease management and response plan.</p> <p>The 2021 lamb recruitment and collar movement data will be used to inform future planning, gain better understanding of the state of disease and help to engage local first nation communities.</p>	\$25,000	<p>Craig McLean</p> <p>Ministry of Forests, Lands, Natural Resource Operations and Rural Development</p>
8-482	Okanagan Lake Kokanee Stock Recovery	<p>This project supports Okanagan Lake kokanee stock recovery efforts by estimating kokanee stock abundance, regulating the Okanagan Lake fishery, evaluating impacts of the sockeye introduction and climate change on resident fish stocks &amp; habitat.</p>	\$35,000	<p>Tara White</p> <p>Ministry of Forests, Lands, Natural Resource Operations and Rural Development</p>
8-483	Road Mortality and Mitigation Monitoring for Snakes	<p>This project built on a longer-term study examining road mortality in a community of threatened snakes, and in particular, assessing the success of an attempt to lower vehicle kills by building under-road passages for the snakes. Because we have historic data at this site, dating back to before the passages were built, we are continuing to collect solid information on this conservation problem. The CESI funds enabled us to continue this work, by largely supporting a team of young biologists who did several things: (1) continued the collection of data on the population size of the snakes, (2) extended our monitoring of roadkill rates by conducting a large number of surveys to identify snakes (alive and dead) on the main roads, and (3) monitoring the use of the passages by snakes through cameras. The project provided critical training to the team members in several important areas in conservation biology, their chosen field. Although the analysis of the population and road mortality data is a continuing exercise, the data we collected this summer has pointed towards some interesting trends. Rattlesnake use of under-road passages did not appear to increase, but racers (another threatened species) are using the passages very frequently compared to other species. At the present we have no explanation for this phenomenon, but we have now launched more focused work on racer behaviour and ecology in subsequent years. Overall the deaths of snakes on the roads appeared to drop last year, but this is possibly attributable to the extremely hot summer along with an accompanying drop in traffic volume.</p>	\$47,700	<p>Karl Larsen</p> <p>Thompson Rivers University</p>
8-484	SAR Fish Monitoring and Inventory in the TOR	<p>The Umatilla Dace is a poorly understood species that occurs through the Columbia Drainage, including the Similkameen watershed in British Columbia. Within the Similkameen watershed the species is limited to a small number of low-density populations, which are believed to be on a declining trend. In 2004 the Umatilla Dace was included on Schedule 3 of the Species at Risk Act SARA and was subsequently designated by COSEWIC as threatened in 2010. Within the Similkameen watershed, the species has been identified in only a handful of isolated locations and there is considerable debate regarding its continued presence at a couple of these locations.</p> <p>This project applied eDNA sampling technology at 20 to 25 sites to confirm the presence of historically identified populations and inventory other locations that may provide suitable habitat. This non-invasive method represents the best tool to systematically and effectively locate the patchily distributed, low-density species, like the Umatilla Dace within the large watershed. In addition to the environmental goals this project was developed and executed to provide valuable partnership and training opportunities aimed at strengthening positive working relationships between provincial and first nations in the watershed.</p>	\$32,500	<p>Ryan Whitehouse</p> <p>Ministry of Forests, Lands, Natural Resource Operations and Rural Development</p>

