

# **NCC Land Stewardship Activities F19**

# FWCP Project No. COL-F19-W-2853-DCA

#### Prepared for:

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## **Executive Summary**

The purpose of the agreement NCC Land Stewardship Activities F19 (FWCP Project No. COL-F19-W-2853-DCA) is to provide resources to enable NCC to continue restoring habitat on conservation properties in the East Kootenay region of the Columbia Basin. This project addresses two FWCP Action Plans: the "Upland and Dryland Action Plan" and the "Riparian and Wetlands Action Plan". The specific actions addressed are:

- 1. Prevent and manage invasive species on, or adjacent to, conservation properties, restoration sites, and other ecologically sensitive areas;
- 2. Contribute to NDT4 restoration planning and treatments on crown land, conservation lands and within Parks and Protected areas (understory slashing, and/or burning), through the NDT4 Ecosystem Restoration Committees; and
- **3.** Restore and create wetland and riparian area habitat in this focal area, where feasible to address impacted, degraded or lost habitat (including but not limited to gravel pits where they exist on the floodplain, oxbows and side channels)

Three projects were undertaken as part of the "NCC Land Stewardship Activities F19" agreement, which took place between 23 August, 2018 and 31 March, 2019. Funding in the amount of \$15,000 was designated to conduct ecosystem restoration activities, specifically restoration of grassland and open forest ecosystems on NCC's Kootenay River Ranch property; \$15,000 of funding was allocated to invasive plant treatments on NCC properties in the Canadian Rocky Mountain Program Area; and \$40,000 allocated for the second and final year of wetland restoration work on NCC's Cherry Meadows property.

From the removal and management of invasive species on several NCC properties in the Canadian Rockies ecoregion to the restoration of wetland habitat and grassland/open forest ecosystems, the funding provided by FWCP has allowed NCC to undertake a series of tasks and measures that seek to mitigate these and other threats to the local ecology, and the ecoregion as a whole.

#### Nature Conservancy of Canada

The Nature Conservancy of Canada (NCC) is a private non-profit organization working for the direct protection of natural habitats and wild spaces across this country. Since 1962, NCC and our partners have protected over 2.8 million acres of ecologically significant land and water for its intrinsic value and for future generations. Almost 1 million of these protected acres are located in British Columbia. It is the goal of NCC to protect, manage, and where appropriate, restore natural areas so they can sustain the ecosystems and species that define them.

Within the Columbia Basin, NCC provides protection for over 190,000 acres of land, including landscapes such as: at-risk grasslands, unusual geological formations, montane regions and precious valley bottom habitat. NCC's properties in the Basin conserve vital habitat for several species at risk (e.g. Badger, Grizzly Gear, Mountain Caribou, Bull Trout and Rocky Mountain Bighorn Sheep).

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# Task 1: Invasive Plant Management: Canadian Rocky Mountain Program Area

#### Introduction

The invasion of noxious weeds has numerous negative impacts on natural ecosystems. Invasive plants threaten the health of Canada's limited native grasslands, may displace or extirpate endangered plant and animal species; negatively impact wildlife habitats, reduce productivity in forestry, agriculture and fisheries, and generally impede the natural functioning of ecosystems.

Invasive plants pose the second largest threat to native biodiversity after the threat of residential development. With the assistance of our partners, NCC – having removed the primary threat of development – is placing a priority on the management of invasive species on private conservation properties.

This component of the project addresses the FWCP's "Upland and Dryland Action Plan", and aligns with the following specific action:

• Prevent and manage invasive species on, or adjacent to, conservation properties, restoration sites, and other ecologically sensitive areas.

#### **Goals & Objectives**

The funding provided by the Fish and Wildlife Compensation Program (FWCP) was for invasive plant treatments on NCC properties in the Canadian Rocky Mountain Program Area. The treatments were directed to address the priorities outlined in the Invasive Plant Management Plan developed for the Canadian Rocky Mountain Program Area and regional invasive plant councils/committees (e.g. East Kootenay Invasive Species Council).

