

Mid-Columbia Ecosystem Enhancement Projects

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Prepared for: Fish and Wildlife Compensation Program

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Executive Summary

First Nations, community groups and the general public in the Revelstoke area are supportive of on-site stewardship projects to improve ecosystem function and habitats impacted by hydropower facility construction and operations in the Mid-Columbia area (between Shelter Bay and Mica dam). This project compiled the scientific information about these ecosystem and potential projects into an easy to access and understand catalogue format and brought First Nations, community groups, interested individuals, local technical specialists and government experts together to review and enrich this information with traditional and local knowledge, and to build relationships to partner on implementing projects in the future.

Over 80 publicly available reports completed in the last 25 years were identified for this project. Resources did not allow for review of earlier literature. The project team scanned a short list of these documents, including original research, project reports and strategic action plans to identify potential projects for the catalogue. An Annotated Bibliography of these documents was compiled and is available on the project [webpage](#) located on the Columbia Mountains Institute of Applied Ecology website. The complete Listing of Relevant Documents is available from the Project Lead.

A draft catalogue was prepared from this information. The draft was reviewed by the team members, representatives of community partner organizations – Columbia Shuswap Invasive Species Society, North Columbia Environmental Society and the Revelstoke Rod and Gun Club – and local agency staff. A refined draft was discussed during a community workshop and field trip in early September 2016. The Kootenay Conservation Partnership provided an informative community presentation in early December 2016 to explain private land stewardship activities in other parts of the Columbia Basin and to explore interest in bringing these approaches to the Mid-Columbia area. The ideas resulting from this discussion are included in the catalogue.

Substantial follow-up with technical specialists was completed after the workshop and evening event to verify new information and finalize the catalogue, which is posted on the project webpage.

All of the original project goals and objectives were met with the exception that the momentum established in the early months of the project towards building relationships for crafting joint project proposals in the future was dampened when the project lead was forced to largely withdraw from the project for periods of time due to personal reasons. Given this outcome, the project lead is committed to continue to foster these relationships on an informal basis going forward.

The catalogue lists 23 potential projects for specific locations within the area and project descriptions were developed for eight more projects that apply to the whole area. The catalogue also includes a listing of additional projects that were suggested during the process. The projects range from very site specific activities, such as oxbow restoration at McKay Creek to broader projects such as a Lake Revelstoke creel survey and area-wide suggestions including low elevation cottonwood forest conservation/re-establishment.

The vast majority of the site-specific projects are located in the Revelstoke Reach upstream to just north of the CPR and highway bridges. Most are located along the Akolkolex River or relate to riparian and wetland habitat enhancement. Recommended actions range from inventories to active habitat enhancement and monitoring. Substantial research and monitoring has been undertaken for this area during the Columbia Water Use Plan studies and a few on-site projects have been completed.

The Fish and Wildlife Compensation Program's *Columbia Basin Streams Action Plan* (2012) lists the Akolkolex River as one of the 15 'priority streams' for investments. The Fish and Wildlife Compensation Program's *Columbia Basin Riparian and Wetland Action Plan* (2014 pages 43-45) identifies the Revelstoke Reach as a 'focal area' and places a first priority on improved info sharing and strengthened collaboration. This project initiated this action, however there is clearly much more to be done.

There is considerable interest in continuing to communicate and partner on local ecosystem enhancement projects amongst First Nations, community groups, local technical specialists, agency staff and interested individuals in the Mid-Columbia area. Some of the project team and representatives from the community partner organizations have discussed reconvening to review the status of projects and new ideas within one year. The project listed in the catalogue to share learnings about drawdown zone enhancement may create a forum for this exchange.

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1. Introduction

The construction and operation of hydropower dams have highly modified the natural environments between Shelter Bay and the Mica dam in the North Columbia sub-region through permanent modification of a substantial area of upland, bottomland riparian, wetland and aquatic ecosystems. First Nations, community groups and the general public are supportive of on-site stewardship, conservation and restoration projects in this area to improve ecosystem function and habitats. Although there are many scientific reports that describe the environmental impacts of reservoirs and hydropower operations and suggest potential enhancement projects and priorities, this information is not readily understood by non-technical readers.

