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Project Title: Advancing Wetland Stewardship & Restoration in the Kootenays

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Photo: Fawn at newly restored wetland in Meadow Creek. Photo Credit: Michele Halleran

Executive Summary

Beginning April 1 2016, the BC Wildlife Federation's Wetlands Education Program successfully completed a series of wetland restoration projects in the Kootenays and hosted a number of Wetland-focused workshops in order to deliver upon commitments made within the FWCP proposal "Advancing Wetland Stewardship & Restoration in the Kootenays" (COL-F17-W-1407). The overarching goal of these workshops is to build the capacity of East and West Kootenay residents to protect, enhance, create, and steward wetlands. In collaboration with multiple partners, BCWF was able to restore wetlands for wildlife while supporting species at risk, controlling invasive species, and providing habitat for wildlife. The 2016 projects closely align with the FWCP's Columbia Basin Riparian and Wetland Action Plan and included initiatives in three of the FWCP priority areas: Elk Valley, Upper Columbia Valley, and the Duncan/Lardeau Valley. A quick summary of the results are:

- Restoration of 2.47ha of wetlands on the Halleran Property in Meadow Creek
- Hosted 15 people at an Open House, centered on the Meadow Creek Restoration Project, which helped communicate FWCP initiatives in the region to members of the public.
- Restoration of 0.7 ha (of a 11 ha project) at Nature Trust of BC's Cherry Creek Site
- Trained 24 participants in wetland classification and stewardship techniques during a Wetlandkeepers Workshop in Golden.
- Trained 22 participants in wetland restoration techniques, project identification, and planning during a Restoration Planning Workshop in Nakusp.
- Trained 30 participants (25 in person, 5 online) in desktop GIS techniques at a Wetland Mapping and Assessment Workshop in Castlegar
- Hosted 18 participants at a Working Group Workshop in Fernie.
- Supported 14 participants with 12 wetland projects through site visits, etc
- Completed inventory of 6 wetland complexes in Columbia Basin benchlands to provide recommendations for future conservation work.

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1. Introduction

In comparison to many other ecosystems, the benefits from wetlands are exceptionally large relative to their size (MacKenzie and Shaw 1999). Based on one commonly referenced study, the market and non-market values of wetland goods and services (ex. climate regulation, nutrient cycling, and food production) are valued at $19,580 hectare/year (Costanza, *et al* 1997), which extrapolates to approximately $100billion/year in B.C.(MOE 2010). When total economic values are considered, wetlands often provide greater economic returns than when the land is converted for other uses (WRI 2005). However, wetlands have been historically degraded and destroyed in low-elevation areas of the Kootenay region from large scale developments (such as hydro-electric production, agriculture, diking, and transportation networks) as well as from residential growth (e.g., see Utzig and Schmidt 2011). Furthermore, remaining wetlands are at risk of degradation from human activities such as mud-bogging and the introduction/spread of invasive plants. Interestingly, in the Columbia River headwaters, the low-lying wetland areas have remained largely intact while the upland and "bench land" wetlands surrounding them have been impacted. The Columbia River Wetlands (located in FWCP's Upper Columbia Valley focal area) is one of the longest intact wetlands in North America and possesses significant cultural significance to First Nations such as the Ktunaxa and Shuswap Indian Band.

The Fish and Wildlife Compensation Program considers wetland conservation and restoration as a priority for the Columbia Basin and has developed a number of interim initiatives (*Columbia Basin Riparian and Wetlands Action Plan* 2014). This project primarily aligns with the following priority actions:

Table 1 (All priority regions):

- Action 4 Map the abundance and distribution, of wetlands in each focal area.
- Action 6 Collaborate and share information with organizations and agencies in this focal area to monitor and address the functional processes and basic ecological parameters of wetland and riparian areas.
- Action 12 Restore and create wetland and riparian area habitat in this focal area, where feasible to address impacted, degraded or lost habitat.
- Action13 Explore options to collaborate with partners, in order to conserve and enhance wetland and riparian areas.

Table 3 (Elk River Watershed):

- Action 4 Work with regional organizations to conserve and enhance riparian areas in and adjacent to communities within this focal area.

Other action plans in the Columbia Basin identify wetlands as a priority habitat for conservation/restoration (e.g., see Green et al. 2006)**.** As with previous years, the BC Wildlife Federation's Wetland Education Program (WEP) supported these initiatives by building the capacity of Kootenay residents to protect, enhance, and restore wetlands through the delivery of a Wetlandkeepers Workshop in Golden, a Restoration Planning Workshop in Nakusp, and a Mapping and Assessment Workshop in Castlegar. BCWF also supported a mapping and assessment of "bench land" wetlands in the Columbia Basin. Furthermore, BCWF facilitated wetland conservation dialogue between key stakeholders in the Fernie area by hosting a Working Group Workshop. An Open House was also hosted on the Halleran Wetland Restoration Project to promote the benefits of wetland restoration to regional landowners and residents, encourage additional restoration works, and communicate FWCP initiatives.

Restoration work continued in the Duncan-Lardeau area at the Halleran property, with 2.47ha of habitat restored. BCWF also supported the restoration of 0.7 ha of wetland on The Nature Trust of BC's Cherry Creek Complex through FWCP funds (The total project was 11 ha). This report provides further details to the above projects, their impact, and future steps to be taken.

Goals and Objectives

1. Goal: Through free workshops, increase community capacity to map, protect, enhance, restore, and steward wetlands in the Kootenays.

   Objective: Train 10-25 participants during the delivery of a 2.5-day Wetlandkeepers Workshop in Golden

   Objective: Train 10-25 participants during the delivery of a 2-day Restoration Planning Workshop in Nakusp.