The project's intent was to address the threat posed by invasive species to biodiversity targets on NCC's conservation lands. The Invasive Species Council (ISC) of BC defines the term invasive species as any non-native organism that causes economic or environmental harm and can spread quickly to new areas of BC. The ISC defines an invasive plant as any invasive plant that has the potential to pose undesirable or detrimental impacts on people, animals, or ecosystems. Invasive plants can establish quickly and easily on both disturbed and un-disturbed sites, causing widespread negative economic, social, and environmental impacts. At a regional level, high priority invasive plants (Early Detection Rapid Response [EDRR]) have been identified by the East Kootenay Invasive Species Council (EKISC) for survey and treatment (Figure 1).



a. Spotted knapweed (Centaurea maculosa)



b. Hound's tongue (Cynoglossum officinale)

#### Figure 1. Examples of high priority invasive plant species.

#### **Study Area**

The Canadian Rocky Mountains ecoregion extends over a large portion of the Rocky Mountains in southeastern British Columbia, and includes NCC's Elk-Flathead, Rocky Mountain Trench, and South Selkirk Natural Areas. NCC conservation lands that were the subject of invasive species treatments and surveys this year include: Cherry Meadows, Columbia Lake Lot 48, Elk Valley Heritage Conservation Area, Kootenay River Ranch, Luke Creek Wildlife Corridor, Luxor Linkage, Marion Creek Benchlands, Morrissey Meadows, Pine Butte Ranch, and Thunder Hill Ranch.

#### **Methods**

All invasive plant management activities were conducted as per the guidelines established by the Invasive Alien Plant Program (IAPP) Reference Guide (BC MFR 2011) and the Invasive Plant Pest Management Plan for the Southern Interior of British Columbia (BC MFLNRO 2014). All inventories, mechanical, and chemical treatment data collected in 2018 have been entered into the IAPP database.

Priority areas and target invasive plants were identified in collaboration with NCC's Stewardship Coordinator, Canadian Rocky Mountains program. Additional stakeholders, private landowners, NCC staff, and invasive species specialists were also consulted as required. See Table 1 for a detailed summary of invasive plant management activities. 
 Table 1. Summary of invasive plant inventories and treatments conducted by EKISC in 2018.

Objectives	Status	Comments
Conduct invasive plant management and control activities on high priority sites on NCC's properties, including: Cherry Meadows, Elk Valley Heritage Conservation Area, Columbia Lake Lot 48, Marion Creek Benchlands, Pine Butte Ranch, Kootenay River Ranch, Thunder Hill Ranch, Morrissey Meadows, Luke Creek Wildlife Corridor, Luxor Linkage, and Dutch Creek Hoodoos.	Complete	All projects completed by EKISC in 2018.
The East Kootenay Invasive Species Council (EKISC) entered all treatment record and survey data completely and accurately into the IAPP system by December 31st, 2018.	Complete	All data entered into IAPP by EKISC in 2018.
Where survey data are not available, EKISC will conduct multi-species inventory and mapping of high priority invasive plants as required. Conduct inventories and promote the use of standardized inventory methodology and data forms that are based on the provincial Invasive Alien Plant Program (IAPP) standards. Inventory should focus on detecting EDRR species, those that are not known in the area and on observing changes in distribution/density or area of established invasive species.	Complete	EKISC completed an invasive species survey and inventory on NCC's Cherry Meadows property, and provided the survey data in the annual report provided to NCC in 2019.
Based on inventories and regional priorities, the EKISC shall implement an integrated management approach to treat high priority invasive plants and/or sites applying the most suitable tools for the particular situation.	Complete	East Kootenay Invasive Plant Management 2018 report

#### **Results**

Invasive plant treatments on NCC Properties in the East Kootenay occurred between May and November 2018.

In 2018, most properties (with the exception of Cherry Meadows) received chemical treatment of high priority invasive species (e.g. diffuse/spotted knapweed, sulphur cinquefoil). In addition to herbicide treatment on Kootenay River Ranch, biocontrol methods were also used to control hound's tongue through the release of 150 adults of *Mogulones crucifer* (a species of weevil). NCC staff also hand-pulled spotted knapweed on the Frocklage Dam at Marion Creek Benchlands as well as along the hiking trail on the Dutch Creek Hoodoos property. Mechanical treatment is preferred at these two sites due to the proximity of a water body (Marion Creek) and high level of public use (Dutch Creek Hoodoos).

