# Haskill Creek – Reimer Reach Floodplain Renovation

DEQ 319 Grant Contract 211083

Final Report 2/12/15 Flathead Conservation District

## GENERAL INFORMATION

**Project Title: Haskill Creek - Reimer Reach Floodplain Renovation**

**DEQ 319 Contract Number: 211083** **Reporting Period:** 06/27/2011 to 12/31/2014

**Sponsor: Flathead Conservation District**

**Contact Name: Valerie Kurth** **Email: vkurth@flatheadcd.org**

**Address: 133 Interstate Lane; Kalispell, MT 59901**

**Phone: 406-752-4220** **Fax: 406-752-4077**

## SECTION 1.0 EXECUTIVE SUMMARY

The Haskill Basin Watershed Council (HBWC), in partnership with the Flathead Conservation District (FCD), works to maintain and enhance the chemical, biological, and physical integrity of Haskill Creek through a voluntary and cooperative effort. Since its inception in 2000, HBWC has pursued a variety of projects throughout the Haskill Basin watershed. The goal of the Haskill Creek – Reimer Reach Floodplain Renovation project was to reduce bank-related erosion and sedimentation along a 1,222-ft stretch of Haskill Creek using two bank-stabilization techniques as demonstration projects. The techniques were implemented at five sites: four of the sites used woody debris jams with willow cuttings and the fifth site employed a soil lift/willow hedge brush and conifer fascine. High streambanks were excavated to create new benches to re-establish connectivity between the channel and the floodplain, and a vigorous riparian buffer was planted using containerized woody plants. Students from Whitefish High School provided volunteer labor and project monitoring, which also facilitated service-learning opportunities and community building. A local engineering firm, River Design Group, Inc. (RDG), collaborated with the partners on the project design, construction, and effectiveness monitoring. Project planning and development took place from June 2011 to October of 2012. The construction and planting were completed in the fall of 2012. Follow-up monitoring in the summer of 2013 revealed substantial plant mortality and weed encroachment; subsequently, replacement plants were installed and herbicides were applied. Final effectiveness monitoring was completed by RDG in the summer of 2014. The monitoring demonstrated that both bank-stabilization techniques were successful in meeting project goals. Specifically, bank erosion and sedimentation were reduced at all five sites (97 tons/year of sediment total; approximate reduction: 74%), and native vegetation in the riparian buffer was well-established. The landowners are extremely pleased with the project outcomes, which is an added benefit, especially given their initial skepticism. Overall, the implementation of this project took longer and required more patience than the partners anticipated, which should be remembered when executing projects of similar size and complexity.

## SECTION 2.0 BACKGROUND

The Haskill Basin Watershed Council (HBWC) is a group of dedicated citizens whose mission is to maintain and enhance the chemical, biological, and physical integrity of Haskill Creek through a voluntary and cooperative effort. The formation of HBWC, in 2000, was initiated by the Flathead Conservation District (FCD) in response to growing community concerns about the impacts of various human-caused disturbances on private land throughout the Haskill Basin Watershed. Since its inception, HBWC has worked consistently and productively in pursuit of its mission, and FCD has partnered with it as an advisor and fiscal manager.

Haskill Creek originates northeast of the City of Whitefish at the Whitefish Mountain Resort, and it flows approximately 11 miles to its confluence with the Whitefish River. Haskill Creek has three main tributaries (First Creek, Second Creek, and Third Creek) that comprise Haskill Basin (Figure 1), and it provides municipal water to the City of Whitefish. In recent years, sediment production from point and non-point sources has increased throughout Haskill Creek due to a variety of anthropogenic modifications, including land cover disturbance, physical stream straightening, and floodplain encroachment, as well as residential and commercial developments.