   Objective: Train 10-25 participants during the delivery of a 2-day Wetland Mapping and Assessment Workshop in Castlegar

2. Goal: Restore wetland habitat in the Kootenay River Floodplain

   Objective: Restore wetland habitat in the Cherry Creek Conservation Lands

3. Goal: Restore wetland habitat in Duncan-Lardeau area.

   Objective: Restore wetland habitat on the Halleran Property

4. Goal: Support watershed scale mapping in the Fernie area

   Objective: Engage 10-25 stakeholders on identifying needs and opportunities related to a watershed scale wetland mapping initiative at a 1-Day Working Group Workshop in Fernie

5. Goal: Support wetland conservation in the Columbia Basin

   Objective: Map and classify 6 benchland wetland complexes in the Columbia Headwaters

6. Goal: Enhance capacity of Kootenay residents to conserve and restore wetlands

   Objective: Work with past workshop participants and other community members to assess a minimum of 2 wetland sites in the region for their restoration needs and provide advice and actionable measures

7. Goal: Through an Open House: increase community capacity and interest to protect, enhance, restore, and steward wetlands in the Duncan-Lardeau area.

   Objective: Support the restoration of wetlands on the Halleran Property through wetland presentation by lead restoration expert Tom Biebighauser and provide opportunity to engage with landowners and other interested individuals.

Study Area

Below are GPS locations of related workshops and restoration projects, with descriptions of field locations when appropriate.

- Wetland Restoration
    - Halleran Property, Meadow Creek: 50.233113, -116.983460
        - Historically a floodplain/wetland complex, the Halleran property has been modified by stream channelization, diking and levelling for agricultural use. Formerly a diversity of wetland types, the site is currently a low-diversity wet meadow at high water levels only. Frequented by Grizzly Bear, Elk, Caribou, Western Toad, and Olive-sided Flycatcher, restoration of wetlands on this site promises to have high value. 5 wetlands were restored in early 2015.
    - Cherry Creek Conservation Area, Wasa, 49.701289, -115.717727
        - Located on The Nature Trust of British Columbia's Cherry Creek Conservation Lands in the floodplain of the Kootenay River, this site once contained wetlands. Beginning in the late 1940's and over a period of several decades, successive landowners used a bulldozer to drain wetlands to increase site suitability for agriculture
        - This site is located near Bummers Flats, where Duck Unlimited Canada (DUC) has constructed large impoundments for waterfowl
        - Wetland restoration works began in 2016, with BCWF becoming a financial supporter involved in phases 2 (2017) and 3 (2018).
- Wetlandkeepers, Golden
    - Reflection Lake, 51.285297, -116.946448
        - Large shallow open water wetland bordered by marsh with a high bird population. Participants used this site to learn about birdwatching, wetland classification, invasive species, and aquatic invertebrate sampling and identification.
    - Edelweiss Slough, 51.320473, -116.977557
        - Community walking trail through marsh and shallow open water wetland habitat. Partially flooded during the workshop. Here participants learned about wetland plant ID, with a focus on sedges.
    - Cedar Lake, 51.262506, -116.983793
        - Popular recreational lake with a boardwalk and artificial beach. Bordered by a fen containing fish-bearing streams. Here, participants practiced wetland classification, soil classification, and plant identification.

- Restoration Planning Workshop, Nakusp
    - Burton School, 49.992740, -117.87579
        - Location of presentations and in-class training.
    - Tatlock's Property, Burton, 49.960725, -117.886571
        - Private property where landowners are supportive of a wetland restoration project. Participants walked through the wetland restoration design process, including initial site assessment.

- Mapping and Assessment Workshop, Castlegar
    - Selkirk College Applied Research and Innovation Centre, 49.295756, -117.635123

- Wetland Restoration Open House
    - See "Halleran Property Meadow Creek"

- Working Group Workshop, Fernie
    - The Arts Station, 49.503758, -115.059740

- West Bench Wetland Inventory

  "The West Bench is found on the west side of the Columbia Valley, located in southeastern British Columbia (51°00'16.72"N; 116°33'49.84"W) and above the west side of the Columbia River Wetlands Wildlife Management Area. The West Bench is a forested ecosystem with both Interior Cedar Hemlock (ICH) and Englemann Spruce Sub-alpine Fir (ESSF) biogeoclimatic

zones. There are several higher elevation lakes and wetlands scattered throughout the West Bench, which is located beneath the Purcell Mountain Range" (Darvill, 2016). The below sites are further described in Appendix B "West Bench Wetlands Mapping and Inventory Project: Summer 2016".

- McMurdo, 51.054250, -117.150222
- Wiseman Lakes, 51.463972, -117.195611
- Dawn Mountain Beaver Ponds, 51.307500, -117.060833
- Loon Lake Recreation Site, 51.056083, -116.806528
- Dogtooth Forest Service Road, 51.355444, -117.048639
- Cedar Lake Recreation Site, 51.262083, -116.984278

Methods

Work Group Workshop, Fernie (May 12, 2016)

This workshop targeted Municipal and Regional staff, planners, First Nations, industry, consultants and stewardship groups involved in riparian and wetland mapping projects, urban development, resource inventory, and/or watershed planning. Through presentations and roundtables, stakeholders worked together to identify gaps and opportunities for advancing wetlands and riparian conservation in the Elk River watershed. The goal was to help inform inventory needs with the ultimate goal of improved coordination among partners and prioritization to advance restoration and conservation efforts within the Elk River Watershed. Speakers and topics included:

- Crystal Klym, Fish and Wildlife Compensation Program: Overview of Elk River Watershed Priorities
- Deb MacKillop, Ministry of Forests, Lands, and Natural Resource Operations: Overview of TEM and PEM mapping within the Elk River Watershed
- Warn Franklin, TECK Coal: Ecosystem Management in the watershed
- Alan Davidson, Regional Forest Hydrologist with the Ministry of Forests, Lands, and Natural Resource Operations: Overview of the Elk Valley Cumulative Effects project

Wetlandkeepers, Golden (May 13-15, 2016)