West Fork Resource Management was also hired to complete additional treatments on NCC's Elk Valley Heritage Conservation Area around some previously restored wetlands (Hosmer wetland).

### **Recommendations (from EKISC)**

Collaborating with the EKISC has allowed NCC to deliver efficient invasive plant management on priority conservation lands in the Columbia Basin. The following are recommendations to ensure even more effective invasive control in the long-term:

1. Continue working with the EKISC on invasive plant management strategies each year. Annual monitoring and treatments should continue in order to achieve lasting results.

2. Increase the budget for invasive plant inventory and treatment on NCC conservation lands.

3. Implement invasive plant management contracts in spring of 2019 to improve planning and timing of treatments. As well, continue collaborating with other conservation land managers to prioritize treatments across the landscape.

4. Continue using biocontrol at Kootenay River Ranch to control hound's tongue.

5. Sites that received detailed invasive inventories prior to treatment have seen more effective control in the past, and inventories assist with creating work plans, save on contractor treatment costs, and increase treatment effectiveness. NCC should build on these successes by requesting inventories on more conservation lands in 2019, and by using this information to develop a more strategic invasive species management plan for each property. This should be done in particular for new properties (e.g. Morrissey Meadows).

6. NCC staff should receive invasive plant identification training to assist with inventory, and so that invasive plants can be treated incidentally as they are encountered.

7. NCC staff should take necessary precautions when working on conservation lands to limit the spread of invasive species, such as by cleaning boots/pants, cleaning work vehicles, seeding immediately following any soil disturbances, and staying on roads/trails as much as possible.

8. The development of Best Management Practices when working on NCC lands continues to be developed in consultation with local Invasive Plant Councils. NCC will participate in invasive plant treatment planning meetings with the EKISC in spring 2019 to further develop strategic plans for invasive plants on NCC priority properties.

## Task 2: Kootenay River Ranch - Ecosystem Restoration

#### Introduction

In the East Kootenay region of British Columbia, approximately 250,000 hectares of dry forest historically experienced frequent, low-intensity fires. Modern suppression of fire has favoured the development of forests with dense growth of conifers in the understory, causing dramatic declines in grasslands and open forest ecosystems. Air photo interpretation in the TaTa Creek area estimated that nearly half the grasslands and open forests had shifted to closed forest from 1952 – 1992 (Gayton 2013). In BC, wildfire seasons are starting earlier and lasting longer, and have been influenced by more pronounced droughts due to climate change and excessive fuels as the result of fire suppression, widespread forest health problems, and forest management practices (Daniels et al. 2017). It is essential that land management agencies practice dry open forest restoration to increase ecosystem resilience and enable recovery following wildfire. The long-term restoration strategy for the Kootenay River Ranch is guided by the Kootenay River Ranch Vegetation Management Plan developed by a Registered Professional Forester in 2006 (Allen 2006).

This component of the project addresses the FWCP's "Upland and Dryland Action Plan", and aligns with the following specific action:

 Contribute to NDT4 restoration planning and treatments on crown land, conservation lands and within Parks and Protected areas (understory slashing, and/or burning), through the NDT4 Ecosystem Restoration Committees.

#### **Goals & Objectives**

The dry interior forest ecosystems to be restored provide important ungulate winter range and habitat for species at risk. This project aims to create a resilient ecosystem with an appropriate mix of native trees, shrubs, and open grassland areas that support the many species that rely on fire-maintained ecosystems while also improving ungulate winter range and reducing fire hazard to local communities.

NCC is continuing the implementation of ecosystem restoration on Kootenay River Ranch with the goal to move this system from a dense closed forest condition to an open forest structure with a thriving shrub and forb understory. Building on the success of recent effective restoration treatments on other parts of the property, NCC planned to conduct forest thinning treatments on an additional 38 hectares of forest during the winter season. The intention of the project is to implement the prescription in an ecologically sound manner to address the conifer ingrowth and growing risk of catastrophic wildfire. A 30-year Vegetation Management Plan that was completed by a Registered Professional Forester is guiding the on-going restoration work (Allen 2006).