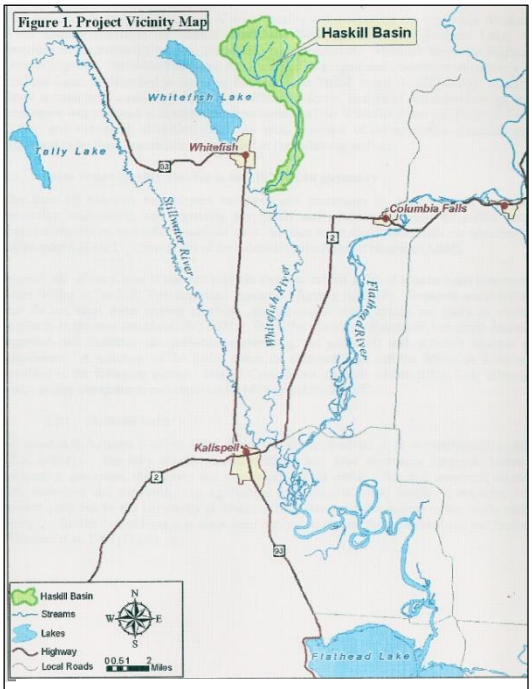


**Figure 1.** Map of Haskill Basin Watershed near Whitefish, MT.

The efforts of the HBWC have been guided by detailed watershed assessments that were completed in 2002 and 2004. The purpose of these assessments was to identify opportunities for improving water quality in the Haskill Creek Basin, as well as downstream receiving basins, including the Whitefish River and Flathead Lake. Both reports were commissioned by HBWC and FCD with grant funding from the Montana Department of Natural Resources and Conservation (DNRC). The first study, conducted by Water Consulting, Inc., identified direct and indirect modifications to the main stem of Haskill Creek and tributary streams that led to elevated fine sediment and impaired aquatic habitat. The second study, conducted by River Design Group, Inc. (RDG), expanded on the first by including field validation and source quantification of suspected impairments. The reports developed a conceptual water quality restoration plan, which identified 14 priority sites along the creek. Five of these sites, located on the Reimer reach, had highly eroding streambanks and terraces with minimal or shallow-rooted grasses and forbs as riparian vegetation (Figure 2). The assessments recommended bank and floodplain restoration to reduce sediment inputs and re-establish connectivity between the channel and the floodplain. The Haskill Creek – Reimer Reach Floodplain Renovation project implemented these restoration treatments, including the lowering of high banks, installation of woody debris jams and conifer/willow fascines, and a rigorous revegetation of the floodplain, along this degraded stretch of Haskill Creek (Figure 3; Attachment R) to achieve the non-point source pollution reduction goals set in the original watershed assessment.

**Figure 2.** Photo showing the highly eroding streambank that characterized the site prior to the renovation. This photo shows Site 4 in 2008.

This project had significant water quality impacts in the Haskill Creek watershed. The effectiveness of the restoration was evaluated in monitoring work conducted in 2014 (2 years post-construction) by the project subcontractor, RDG (Attachment I). The monitoring documented that over 1,200 feet of riverbank was restored using primarily bioengineering-based treatments (e.g., vegetated soil lifts, conifer and willow fascines, and riparian plantings). Sediment loading was reduced by 97 tons/year (as measured two years post-construction) through the alleviation of streambank erosion and instability. In addition, 300 containerized plants were installed (willow, red osier dogwood, alder, and cottonwood) to establish a riparian buffer for enhanced floodplain stability and increased shading of the creek. The reduction in sediment loading and increased bank stability will both be significant to the Flathead-Stillwater Total Maximum Daily Load (TMDL), which calls for a 7% (26.1 tons/year) reduction in sediment from eroding streambanks and a 20% reduction from upland sources (74.7 tons/year). Estimates for sediment load reduction from eroding streambanks appear to meet the sediment TMDL, and the increased vegetation will further reduce sediment from upland sources. Finally, on a personal level, the landowners, Kurt and Kent Reimer, are extremely pleased with the project outcomes. Their family had struggled with bank erosion for decades, but they lacked the time and resources to address the problem. This project was a timely opportunity for them.