Methodologies for soils, vegetation zonation, plant mapping, plant/wildlife inventories, invasive species removal, project planning, land owner contact and dialogue techniques are primarily based on the Wetlandkeepers Handbook (Southam and Curran 1996). However, participants were also introduced to additional methodologies where available/appropriate, in order to harmonize with well-established protocols in BC. These include evaluation methodologies to assess wetland health using BCWF's Wetlandkeeper Long Form Surveys (developed in 2011 and 2014). Furthermore, participants learned how to identify wetland ecological communities using the Mackenzie and Moran (2004)'s Land Management Handbook 52. Additional topics and speakers included:

- Rachel Darvill (Goldeneye Ecological Services) trained participants on waterfowl ID and the new Columbia Wetlands Waterbird Survey, which is a coordinated bird count that utilizes citizen-scientists to gather baseline data with the ultimate goal of designating the Columbia Wetlands as an Important Bird Area.
- Laura Gaster (Columbia Shuswap Invasive Species Society) trained participants on invasive species identification and management.
- Jason Jobin (BC Wildlife Federation) training participants on aquatic invertebrate sampling and identification

Restoration Planning Workshop, Nakusp (September 13-14 2016)

Participants were provided a presentation on wetland classification based on using the Mackenzie and Moran (2004)'s Land Management Handbook 52, *Wetlands of British Columbia*. Through hands-on activities at a potential restoration site, participants learned the stages of wetland restoration design including initial site assessment, digging a test pit, soil texturing, rod and level use, and design considerations. Other presentations and speakers included:

- Virgil Hawkes, LGL Limited: Restoring wetlands while considering long-term studies on wetlands and plant establishment in drawdown zones
- David Polster, Polster Environmental Services: Bioengineering techniques in drawdown zones and hydro sites to restore vegetation communities and plant diversity
- Harry van Oort, Columbia Mountain Institute of Applied Ecology: Birds and Drawdown Zones - A look at the impacts and design components that could support healthy populations of birds.
- Neil Fletcher, BC Wildlife Federation: Wetland Loss in BC – Historical Overview
- Neil Fletcher, BC Wildlife Federation: How to Write a Successful Grant

Wetland Mapping and Assessment Workshop (May 10-11, 2016)

Participants spent 2 days within a computer lab at Selkirk College being trained on Q-GIS; an open-source, free mapping program. Topics included an introduction to the program, as well as wetland delineation using remote imagery. Trainers Graham Watt (Environmental Technologist of Grand Forks) and Ryan Durand (Qualified Professional Biologist with Durand Ecological) were contracted to provide training. By using GotoMeeting software, BCWF was able to offer the workshop remotely as well.

Open House, Meadow Creek (January 22, 2017)

Regional landowners and residents were invited to attend a 1-day Open House which included a presentation by restoration specialist Tom Biebighauser and a site tour of the Halleran property, led by Robin Annschild and Tom.

West Bench Wetland Inventory (June-July 2016)

Sites were selected due to ease of access and suspected range of potential wetland health impacts. BC Wildlife Federation's Wetland Classification Forms were used to collect data, and Mackenzie and Moran (2004)'s Land Management Handbook 52, *Wetlands of British Columbia* was used to classify wetlands. Methods are described in detail in Appendix B "West Bench Wetlands Mapping and Inventory Project: Summer 2016".

Participant Support

When the opportunity arose, past workshop participants were provided support on their respective wetland projects through knowledge sharing, site visits, assistance with permitting, grant writing, training, restoration design, and more.

Wetland Restoration, Enhancement, and Securement

Wetland design prescriptions were developed by Tom Biebighauser and Robin Annschild, with input from landowners and regional biologists. Over 35 years Tom has designed over 5,000 wetland restoration projects and successfully restored of over 2000 wetlands in North American and New Zealand. Since 2014, Robin has restored 213 wetlands. Projects were designed to have a high degree of success, provide maximum ecological lift, be inexpensive, and require minimal to no long-term maintenance. Excavated soils remained on site and were used to create ridges, islands, and hummocks to increase habitat complexity. Soil was seeded to reduce erosion. Logs and coarse woody debris were also placed in and around wetlands as habitat features. Specific site details can be found below.

- Halleran Property, Meadow Creek
    - Continuing with the methods successfully used in Phase 1 of the Halleran restoration project in January 2015, shallow pools were excavated to expose groundwater and allow pockets of the wetted field to hold water for a longer period and allow native amphibians to successfully breed. The excavated soil was used to support the growth of hay, and also raise land for plantings shrubs, which would in turn provide a visual screening for wildlife as well as provide early spring forage. Wetland restoration experts Tom Biebighauser and Robin Annschild were contracted to supervise the heavy equipment.
- Cherry Creek Conservation Area, Wasa
    - With input from Cody Fernandes (The Nature Trust of BC), Rob Neil (The Nature Trust of BC/Kootenay Conservation Land Manager) and Dave Lewis (Wildlife Biologist), this project was designed to provide habitat for a variety of species, particularly waterfowl and amphibians. The site was historically farmed and modified in an effort to create hayfields. The methodology to restore wetlands at this site was a clay liner technique, whereby top soil was set aside, and then underlying clay soils were compacted with the use of a rock truck in 12" lifts. Top soil and remanent soils where then placed back on top using a rough and loose technique to allow native plants to establish and create habitat niches. A full description of this project and methodology is provided in FWCP Project No. COL-F19-W-2854-DCA managed by the Nature Trust of BC. Funding from this grant was transferred (with permission from FWCP) to this project from a nearby private land restoration project that was unable to proceed. Based on a breakdown of project expenses, this grant contributed 0.7 ha of a 11ha project completed over a 3 year period..