As well, interested groups do not have relationships in place to partner on projects. These barriers have slowed the development of on-site initiatives. This project reduced these barriers by compiling the scientific information into a catalogue of potential projects and by bringing First Nations, community groups, interested individuals, local technical specialists and government experts together to review and enrich this list with traditional and local knowledge.

2. Goals and Objectives

The principal goals and objectives for this project were to:

Goal 1. Facilitate the development of strong relationships between organizations and individuals who might be interested in partnering on ecosystem enhancement projects in the Mid-Columbia area.

Objectives:

- a) Introduce representatives from First Nations claiming traditional territory in the area, community groups, consulting businesses and agencies as well as interested individuals to one another as the foundation for future information exchange and partnerships.
- b) Develop relationships through interactions during the project including the literature scan, workshop/field trip, private land conservation tools event and project team tasks to strengthen partnerships to successfully implement some of the identified projects.

Goal 2. Compile information about potential ecosystem enhancement projects in easy to access and understand formats, with links back to technical and scientific sources.

Objectives:

- a) Create a brief background summary of local ecosystem impacts from dam construction and operation, and opportunities to offset these impacts.
- b) Prepare a catalogue and map of site specific ecosystem enhancement project opportunities that describe the type of enhancement activities, potential benefits and any challenges to implementing each project.

- c) Compile a list of literature that is relevant to ecosystem enhancement projects for areas impacted by dam construction and operation from Shelter Bay to Mica dam.
- d) Establish a webpage on CMI's website that makes this information readily available to potential project proponents for at least five years.

The original project proposal included a goal for community engagement in Revelstoke and First Nations communities to educate community members about the ecosystem impacts of dam construction and operations in the local area and the potential to reduce these impacts through projects that conserve, enhance or restore these ecosystems. This aspect of the project was curtailed because of limited funding.

2. Study Area

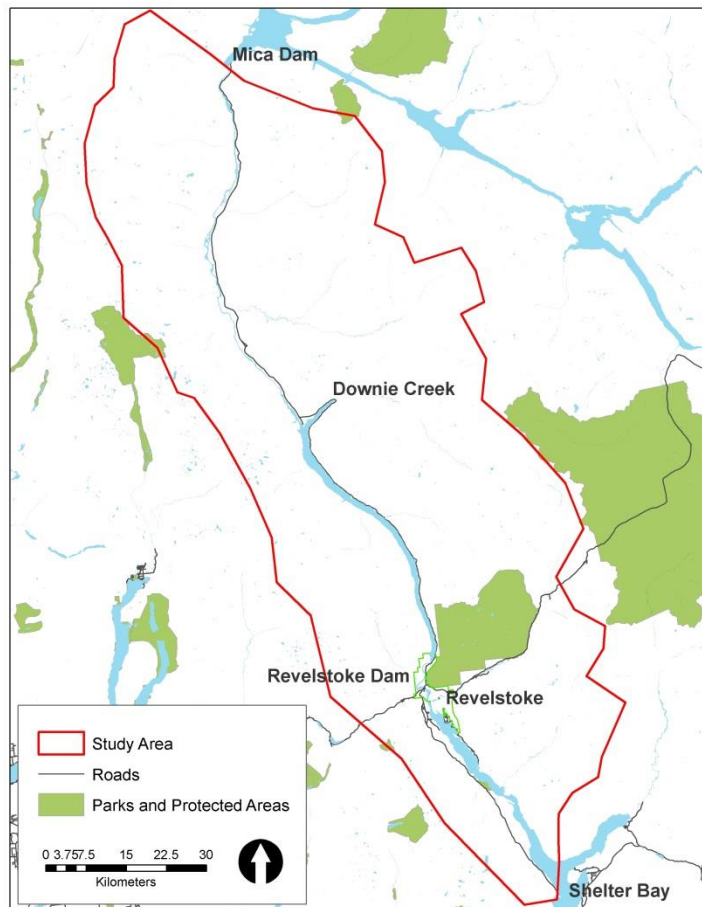
This catalogue covers the area considered to be 'local' to Revelstoke - from Shelter Bay to Mica dam - as shown in the map on the right.

