

Environment and Climate Change Canada
Canada Nature Fund: Community-Nominated Placed for Species-At-Risk

Kootenay Connect: Bonanza Biodiversity Corridor

YR 2 Annual Report

April 2020 – Mar 2021

Kootenay Connect is a project facilitated by Kootenay Conservation Program

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1 Summary of Progress

1.1 Project Milestones

The Bonanza Biodiversity Corridor (BBC) projects can best be described as a series of wetland restorations¹ while expanding our biodiversity knowledge of sensitive ecosystems and habitats throughout the corridor. After the first year of initial field work was completed, the scenario was set for detailed assessments and field surveys to occur in the Summer of 2020. These studies and assessments were conducted at both the restoration site level and at the corridor level (re: SARS, Beaver Habitat and Old Growth). The following list of field surveys and assessments were completed in Year 2:

- Archeological and Cultural Assessment (Oct 2020)
- Bonanza Restorations Fish & Invertebrate Baseline (Okanagan Nation Alliance, Oct 2020)
- Amphibian Survey (Sept 2020)
- SAR/Habitat Data Collection (July – Aug 2020)
- Beaver Habitat Assessment (Feb 2021)

Wetland Restorations: The wetland restoration at Hunter Siding was implemented in 2020. With the completion of site-specific field studies, the design and engineered plans were completed for the Summit Lake Marsh and the Upper Bonanza restoration sites. Permit applications were submitted to FLNRORD for S.11 Permit Approval under the Water Sustainability Act. A Special Access Permit was obtained from FLNRORD for crown land use and machinery access at the Upper Bonanza. Summit Lake Marsh and Upper Bonanza restoration work is scheduled for the Fall of 2021. Summaries of restoration plans are provided in Section 2 of this document.

Biodiversity and Species-at-Risk: Identification and classification of the ecosystems, habitats and species in the BBC has been ongoing for more than a decade. Datasets from previous field work, environmental assessments and species inventories were then updated with data and knowledge collected from 2019 to 2020. This expansion of our biodiversity knowledge was ongoing throughout the year and included upslope field work. Efforts in Year 2 were focussed on expanding data collection and identification of SAR, beaver activity and species monitoring within the corridor. These extensive data sets were then compiled and correlated to develop ecosystem mapping layers for the BBC. The resultant Terrestrial Ecosystem Maps (TEM) are a major milestone for the Bonanza project and is critical in establishing the level of conservation management needed. Maps provide the integrated knowledge needed to preserve the BBC's biodiversity and over time, its usefulness as a climate refugia. Ecosystem map layers developed for the BBC in Year 2 are:

- Species-at-Risk / Sensitive Habitats
- Beaver Habitats
- Old Growth / Mature Stands

¹ Restoration Sites are located in the riparian zones of Bonanza Creek and commonly referred to as Hunter Siding, Summit Lake Marsh and Upper Bonanza wetland complexes.

1.2 Related Project Documents

In addition to the delivery of BBC TEM maps, the following documents and reports are an integral part of this report and project deliverables for Year 2.

- *Archaeological Overview Assessment for Bonanza Restoration Sites*
- *Hunter Siding Restoration - Post-Construction Report*
- *Summit Marsh Restoration Plan – Technical Memorandum & Engineered Drawings*
- *Upper Bonanza Restoration Plan - Technical Memorandum and Engineered Drawings*
- *Monitoring Plan - Bonanza Ecosystem Enhancement Program*
- *Beaver Habitat Assessment*
- *Preliminary Summary of Biodiversity and Species-at-Risk Results*
- *Summary of BBC Old Growth*

2 Accomplishments by Project

2.1 Hunter Siding Implementation

The Hunter Siding restoration site implementation was completed in October 2020. Hunter Siding. This site called for extensive revegetation to replicate riparian zone features for this type of wetland with a prescription of vegetation planting, sculpting and creating biomass mounds for tree growth and enhanced wetland complexity. Relatively small restoration size but significant in the regeneration of wetlands for this disturbed site.

Hunter Siding vegetation test plots plantings from the fall of 2019, successfully survived the winter season. Protective sapling coverings were used to prevent beaver damage to young trees. In total, approximately 1,600 native trees and shrubs were planted: western redcedar, mountain alder, Engelmann spruce, paper birch, black cottonwood, willows and red-osier dogwood.

The Hunter Siding baseline monitoring program was established to monitor the survival rates and effectiveness of wetland contouring over time. See further details in the *Monitoring Program – Bonanza Ecosystem Enhancement Program*. Plantings and preventive measures taken during construction are summarized in the *Hunter Siding – Post Construction Report* submitted to and accepted by FLNRORD Water Management in Jan 2021.

2.2 Summit Lake Marsh Restoration Plan

The Summit Lake Marsh restoration is focussed on accommodating surface flow characteristics and hydro scenarios for a small stretch of deteriorated rail bed. All required permit applications, technical memos and engineered designs were submitted in Feb 2021, permit approval is expected by August 2021 with construction planned for Oct 2021. There are four main restoration components:

- Construction of 5 swales to direct water from the upstream to downstream
- Control of water movement along the upstream edge alongside the rail trail
- Raising of the rail trail bed in sections on either side of the swales
- Provision of pedestrian passage over the swales

Fish have been observed in the adjacent ponds and inhabit upstream spawning areas. In order to assure fish passage during fish in-migration periods, the eastern most swale will be shaped to focus water along one side of the swale and ensure adequate depth for passage. The swales will have zero slope to reduce water velocity and during the timing of Rainbow Trout in-migration, rising lake levels will provide additional assurance of enhancing fish in-migration conditions during early spring.