Results

Working Group Workshop, Fernie (May 12, 2016)

18 people participated during this workshop. The Elk River Alliance and participants were provided a summary of the key points revealed during the workshop. Some of the topics discussed included:

- Funding opportunities to support riparian and wetland conservation in the Elk Valley
- Predicitive Ecosystem Mapping (PEM), Sensitive Ecosystem Inventory (SEI), Terrestrial Ecosystem Mapping (TEM), and a Cumulative Effects Framework for the East Kootenays
- Knowledge sharing between key groups present
- The District of Sparwood's interest in wetland management, stormwater wetlands, and recreational development.
- Knowledge gaps and next steps for wetland and riparian inventory

Wetlandkeepers, Golden (May 13-15, 2016)

24 people attended the workshop. Due to the workshop Goldeneye Ecological Consulting was able to recruit volunteers for the West Bench Wetland Inventory as well as the Columbia Wetlands Waterbird Survey. 17/24 participants completed a workshop evaluation form. Of those respondents, 100% stated that the course would help them achieve their wetland goals, and 100% of respondents stated they would recommend the course to others. 71% of respondents rated the course as "Excellent", while the remainder rated it as "Good". One participant commented "So grateful that this is available. Very important to us regular citizens to have free access to such an amazing resource. I really hope it continues to receive support!!"

Restoration Planning Workshop, Nakusp (September 13-14 2016)

22 participants attended the workshop. Presentations by Virgil Hawkes, David Polster, and

Harry van Oort were recorded and made available online. See Figure 12 for links. The high number of participants in such a small community demonstrates the demand for education on this subject.

Wetland Mapping and Assessment Workshop (May 10-11, 2016)

30 participants attended the workshop (25 in person, 5 remotely). Many attendees were past workshop participants (dating back to 2011) and attended to increase their ability to manage their respective wetland projects. Participants travelled from as far as Squamish to attend, which demonstrates the need for such training.

Open House, Meadow Creek (January 22, 2017)

15 participants attended the Open House. Open houses were helpful in gaining landowner interest and building local support for wetland restoration projects.

West Bench Wetland Inventory (June-July 2016)

Six wetlands were assessed using the methods described above. In general, the inventory was beneficial in locating red and blue listed species, identifying disturbances and threats, engaging community members, and describing wetland classes found in the area. There is local partner interest in using this information for taking management actions, including: managing recreational access and preserving a discovered very rare wetland plant population. For detailed results on each site, see Appendix B.

Participant Support

Using the methods described above, BCWF was able to support 14 participants with 12 wetland projects. For example; hosting a Map our Marshes in Duncan to assist a 2014 Wetlands Institute participant with their mapping and invasive species project in Somenos Marsh, supporting a 2015 Institute participant through a partnership in hosting a Working Group Workshop and Wetlandkeepers in Fernie, and supporting a 2015 Institute participant through a number of site visits and hosting the Nakusp Restoration Planning Workshop.

Wetland Restoration, Enhancement, and Securement

Methods described in the previous section were successfully carried out, resulting in the below:

- Meadow Creek:
    - Restoration works were initiated in January 2016 and were completed in May 2016 to restore a total of 2.47ha of shallow open water wetland and marsh habitat. Though contracted to complete 4 wetlands on the Halleran property, BCWF was able to restore 9 wetlands in 2016.
- Cherry Creek Conservation Area:
    - Phase 2: 37,106 m^2 (3.7 ha) of ephemeral and emergent habitat. BCWF FWCP contribution, based on proportion of expenses: contributed to 0.24 ha
    - Phase 3: 53,927 m^2 (5.4 ha) of ephemeral and emergent habitat. BCWF FWCP contribution, based on proportion of expenses: contributed to 0.52 ha

Discussion

BCWF's Wetlands Education Program continued its support in the Columbia Basin, and was in line with multiple FWCP priorities, as outlined in the Columbia Basin Riparian and Wetland Action Plan, including:

Table 1: Recommended actions that apply to all six focal areas

4-1- "Map the abundance and distribution of wetlands in each focal area"
The Castlegar workshop provided training on pre & post field work to help various regional mapping initiatives. The Fernie workshop support a wetland mapping and assessment initiative in the Elk River Watershed. The West Bench Wetland inventory mapped and classified 6 wetlands in the Columbia Basin.

6-1- "Collaborate and share information with organizations and agencies in this focal area to monitor and assess the functional processes and basic ecological parameters of wetlands and riparian areas."

The Fernie Working Group Workshop brought together major stakeholders to support a wetland mapping and assessment initiative within the Elk River Watershed

12-1- "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)"

This project restored wetlands at the Halleran Property (Meadow Creek) and the Cherry Creek Conservation Area (Wasa)

13-4- "Explore options to collaborate with partners, in order to conserve and enhance wetland and riparian areas."

The Golden, Nakusp, Fernie, and Castlegar workshops engaged multiple stakeholders, professionals, and active and potential stewards that have the propensity to map, conserve, and restore wetlands. This project involved over 10 partners including Government, Private Landowners, Fish and Game Clubs, and ENGOs. See "Acknowledgements" for a complete list.

Table 3: Action priorities for the Elk Valley

4-1- "Work with regional organizations to conserve and enhance riparian areas in and adjacent to communities within this focal area."

The Fernie Working Group Workshop worked with regional stakeholders such as Teck and the Elk River Alliance to map and assess wetlands to improve wetland management.

Though not written into the project proposal, BCWF was able to opportunistically support project partners in Nakusp and Grand Forks. While travelling to Castlegar, BCWF was invited to give a presentation to Grand Forks city council about protecting Johnson Flats Wetland. The wetland is a large marsh and open shallow water wetland which city council is looking to declare as a protected area. Neil Fletcher presented at an official city hall meeting in front of Mayor Frank Konrad, city council, and several members of the community. The presentation outlined the importance of wetland conservation and addressed the importance and rarity of wetlands on the scale of the Johnson Flats Wetland. The presentation was well received and followed by a short Q&A for the council members.