#### **Study Area**

All activities took place on the Kootenay River Ranch (KRR) property (1,340 ha), owned and managed by the Nature Conservancy of Canada (Figure 2). The KRR property is located in the Rocky Mountain Trench and lies between the village of Canal Flats to the north and the hamlet of Skookumchuck to the south within the Kootenay Dry-Mild Interior Douglas-fir biogeoclimatic subzone (IDFdm2).



Figure 2. Location of the Kootenay River Ranch property (highlighted in red).

### **Methods**

All treatments are being carried out by local contractors between January and April, 2019. Restoration work is focused on treatment unit 4A, located immediately north of Island Pond on the east side of Highway 95 (Figure 3). Chainsaws are used to remove the smallest diameter understory trees and lower branches, and specialized equipment such as a mini hoe harvester and chipper is used in unit 4A-b (5.5 ha) where slash loading was too great for the "lop and scatter" approach. In order to reduce any excessive fuel loading in unit 4A-b, slash that was not chipped was piled and saved for later burning or use as pulp material.

### Results

In January 2019, restoration began on a 38-ha treatment unit of grassland and open forest (unit 4A). A registered professional forester (Jeff Allen) was hired in November, 2018 to develop a restoration prescription for unit 4A, which was completed and submitted to NCC in December, 2018 (see Allen 2018). Jeff Allen was also responsible for hiring and overseeing contractors and coordinating prescription implementation, and will provide a final report to NCC once restoration is complete.

Strategic Fire Control Ltd. was hired to complete restoration work on approximately 32 ha (treatment unit 4A-a). Treatment is being completed through the use of chainsaws, and slash is either scattered

or piled for burning if slash densities exceeded 1 tonne/ha. In the treatment unit overall, stocking will be reduced to approximately 400 layer 1 Douglas-fir/Ponderosa pine leading stems per hectare (sph), with target species including Douglas-fir, Ponderosa pine and Lodgepole pine with stems greater than 0.3 m tall and less than 15 cm dbh. Trees are cut with a maximum stump height of 0.1 m with all live limbs removed, and all deciduous species (e.g. aspen) are retained. The final stocking density will be variable over the treatment unit, as small patches of high crown closure areas identified as Wildlife Tree Patches will be retained in order to maintain diverse forest structure on the landscape (Figure 3).

Summit Valley Contracting Ltd. was hired to complete restoration work on 5.5 ha within treatment unit 4A-b. While the prescription was the same as for 4A-a, it was anticipated that the slash loading would be much higher in this unit. In order to avoid excessive fuel loading from scattered slash, specialized equipment is being used to chip excess material as well as to prepare larger logs for use off-site as pulp. See Figure 4 for pre- and post-treatment images for both treatment units.

The BC Wildfire Service (BCWS) was also invited to be part of this project, and a crew of 4 wildfire technicians under supervision of a Chainsaw Training Specialist from the BCWS practiced their tree felling skills on a small section of the project site. This work contributed to the overall restoration project while also furthering the development of future fire fighters in the province.

NCC summer students conducted pre-treatment ground squirrel surveys to help determine if this important prey species for badger increase post-treatment. Photo points were also established in key locations for long-term monitoring and pre-treatment photos were collected.

#### **Discussion**

Restoration work carried out up until the time of writing this report has been successful, and once the project is complete in spring of 2019, it will have contributed an additional 38 ha of treated open forest ecosystem to past restoration work on the property. Treating overgrown, young forests in this manner is relatively inexpensive, and ensures that a minimal amount of slash is left on-site which would pose a fire hazard in the near future. This type of forest thinning work is not only beneficial for wildlife that rely on open forest ecosystems, but also sets the stage for safer and more effective prescribed burns in the future.



**Figure 3.** Map describing the location of 2018-19 restoration work at Kootenay River Ranch. Treatment units 4A-a and 4A-b are highlighted in purple, and Wildlife Tree Patches to be retained are highlighted in green.