4. Methods

Project team and partners

The team for this project included:

- Cindy Pearce, Project lead, Mountain Labyrinths Inc.;
- Harry van Oort, biologist and Ryan Gill, biologist/GIS operator, Coopers Beaudesne;
- Mandy Kellner, Kingbird Biological Consulting;
- Will Warnock, Canadian Columbia River Inter-tribal Fisheries Commission (CCRIFC);
- Michael Zimmer, fisheries biologist, Okanagan Nation Alliance;
- Lucie Thompson, biologist, Splatsin Development Corporation; and
- Hailey Ross, staff, Columbia Mountain Institute of Applied Ecology (CMI).



The Columbia Shuswap Invasive Species Society, Kootenay Conservation Partnership, North Columbia Environmental Society and Revelstoke Rod and Gun Club partnered with the project team for this project. Representatives of these community organizations reviewed the draft catalogue, attended the workshop/field trip and the community event and reviewed the final draft of the catalogue. Staff with the City of Revelstoke, BC Hydro and the BC government also participated.

Literature scan

This project was initiated by collecting a listing of relevant documents that describe the environmental impacts of reservoirs and hydropower operations in this area, with some suggesting potential ecosystem projects and priorities. Over 80 publicly available reports completed in the last 25 years were identified. Project resources did not allow for review of earlier literature.

The project team scanned a short list of these documents, including original research, project reports and strategic action plans to identify potential projects for this catalogue. An Annotated Bibliography of these documents was compiled and is available on the project [webpage](#). The complete Listing of Relevant Documents is available from the Project Lead.

Webpage

CMI established a [webpage](#) for the project on their website. This webpage was updated with new information as it became available.

Draft catalogue and review

A draft catalogue was compiled based on the projects recommended in the reports that were scanned and the local knowledge of the project team members. The draft catalogue was reviewed by technical specialists in agencies and community groups and was posted on the project webpage hosted by CMI, with an invitation for public input through an on-line survey and interviews. A media notice was issued to invite input.

Workshop/field trip

Input from technical specialists, surveys and interviews were added to the catalogue which was reviewed during a workshop and field trip in early September 2016. This workshop was attended by 13 individuals. During the field trip the group viewed a site at Airport Marsh to discuss invasive species control projects and others such as turtle habitat and general wetland enhancement. The group also walked the lower reach of Drimmie Creek to explore a recommended fish passage enhancement project. The group agreed that this project was no longer needed. Several participants committed to follow-up tasks after the workshop. These were tracked and have been largely completed.

Private land stewardship event

In early December 2016 two representatives from the Kootenay Conservation Program (KCP) provided a presentation on KCP programs and an overview of private land stewardship options at an evening event attended by 19 community members. This was followed by a lively discussion, including identifying potential projects that have been added to the catalogue. KCP provided follow-up information on outstanding questions after the event.

Final catalogue

Substantial follow-up with technical specialists was completed after the workshop and evening event to verify new information and revise the draft catalogue. During this review it was found that recommendations in scanned reports for removal of fish passage barriers and addition of large woody debris to streams to enhance fisheries habitat are no longer supported based on more recent

understanding about effective fisheries enhancement practices in the steep, flash-prone conditions in local streams, so these projects were removed from the catalogue.

The project team members and community partner representatives reviewed the final draft before the final catalogue was prepared and posted on the project webpage.

5. Results and Outcomes

The project proceeded as planned through April to September, with the completion of the literature scan, webpage creation, preparation of the draft catalogue and the workshop/field trip. At that point the project lead was forced to largely withdraw from the project for personal reasons.

The private land conservation event was held in December as planned. Then work continued intermittently on finalizing the catalogue when the project lead was available. As requested by FWCP, BC Hydro personnel with expertise in Water Use Plan implementation (Karen Bray and Margo Sadler) were consulted. Cory Legebokow, Habitat Management Specialist at the local office of the BC Ministry of Forests, Lands and Natural Resource Operations also provided substantial input.

These delays extended the project timeline significantly and likely dampened the momentum towards building relationships for crafting joint project proposals that had been established in the early months of the project.