While in Nakusp, BCWF was able to present about the benefits of wetlands to 25 students at Nakusp Elementary School, as well as tour the grounds with a teacher who wished to have a wetland constructed at the school.

Originally, we proposed to restore a minimum of 1 hectare of wetlands on Private Property in Mayook Station. This project was in collaboration with Ducks Unlimited and the property owners, who were providing 8K and 30K respectively to the delivery of the works. BC Wildlife Federation estimates that our contribution from FWCP would have contributed 0.24 ha of the 1 ha wetland to the overall project. Unfortunately, this project suffered from long administrative delays. The property owners waited more than 2 years to obtain a water license to complete works. Government contacts kept changing due to staff changes and there were long delays regarding status updates. The landowners subsequently opted not to pursue the works at their property after feeling that the Water Office in Creston was unsupportive of this habitat project and not prioritizing it in their scope of works. With permission from FWCP we then changed our scope of works and relocated our restoration project to the Cherry Creek site, where our FWCP contribution supported approximately 0.7 ha of a 11 ha project. This change resulted in the restoration of an additional 0.46 ha of wetland habitat.

Recommendations

BCWF's Wetland Education program strongly believes that training and providing support to communities, local stewardship groups, First Nations members, government workers, and professionals can increase the capacity for improved conservation and protection actions. The 2016 project and previous workshops have fostered a community of practitioners and have increased the capacity of the region to be more self-reliant with long lasting benefits. These community members are expected to not only be stewards of local wetlands but will also help identify new locations for future wetland projects. Wetland restoration has improved habitat for wildlife, provided invasive species management, mitigated cattle impact, and improved water quality. It is expected that restoration efforts will lead to future restoration opportunities, as they have in the past. It is the Wetland Education Program's recommendation that the FWCP and other organizations continue to invest in similar capacity building programs in the Columbia Basin to build upon the momentum that the Wetlands Program instigated through the delivery of projects through 2012-2018.

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- Wildlife Habitat Canada
- The Government of Canada's National Conservation Fund
- The Habitat Conservation Trust Fund
- Environment and Climate Change Canada
- TD Friends of the Environment Fund

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- The Nature Trust of BC, Terry and Michele Halleran, Golden District Rod & Gun Club, Goldeneye Ecological Services, Elk River Alliance, CommonsPlace Consulting Ltd, Durand Ecological Ltd, Teck Resources, Government of BC, and Selkirk College.

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Confirmation of FWCP Recognition

FWCP's logo was displayed before the related workshops on all advertisements, including posters and the Eventbrite pages. During WEP workshops the BCWF recognized the financial support of the FWCP on participant packages, and in presentations. FWCP's contribution is also recognized online on the BCWF website, on blog posts, and in photo album descriptions. The 2017 Wetlands Update, BCWF AGM booklet, and BC Outdoors Magazine all recognize FWCP's contribution in print format. A sign was installed on the Halleran Project, which thanks FWCP for its contribution.

In May 2017, BCWF hosted a field tour of FWCP-supported restoration projects in Meadow Creek for the Kootenay Conservation Program. 15 participants attended and were informed of the project sponsors. In addition, BCWF continues to distribute the Landowner Contact pamphlets that were created in 2015 with funding from FWCP.

Over 100 photos were taken of the Nakusp and Golden Workshops. Photos can be viewed at the following links:
Nakusp Design Workshop: https://www.flickr.com/photos/bcwfwep/albums/72157673043889203
Golden Wetlandkeepers: https://www.flickr.com/photos/bcwfwep/sets/72157667921697880

Some sample photos can be found below.

Top Left: Participants identify bog plants during the Golden Wetlandkeepers, Top Right: Participants measuring a core sample during the Nakusp Wetland Restoration Planning Workshop, Bottom: Participants identify invertebrates sampled during the Golden Wetlandkeepers

Below are some other examples of FWCP's financial support being accredited:

BCWF

WETLANDS EDUCATION PROGRAM

Presenters included:

Crystal Klym of the **Fish and Wildlife Compensation Plan (FWCP)**, who outlined the purpose of the FWCP and the different types of grants they offer. She then explained the FWCP's Wetland and Riparian Action Plan priorities and how to apply for the different types of grants.

Deb MacKillop from the **Ministry of Forests, Lands and Natural Resource Oerations (MFLNRO)**, where she is a research ecologist working on zone mapping for the Kootenay-Boundary region. She uses Predictive Ecosystem Mapping (PEM) and Terrestrial Ecosystem Mapping (TEM) and in her presentation she showed the maps and data she has collected for her project. Her goal is to make this new information available and to create a standard for the sharing of mapping data. Once provincial standards are set for data collection about wetlands, it will be easier for different parties to share and compare information.

Warn Franklin from **TECK Resources**, Canada's largest mining and resources company, where he manages the company's Biodiversity Program. Warn introduced the company's No Net Loss policy and explained a new benchmark system they are using to evaluate the quality of ecosystem restoration.

Alan Davidson, with the **Cumulative Effects Management Framework (CEMF)**, where he's a provincial biologist working for the riparian section. His project has divided the Elk Valley into 79 watersheds they hope to better manage using the new technology. It looks at potential risks to watershed floodplains and once the impacts and risks are assessed, they use this information to help them plan restoration work.

The next and last stop for the WEP team on the Kootenay tour was a three day Wetlandkeepers workshop in Golden, May 13-15. Hosted by the BCWF and taught by Fletcher and WEP coordinator Jason Jobin, its goal was to educate participants about the entire scope of wetland conservation.

They taught participants about wetland mapping and classification, GPS use, soil sampling, and how to identify plants, aquatic invertebrates and birds and waterfowl. A total of 24 people joined the workshop, including teachers, biologists, a city planner as well as other interested members from the Golden area.