In addition to the achieved water quality benefits, this project also benefited the local community and project partners. Various volunteer groups were instrumental in willow cutting and treatment construction, including the Montana Conservation Corps, Flathead Valley Chapter of Trout Unlimited, and local high school students. In particular, students from Whitefish High School's Project FREEFLOW (Flathead River Educational Effort for Learning in our Watershed) program gained valuable experience in service-learning and applied science through planting containerized vegetation and conducting site assessments and monitoring. This project was also featured in the 2014 Northwest Projects Tour, a Montana Watershed Coordination Council-sponsored event wherein various agency personnel and private consultants viewed a variety of restoration projects around northwestern Montana (Attachment L). Local outreach for this project included an article in the Flathead Beacon newspaper on 11/14/12 and one in the Whitefish Pilot on 11/7/12 (Attachments M and N); in addition, FCD highlighted the success of this project in its monthly advertisement in the Flathead Beacon in August 2014 (Attachment O). In-kind support of this project came


**Figure 3.** Aerial view of project vicinity.

from the myriad volunteers involved, as well as the contractor (FCD) and subcontractor (RDG, who wrote off $7,550 of construction and installation costs).

## SECTION 3.0 GOALS

The overarching project objectives were to reduce sedimentation and associated nutrients and improve terrestrial and aquatic habitat along the Reimer reach of Haskill Creek. The water quality in Haskill Creek was previously assessed as part of the Flathead Stillwater TMDL planning process. This process determined that Haskill Creek is impaired by sediment for which a TMDL was written. Although the TMDL was completed in 2014, the data used for assessment were collected in 2008, prior to the implementation of this project. Haskill Creek is also a tributary of the Whitefish River. The Whitefish River was listed for nutrient impairment in the 2012 Integrated Report but was delisted in 2014; it remains impaired for temperature and a TMDL was completed in 2014. In implementing this project, FCD and HBWC specifically sought to:

1) Reduce nonpoint source pollution from bank-related sources of sediment and nutrients to Haskill Creek and its downstream water bodies.
2) Reduce local and downstream erosion and sedimentation by reestablishing floodplain connectivity and function.
3) Improve riparian habitat and function by increasing cover of native riparian vegetation within the immediate floodplain corridor.
4) Implement agricultural BMPs to prevent introduction of nutrients.
5) Implement Flathead Lake TMDL to reduce siltation and its associated nutrients.

The project monitoring conducted in 2014 by RDG (Attachment I) documented success in meeting Goals (1) and (2) two years following treatment construction. Sediment reduction was quantified by conducting pre- and post-construction channel surveys and streambank profiles using a survey grade Global Positioning System (GPS). Bank erosion was estimated using the Bank Assessment for Non-Point Source Consequences of Sediment (BANCS) model. Sedimentation was reduced by approximately 74% across the five sites, amounting to a total reduction of 97 tons/year. Concurrently, the bank erosion hazard index (BEHI) rating fell from between High to Extreme (2012 pre-construction) to either Low or Moderate (2014 post-construction). Haskill Creek was not monitored for nutrient reductions as part of this study because of the added cost, but the partners predict that observed reductions in sedimentation also yielded reductions in nutrient inputs to the stream (particularly phosphorus because it is commonly adsorbed to soil particles). In addition to meeting the first two goals, this project also succeeded in implementing measures to achieve the Flathead Lake TMDL (Goal 5), which called for a 25% reduction in nutrients from agricultural and urban areas in the Flathead Valley. FCD prioritized this project because of its location on agricultural land within the headwaters of the Flathead River and Flathead Lake; thus, it will benefit Flathead Lake (as the receiving basin).

The project monitoring also indicated success in meeting Goal (3). Vegetation was monitored at two of the five sites two years post-construction. Percent leafy cover of the installed willow cuttings was estimated along bankline transects. Percent survival of the installed containerized stock plants was quantified in floodplain plots. After two years of growth, percent leafy cover from the willow cuttings varied considerably between the two monitored sites; cover ranged from 0 to 25% at one site and 30 to 100% at the other. Despite this variability, active willow growth from the cuttings was observed throughout the project reach. After two years, the percent survival of the containerized plants was 100% within the monitoring plots at both sites. In addition, survival rates of 93% and 100% were observed

throughout the entire floodplain area at the two sites. Associated with the high success of native plant establishment, a reduction in the cover of noxious weeds, including reed canarygrass and Canada thistle, was also observed along the reach.