All of the project goals and objectives were met with the exception that the opportunities to strengthen relationships were limited by the changes in funding and the extended timeline.

The catalogue lists 23 potential projects for specific locations within the area. Most are located in the Revelstoke Reach and between the bridges to the Revelstoke dam (20 projects). Project descriptions were developed for eight more projects that apply to the whole area. The catalogue also includes a listing of additional projects that were suggested during the process. The projects range from very site specific activities, such as oxbow restoration at McKay Creek to broader projects such as a Lake Revelstoke creek survey and area-wide suggestions including low elevation cottonwood forest conservation/re-establishment.

6. Discussion

Although the Arrow and Mica dams have existed for over 40 years, substantial knowledge gaps remain in understanding the new ecosystems that have been created, particularly in the Revelstoke Reach, and appropriate ecosystem enhancement opportunities. The Water Use Plan studies are beginning to fill this gap.

This project illustrates the challenges faced by non-technical groups in accessing information about potential ecosystem enhancement projects in this area. For example, although several reports recommend fisheries enhancement projects in streams in the area, most are no longer relevant due to changes in best practices for the local steep, high-flow, flash-prone streams. To test the challenges, the Project Lead reviewed the relevant Water Use Plan and other reports regarding

wildlife projects in the Revelstoke Reach area to figure out which, if any projects should be included in the catalogue. After scanning the documents and discussing the initial findings with BC Hydro staff, it was found that projects had been dropped from one report to the next, without any documentation, making it impossible to track how recommended projects had been evaluated and decisions made to drop them from further consideration.

The unfortunate necessity for the project lead to largely withdraw from the project for extended periods made it difficult to sustain the relationship building activities that were initiated in the early phases of the project. Given this outcome, the project lead is committed to continue to foster these relationships on an informal basis going forward.

7. Recommendations

The vast majority of the site-specific projects are located in the Revelstoke Reach upstream to just north of the CPR and highway bridges. Most are located along the Akolkolex River or relate to riparian and wetland habitat enhancement. Recommended actions range from inventories to active habitat enhancement and monitoring. Substantial research and monitoring has been undertaken for this area during the Columbia Water Use Plan studies and a few on-site projects have been completed.

The Fish and Wildlife Compensation Program's *Columbia Basin Streams Action Plan* (2012) lists the Akolkolex River as one of the 15 'priority streams' for investments. The Fish and Wildlife Compensation Program's *Columbia Basin Riparian and Wetland Action Plan* (2014 pages 43-45) identifies the Revelstoke Reach as a 'focal area' and places a first priority on improved info sharing and strengthened collaboration. This project initiated this action, however there is clearly much more to be done.

There is considerable interest in continuing to communicate and partner on local ecosystem enhancement projects amongst First Nations, community groups, local technical specialists, agency staff and interested individuals in the Mid-Columbia area. Some of the project team and representatives from the community partner organizations have discussed reconvening to review the status of projects and new ideas within one year. The project listed in the catalogue to share learnings about drawdown zone enhancement may create a forum for this exchange.

The recent 'Imagining the Columbia River' film and panel event has enlivened local interest in the Mid-Columbia area and the impacts of hydropower operations. The upcoming One River-One Ethic event in May in Revelstoke may be an opportunity for community education about the project and potential enhancement projects.

This project showed some initial benefits of bringing potential project partners together to jointly learn about impacts and project opportunities. If a similar project was considered for another area, it is suggested that an early first step should be a series of project team interviews with senior aquatic and terrestrial ecosystem technical specialists who are knowledgeable about the local area, relevant research and past projects before embarking on the literature scan and compilation.

8. Acknowledgements

The continuing commitment of the project team members and the community partner representatives as the project timeline was extended is greatly appreciated, as is their ongoing dedication to improving ecological conditions in the Mid-Columbia area.

This project was made possible by the financial support of the Fish and Wildlife Compensation Program and the Columbia Basin Trust as well as the generous in-kind contributions of the project team, community partner organizations and agency staff.

9. References

See the Annotated Bibliography on the project [webpage](#).

The complete List of References is available from the Project Lead.