Biologist Rachel Darvill taught a waterfowl and birding class about the Columbia Basin Waterbird Survey and the Canadian Wildlife Service Marsh Bird Monitoring Program. Laura Gaster of Columbia Shuswap Invasive Species Society (CSISS) taught the class about some key aquatic invasive plants and animals while Fletcher explained plant identification, wetland classification, wetland mapping and GPS usage. Jobin focused on invertebrate identification and field techniques as well as more detailed instruction about GPS.

There used three field locations: Reflection Lake for bird, plant and invertebrate identification; Edelweiss Slough for sedge identification; and Cedar Lake for wetland classification, plant identification and GPS mapping.

WETLANDS INSTITUTE

A week long intensive course, Wetlands Institute (W.I.) is designed to guide and provide support for participants so they can return to their communities and use their new skills for wetland restoration or creation.

Last year's event in the Okanagan brought together biologists, landscape technologists, landscape architects, environmental planners, program coordinators, educators, fund coordinators, consultants and others. The W.I. was joined by members of Environment Canada, the Okanagan Nation Alliance, the Okanagan Collaborative Conservation Program,

FINANCIAL SUPPORT

WILDLIFE HABITAT CANADA HABITAT FAUNIQUE
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14 *BC OUTDOORS BCWF JULY/AUGUST 2016*

Figure 1: Sample page from the July/August 2016 issue of BC Outdoors where the Fernie Working Group Workshop, Golden Wetlandkeepers, and the Wetland Mapping And Assessment Workshop in Castlegar.

Map Our Marshes, Langley

BCWF Wetlands Education Program Report

In 2015 the BCWF Wetlands Education Program (WEP) conducted 30 activities throughout the province, providing stewardship training involving wetland advocacy, conservation and restoration. All programs are absolutely free, removing the financial barrier for smaller conservation groups and clubs.

Working Group workshops bring together multiple stakeholders to discuss various wetland issues and work on concrete solutions within a municipality or region, providing resources and training to municipal and regional leaders who can engage in wetland projects.

On February 17th, 2016 the BCWF held the Squamish Working Group Workshop in partnership with the District of Squamish, Durand Ecological Ltd, and Ecoscape Environmental Ltd to discuss the District of Squamish's Natural Resource Inventory Project and explore opportunities to enhance wetland inventory and build local capacity throughout the process. The project will be used to identify Environmentally Sensitive Areas (ESA) and develop land use guidelines. The inventory may also help identify restoration and further conservation opportunities. The 32 attendees comprised of key municipal staff, environmental consultants, First Nations, community stewardship and conservation groups.

DURAND Ecological Ltd.

ECOSCAPE Environmental Consultants Ltd.

SQUAMISH HARDWIRED for ADVENTURE

WORLD WETLANDS DAY FEBRUARY 2, 2016

The BCWF Wetlands Education Program had the pleasure of reaching out to over 80 children at Dewdney Elementary School in Mission for World Wetlands Day this year. Dewdney Elementary is slowly introducing wetlands into their curriculum and planning a restoration project with BCWF for the wetland on their school property.

Students were introduced to the basics of wetlands and ran them through a couple of fun activities in the crisp outdoors.

Wetland Introduction

Students took turns holding up wetland artifacts and cue cards in front of the class to learn about a few key wetland topics. Students learned about:

- The 3 main ingredients: Water, Soil and Water-loving Plants;
- The 5 types of wetlands: Marsh, Bog, Fen, Swamp and Open Water;
- Some of the main functions that wetlands offer: Filtration, Flood Control and Habitat;
- As well as some of the key animals that use wetlands: Birds, Beavers, Moose (we passed around a real moose jaw for them to feel the teeth), Amphibians, Reptiles, etc.

Invertebrates-Pond Dip

A pond dip in the wetland on the school property showed students some of the invertebrates that live in and depend on wetlands. Invertebrates were collected into white viewing basins with pond water and later released back into the water. Students were fortunate on this brisk day to see a variety of invertebrates including scuds, caddisfly larvae, a type of sow bug, aquatic beetles and more. The students loved seeing the caddisfly larvae come out of their homes made of leaves and tiny sticks.

Figure 2. Sample page from May/June 2016 issue of BC Outdoors which lists the upcoming 2016 workshops and includes funder logos, including FWCP.

Wetlands Education Report

ALANA HUNTER

IN THE PAST YEAR, THE BCWF Wetlands Education Program (WEP) trained and assisted more than 40 community groups to restore local wetlands, all at no cost to participants.

The WEP hosted a number of new workshops and events, including a GIS training workshop in Castlegar, and a dam reservoir wetland restoration design workshop. As part of Surrey's Environmental Extravaganza, the BCWF developed a new outdoor event called Nature Knowledge Fest, where children visited a number of interactive booths throughout a park.

Also new and noteworthy was a partnership established with the District of Squamish to map wetlands within their boundaries for the purposes of conservation. BCWF supported intensive field visits and also worked with the district to develop an App that enables members of the public to participate in the process by mapping additional wetlands and identifying conservation needs.

MAP OUR MARSHES

Participants in the Map our Marshes course learn how to identify conservation needs at a wetland or watershed scale. Community groups are taught how to upload important GPS data to Google Earth and the BC Wetlands Atlas. This data can be shared publicly with other stakeholders and is the first step to conserve wetlands.

The BCWF held Map our Marshes courses in Duncan, Langley, Lillooet, Penticton and Squamish.

WETLANDS INSTITUTE

This intensive, week-long program took participants to wetland project sites in Aldergrove, Cheam Lake, Chilliwack, Delta, Mission, and Pitt Meadows. Participants represented a wide range of government agencies, conservation groups, First Nations, consulting firms and educators.

Upon completion of the Wetlands Institute, participants are trained to complete wetlands projects in their own communities. The 2017 Wetlands Institute will take place in the East Kootenays around the Columbia Wetlands.