#### **Recommendations**

Several recommendations can be derived from work completed in 2018-19:

1. The scope of the challenge to restore a fire maintained ecosystem from which fire has been excluded requires consideration of larger landscape-scale projects that may include prescribed burning or controlled wildfire. NCC should continue to investigate options to initiate a prescribed burning program on the Kootenay River Ranch property.

2. Given the size of the property, it is important that NCC should continue to identify additional high priority areas for forest restoration treatments that coincide with current fire breaks and potential future firefighting needs. NCC should refer to the Vegetation Management Plan for the property and update it as necessary when planning future restoration treatments.

3. Follow-up monitoring of treated areas should be a priority for the NCC to determine effectiveness of treatments.



a. Pre-treatment conifer in-growth in treatment unit 4A-a on Kootenay River Ranch.

b. Completed slashing in a portion of treatment unit 4A-a.



c. Pre-treatment conifer in-growth in the high density treatment unit 4A-b.

d. Completed slashing/chipping in the high density treatment unit 4A-b.

Figure 4. Before and after treatment photos of unit 4A-a and 4A-b at Kootenay River Ranch.

## **Task 3: Cherry Meadows Wetland Restoration Project**

### Introduction

Low elevation wetlands that occur in the floodplains of major rivers throughout the Columbia Basin have been the most effected by hydro-electric developments and other human activities relative to other types of wetlands (FWCP 2014). The Cherry Meadows wetland restoration project works to address this issue by restoring over 16 hectares of former agricultural field to productive habitat for wildlife on the Cherry Creek floodplain near Kimberley, BC. In the summer of 2017, NCC initiated a 2-year wetland restoration project on the Cherry Meadows property under the guidance of wetland specialists Thomas Biebighauser and Robin Annschild, and finalized the restoration work in the summer of 2018.

This component of the project addresses the FWCP's "Riparian and Wetlands Action Plan", and aligns with the following specific action:

• Restore and create wetland and riparian area habitat in this focal area, where feasible to address impacted, degraded or lost habitat (including but not limited to gravel pits where they exist on the floodplain, oxbows and side channels).

#### **Goals & Objectives**

The goal of the project was to improve habitat for waterfowl and rare species on NCC's Cherry Meadows property by filling in ditches and conducting earthmoving in order to transition the area from a flat, dry field of reed canary-grass into a network of wetlands filled with native plants. This project also aims to control erosion, recharge groundwater, increase wildlife habitat diversity, and greatly improve opportunities for the public to view wildlife. A secondary goal was to create wetlands that look and function like natural ecosystems, requiring little – if any – maintenance. Actions taken to improve wetland habitat on the property were guided by the "Cherry Meadows Wetland Restoration Project" report prepared for NCC by wetland specialists (Biebighauser & Annschild 2016).

Restoration work in 2018 built on work from the previous year, which had resulted in the creation of 8 (3.3 ha) new emergent, ephemeral, and wet-meadow wetlands. See Table 2 for a summary of the planned restoration activities in 2018.

Objectives	Status	Comments
Identify year two wetland restoration parameters at Cherry Meadows	Complete	Cherry Meadows Wetland Restoration Project report was provided to FWCP in 2016
Coordinate experienced contractors to oversee wetland construction and machine operators	Complete	Thomas Biebighauser and Robin Annschild (wetland specialists), were hired to oversee contractors
Coordinate and employ heavy machine operators to conduct the work	Complete	Fiorentino Brothers Contracting was hired again to conduct the heavy machinery works for the project
Restore 10 additional wetlands with funding secured in 2017 and 2018	Complete	Using machinery and experienced operators, 10 new wetlands were constructed in 2018

Table 2. Summary of activities for Cherry Meadows restoration project in 2018.

#### **Study Area**

The 70 hectare (172.5 acre) Cherry Meadows property is located approximately 15 km east of Kimberley on the benchlands west of the Kootenay River. The property is located immediately north of the St. Mary's Indian Reserve, and 10 kilometers north of Cranbrook, BC (Figure 5).



Figure 5. Location of the Cherry Meadows property.