The western toad (*Anaxyrus boreas*) is known to migrate across the rail trail at the wetland restoration location. Adults move from the upland area to the lake breeding habitat in early spring and return to upland habitats in the fall. Swale construction is designed to support these toad migrations. The management of the rail trail includes seasonal closures for toad migrations. Beavers are also present in the adjacent wetlands. Given the close proximity of some of the beaver dams to the project site, precautions will be taken to minimize any impact on beaver activity and dams. Sedimentation mitigation and species protection during the construction period are provided in the Technical Memorandum for Summit Marsh.

2.3 Upper Bonanza Restoration Plan

The Upper Bonanza wetland complex is wide ranging in its' hydrology, habitats and species that it supports. Fish and amphibian studies were conducted throughout the restoration site and found it to be rich with life and biodiversity, including extensive beaver habitat (lodges, dams and larders). The Okanagan Nation Alliance (Fish Biology Division – Columbia Region) were commissioned to conduct a fish and invertebrate baseline study for this site. Fish study results and observations pertinent to the development of site-specific restoration plan, as follows:

- Presence of adequate spawning gravel for Rainbow Trout at the site
- Primarily juvenile Rainbow Trout rearing habitat
- Glide habitat was the most common habitat followed by pond and riffle habitats
- The riparian area cover was mostly comprised of shrubs, with few mature trees
- Sampling of the invertebrate community following the CABIN² protocol indicated excellent water quality with high diversity and representation of EPT (Ephemeroptera, Plecoptera, and Trichoptera);

The restoration site plan and design for this site addresses three main objectives:

- Reconnect valley bottom areas that have been hydraulically isolated from the creek
- Increase the hydraulic diversity in the Bonanza Creek mainstem by deflecting flows in straight sections adjacent to the rail bed towards the southwest bank
- Enhance the quality of instream rearing Rainbow Trout habitat by installing large woody debris features in several section

The Upper Bonanza Restoration Plan - Technical Memorandum and Engineered Drawings describe in detail the specific prescriptions, machine work, large woody debris requirements and placement. Included in the Technical Memorandum are the mitigation strategies and protection of sensitive habitats and species during the construction period.

² Canadian Aquatic Biomonitoring Network

2.4 Beaver Habitats

The *Beaver Habitat Assessment* is the result of 2 years of field work, research and digital monitoring of beaver activity and habitat structures in the BBC valley bottom. There is no question there is significant beaver activity, providing natural channelling and hydrologic flows throughout the corridor. The active beaver population in the corridor is estimated to be 85 beavers from 17 individual colonies. Beaver habitat maps were produced for the corridor identifying lodges, dams, larders and historical beaver habitats. Details, maps and further beaver observations are provided in the *Beaver Habitat Assessment* report.

2.5 Biodiversity and Species-at-Risk

The BBC is known as a biodiversity hot spot, with a diverse and ever-expanding list of species confirmed and many more species in the corridor that have yet to be confirmed. Year 2 of the Biodiversity/SAR surveys resulted in a several hundred species not previously known to have occurred. A total of 994 taxa have been recorded in the BBC.

Summary of Species Confirmed in the Bonanza Biodiversity Corridor

Lifeform	No. of Taxa
Amphibian	4
Arthropod	82
Bird	154
Fish	16
Fungus	203
Lichen	7
Mammal	28
Mollusc	21
Myxomycete	39
Plant	438
Reptile	2
Total	994

Conservation Ranking of Species Confirmed in the Bonanza Biodiversity Corridor

BC List	No. of taxa	COSEWIC	No. of taxa	SARA	No. of taxa
Red	1	Endangered	3	Endangered	3
Blue	18	Threatened	11	Threatened	8
Yellow	409	Special Concern	2	Special Concern	4
Accidental	1	Not at Risk	14		
Exotic	28				
No Status	99				
Unknown	5				

3 Monitoring Program

As the projects build in biodiversity knowledge and site-specific restoration works are implemented, a tailored monitoring program is being developed at the restoration site and the corridor level. This Monitoring Program includes management processes, post-project monitoring and maintenance plans. The current version of the *Monitoring Plan - Bonanza Ecosystem Enhancement Program* provides an overview of all three restoration sites. In Year 3, corridor-wide monitoring programs will be included in Version 3.0.

4 Year 3 Work Plan

In addition to completing SARS and Habitat Projects work will be expanded to include an integrated Conservation Management Plan for the BBC. Monitoring programs for sites and the corridor post-project will be ratified and finalized in Year 3.

Time Period	Work Activity
Spring 2021 (April – Jun)	<ul style="list-style-type: none"> • Wetland Restorations – Resource planning • Finalize SAR and biodiversity ground truthing for Year 3
Summer 2021 (Jul – Sept)	<ul style="list-style-type: none"> • Continue with expanded SAR field studies • Hunter Siding Monitoring – measure and assess • Perform pre-implementation reviews for Upper Bonanza and Summit Lake Marsh • Update Ecosystem Maps as required
Fall 2021 (Oct – Dec)	<ul style="list-style-type: none"> • Implement restorations works at Summit Lake Marsh and Upper Bonanza • Finalize baseline monitoring programs • Develop an integrated <i>Conservation Management Plan</i> for the BBC
Winter 2022 (Jan – Mar)	<ul style="list-style-type: none"> • Draft a high-level Climate Change vulnerability assessment for the BBC • Ratify Conservation Management Plan with key stakeholders. • Finalize monitoring programs for sites and BBC post-project • Finalize ecosystem maps • As appropriate, update provincial datasets & mapping systems