WETLANDKEEPERS COURSES

These two-and-a-half day hands-on workshops educate participants about wetland conservation and provide them with technical skills to steward their own wetlands. Each course is uniquely tailored to the host community, and topics such as wetland classification and mapping, soil sampling, vegetation surveys and wetland services are part of the basic structure. In 2016 workshops were held in Parksville, Fernie and Golden.

Keep an eye on the upcoming WEP programs under the Programs Menu of the BCWF website, or sign up for updates on the https:// bcwfbogblog.com

Figure 2. Sample page from BC Outdoors March/April 2017 issue, where we thank our 2016 funders.

Wetlands Education Report

WEP

THE BCWF WETLANDS Education Program was busy delivering hands-on wetlands restoration education around the province this fall.

YOUTH INITIATIVES

Hundreds of people enjoyed the WEP wetland display and photo booth at the annual Riverfest September 23 at the New Westminster Quay.

The WEP team worked with students and teachers to plant native species and continue wetland restoration on the Dewdney Elementary and Silverdale sites near Mission, BC. The WEP visited Nakusp Elementary to discuss the importance of the Burton Flats wetland habitat, which the school is going to study as part of the new curriculum placed-based focus.

The WEP hosted an activity table with the Simpcw First Nations Raft River Outdoor School Program near

RESERVOIR WETLANDS

Opportunities to restore wetlands both within and outside of reservoirs was the subject of a two-day workshop September 13 &14 in Burton, B.C. 22 participants from the Kootenay region studied wetland restoration, including the challenges and opportunities in reservoir draw down zones. The East and West Kootenays are within the Columbia watershed, where many of the wetlands have been flooded or impacted by hydroelectric projects.

Expert speakers included;

• Virgil Hawkes shared his research on the impact of reservoirs on ecosystems in the draw down zone and on the current wildlife using them.

• David Polster, an expert in bioengineering, shared his rough and loose techniques for seeding wetlands, and using live willow and alder stakes to jump start primary successors when regenerating sites.

pensation Program, Environment Canada, and Wildlife Habitat Canada for the sponsorship that makes it possible for the Wetlands Education Program to provide workshops at no cost to participants.

MAP OUR MARSHES SQUAMISH

Report by Doug Newbigging, photos by Jason Jobin

The BC Wildlife Federation's Wetlands Education Program (BCWF WEP) hosted a free public Map our Marshes workshop in Squamish on October 22, 2016. This workshop added a public engagement component of a more detailed wetland mapping process that the District of Squamish has been undergoing with the support of the BC Wildlife Federation. This multi-year mapping initiative is an effort to better conserve and protect wetlands in the region. Over the summer, Doug Newbigging, an intern with BC Wildlife Federation and a student at BC Institute of Technology's Ecological Restoration Program, worked with consultant Ryan Durand of Ecologic Environmental Consultants, to map wetlands within the District of Squamish.

Prior to the workshop, and to meaningfully engage the public and citizen-

Map our marshes Squamish

PHOTOS BY WETLANDS EDUCATION PROGRAM

Raft River friends try on wetland animal masks

Figure 3. Sample from article to be published in the January/ February 2017 issue of BC Outdoors. The article discusses outreach at Nakusp Elementary School as well as the Nakusp Restoration Planning Workshop Funders are thanked at the end of the article.

Figure 4. Poster used to advertise the Nakusp Restoration Design Workshop.

Sunday	
9:00 – 10:00 AM	***Classroom***
	1. Wetland Aquatic Invertebrates– *Jason Jobin (BC Wildlife Federation)* • Life history, classification
10:00 AM-11:00 AM	***Field Location – TBA***
	1. Hands on invertebrate sampling 2. Invertebrate identification/microscope use
11:00 AM -11:30 PM	***Lunch in Field***
11:30- 3:00 PM	***Field Location – TBA***
	1. Wetland Overview Classification Forms 2. Overview form 3. Using GPS Technology to Map Wetlands • GPS Theory • Hands on field experience GPS
3:00-5:00 PM	***Classroom***
	1. Discussion on community based wetland conservation – Case studies 2. Transferring GPS Data to Google Earth and Community Mapping Network 3. Evaluations and Certificates 4. Wrap-up, return equipment

Figure 5. Portion of the Golden Wetlandkeepers agenda, which acknowledges FWCP's contribution.

Wetlands Update

The Newsletter of the BC Wildlife Federation's Wetlands Education Program

2017 Edition

Participants gather in front of a small ephemeral wetland during the 2016 Squamish Map our Marshes Workshop

Wetlands Program Fills Gaps in Conservation Needs

If one thing is certain within the Wetlands Education Program, it is that every year will be unique and expand upon previous years. The 2016 programming was no different, with 3 wetland restoration projects completed, 635 program participants, and over 2100 people educated through public outreach and school visits.

BCWF hosted a number of new workshops and events including a GIS training workshop in Castlegar, and a dam reservoir wetland restoration design workshop (see Pg. 5). As part of Surrey's Environmental Extravaganza, BCWF developed a new outdoor event called "Nature Knowledge Fest" where children visited a number of interactive booths at Surrey Bend, a new Metro Vancouver Park (Pg. 7) The Wetlands Education Program crew was invited to visit classrooms at multiple schools. Also new and noteworthy were the creation of a multi-week Youth Wetlandkeepers Workshop in Fernie BC (Pg. 3), and the development of a wetland Mapping App with the District of Surrey (Pg. 4)

Please continue reading to learn more about our 2016 programming, and what workshops may be coming to your area in 2017.

In This Issue

Figure 6. The Wetlands Update is available free online, with printed copies distributed at all workshops and public events. The final page acknowledges FWCP and other funders. The 2017 version available here: https://bcwfbogblog.files.wordpress.com/2019/02/wetlands-update-2017.pdf

Figure 7. Portion of registration page for a FWCP-supported workshop.