#### **Methods**

The potential for a wetland restoration project was identified in the old farm fields at Cherry Meadows. This site was once a natural mosaic of wet-meadow, ephemeral, emergent, shrub, and forested wetlands that were hydrologically connected before they were drained for agriculture. In spring of 2016, these fields were examined by wetland specialists and NCC staff to uncover the locations of drainage ditches, filled wetlands, moved streams, sloped lands, and compacted soils so that a restoration plan could be drafted. Sites were selected for wetland restoration where slopes were gradual, groundwater was near the surface, and soil texture was high in clay.

In 2017, the first phase of the project restored over 3.3 ha of emergent, ephemeral, and wetmeadows wetlands. Fiorentino Brothers Contracting was hired to complete the earthmoving that created the wetland features by filling in ditches, removing fill, and reshaping natural contours on the landscape.

In 2018, restoration work built on the efforts of the previous year, and Fiorentino Brothers Contracting was hired again to continue earthmoving for the final 10 wetland features. See Figure 6 for the location of all 18 of the new wetland features.

#### Results

See Figure 7 for project photos. Highlights from restoration conducted in 2018 include:

- 10 wetlands were created ranging in size from 0.14 ha to 1.17 ha.
- In total, 10.26 ha of wetland was restored, along with 6.05 ha of associated upland habitat.
- Some of the new wetlands are shallow enough to dry out in the summer, while others are deep enough to contain flowing water through the winter to support future hibernation habitat for Northern Leopard Frogs.
- The wetlands were built to have naturally appearing, irregular edges which featured peninsulas, points, bays, coves, islands, ridges, and hummocks to provide habitat diversity.
- Woody debris such as logs were sourced on-site and placed in wetlands to provide additional wildlife habitat features.
- Ditches that previously drained the site were disabled by the project by adding compacted, clay-rich soil to the ditches in key locations.
- Excess topsoil removed during wetland construction was spread out over the project site to improve conditions for native plant growth.
- Two of the wetlands required the placement of rock to armor inlets and outlets and prevent erosion. Rock material was sourced on-site during the excavation of the deeper wetlands.
- All 18 of the new wetlands are designed to conform to natural processes, meaning they won't require maintenance and did not require dams, diversions, water control structures, pumps, or wells during construction.
- New wetlands and the freshly excavated topsoil were seeded with winter wheat to prevent soil erosion and the establishment of invasive species, as well as a riparian seed mix to encourage the establishment of native plants.
- The access points that were used by the heavy equipment to access the wetlands (e.g. roads, hillside) were rehabilitated at the end of the project. Any area impacted by equipment was seeded with a native grass mix and covered with straw to prevent erosion and spread of invasive species.
- Wildlife was observed using the wetlands created by this project in 2017, such as Sandhill Crane, Canada Geese, Osprey, Bald Eagle, American Crow, White-tailed Deer, Grizzly Bear, Elk, as well as a variety of other waterfowls and shorebirds.
- Approximately 40 high school students from Cranbrook volunteered to collect live woody plant material (e.g. red-osier dogwood) and plant it in the upland areas around the new wetlands to encourage the growth of native shrubs.



Figure 6. Map showing outline of restored wetlands (red), and associated restored upland areas (2017 areas in orange and 2018 areas in green).

#### **Recommendations**

NCC staff will monitor the project site annually in order to track the re-naturalization progress of the new wetlands. A monitoring protocol, in cooperation with FWCP, will be initiated that will include permanent vegetation survey plots, photo points, wetland health assessments, and incidental wildlife surveys to determine the effectiveness of the project over the long-term. Management actions will also be implemented by NCC staff as necessary, such as coordinating additional plantings or controlling invasive species.



a. Wetlands constructed in 2018 showing diversity of shoreline edges and features such as hummocks.



b. Large, shallow-water ephemeral wetland with retained shrubs constructed in 2018.



c. Aerial view of all 18 constructed wetlands showing diversity of size, depth, and shape (photo taken in October 2018).



d. Native vegetation establishment after one full growing season in a wetland constructed in 2017.

Figure 7. Sample images from both years of the Cherry Meadows project (2017-18).

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