Figure 8. Sample of BCWF Wetlands Education Program Facebook post thanking FWCP

TRAVELLING THROUGH THE KOOTENAYS

Posted by *dougnewbigging* on May 24, 2016 · *Leave a Comment (Edit)*

The BCWF Wetlands Education Program (WEP) spent an intensive 7 days travelling through the Kootenays to host events in the communities of Grand Forks, Castlegar, Fernie and Golden.

DAY 1

On our way to Castlegar, the WEP team was invited to give a presentation to Grand Forks city council about protecting Johnson Flats Wetland. The wetland is a large marsh and open shallow water wetland which city council is looking to declare as a protected area. Neil Fletcher presented at an official city hall meeting in front of Mayor Frank Konrad, city council, and several members of the community. The presentation outlined the importance of wetland conservation and addressed the importance and rarity of wetlands on the scale of the Johnson Flats Wetland. The presentation was well received and followed by a short Q&A for the council members.

DAYS 2-3

The WEP team then headed to Castlegar for a two day Q-GIS Workshop at Selkirk College. A first of its kind, participants travelled from as far Vancouver Island to learn how to integrate this free mapping software program with their wetland inventory projects. BCWF had a total of 25 participants in the classroom and additional 5 who joined remotely. Two

Figure 9. Sample from a Blog Post about some workshops funded by FWCP. Funders are recognized at the end. Full article can be found at https://bcwfbogblog.com/2016/05/24/road-trip-to-the-kootenays/

Figure 10. Sample of a webpage on the BCWF website, thanking the 2017 funders. A similar page was live in 2016.

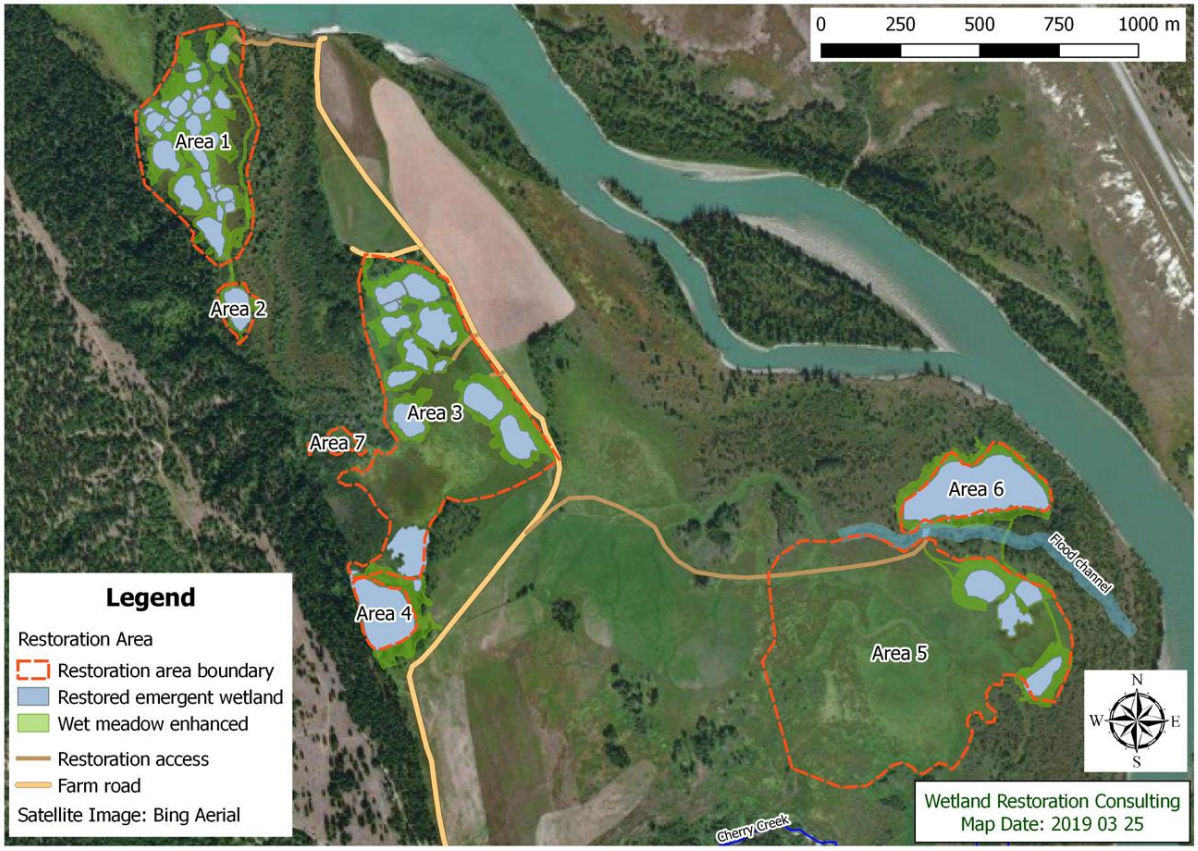
Figure 12. Three talks from the Nakusp Restoration Planning Workshop were recorded and posted on Youtube. They begin and end with graphics thanking the sponsors. Video descriptions also thank sponsors. The videos are as follows:

- "The Use of Topographic Heterogeneity to Enhance Diversity - David Polster": https://youtu.be/HGsMmTt1a2U
- "Reservoir Revegetation, Assessment, and Wetland Prescriptions - Virgil Hawkes": https://youtu.be/yWriPbb8RcI
- "Reservoirs, Wetlands, & Birds - Harry van Oort ": https://youtu.be/qJz2PTMD6kw

Figure 13. Sign erected at the Halleran Farm, thanking funders.

Appendix A: Maps of restoration projects

1. Map of Halleran property and shallow water wetlands restored. MC 1 to 5 (Purple) were restored in January 2014. MC 6 to 14 (Blue) were restored in January and May 2016.



2. Map of Cherry Creek Project