FCD collaborated with the landowners, Kurt and Kent Reimer, to implement agricultural best management practices (BMPs) to prevent the introduction of nutrients and to maintain the riparian buffer (Goal 4). A landowner agreement (LA) was signed by all parties (Attachment H) to adhere to a Riparian Management Plan (RMP; Attachment G) wherein cropping and agricultural activities are prohibited in the buffer area and livestock grazing will be managed. Specifically, no livestock grazing will occur in the buffer for 3 to 5 years (until vegetation is well-established), and, subsequently, if grazing is desired, an appropriate prescription will be developed in consultation with Montana Fish, Wildlife and Parks (FWP), Montana State University Extension, or the Natural Resources Conservation Service (NRCS) prior to initiating grazing. In addition, the buffer area will be surveyed for weeds twice per year and addressed as needed. The implementation of these agricultural BMPs will ensure treatment longevity, as well as long-term water quality benefits to Haskill Creek.

FCD and HBWC are pleased with the project's successes in meeting its goals in improving water quality in the Reimer reach of Haskill Creek. The partners are also satisfied with the public outreach and educational opportunities that accompanied this project. An unexpected benefit to this project is the high amount of landowner satisfaction that was achieved. The landowners, Kurt and Kent Reimer, were initially skeptical of the project, but they are extremely pleased with the results.

## SECTION 4.0 ACTIVITIES

### TASK 1 – PROJECT PLANNING

**Task 1 Description.** Contractor shall prepare a final design plan for the floodplain renovation project. Final design must incorporate any necessary modifications to the design plan that arise from the early 2011 project area visit.

Contractor shall prepare a draft and final Sampling and Analysis Plan (SAP) for effectiveness monitoring within the Reimer project area.

Contractor shall prepare a draft and final riparian management plan (RMP) for the Reimer project area. Contractor shall address DEQ comments on the draft RMP prior to completing the final RMP. Contractor shall obtain a signed landowner agreement (LA) for adherence to the final RMP plan.

**Task 1 Summary of activities.**
The draft project design was completed by RDG with funds from a DNRC House Bill 223 grant prior to requesting the 319 funding for the Haskill Creek-Reimer Reach Floodplain Renovation. The field visit and discussion with all permitting agencies took place on 4/25/11, and a written summary of this discussion was submitted to DEQ on 9/15/11 (Attachment A). Subsequently, the design was modified to include a soil lift/willow hedge brush and conifer fascine treatment at one of the sites, and the final design that accounted for agency feedback was approved by DEQ on 8/15/12 (Attachment C)

The Request for Proposal (RFP; Attachment F) for a subcontractor was issued on 8/21/12 by posting on the FCD website and emailing to nine environmental consulting firms. Four firms attended the mandatory on-site meeting on 8/27/12, and two firms submitted proposals by the closing date of 9/10/12. HBWC evaluated them, and they selected the subcontract proposal submitted by RDG. FCD and DEQ approved their selection, and the subcontract was finalized on 10/9/12.

Pre-construction baseline erosion data and photo points were collected in the summer of 2012 by RDG, and FCD submitted this information to DEQ on 7/11/12 (Attachment B). The Riparian Management Plan (RMP) was approved by DEQ on 10/4/12 and the final RMP, which incorporated DEQ comments, was completed on 10/9/12 (Attachment G). The landowner agreement, which stipulates adherence to the RMP, was subsequently completed and signed by the landowners on 10/4/12 (Attachment H).

The Joint Application for Proposed Work in Montana's Streams, Wetlands, Floodplains, and Other Water Bodies (includes the required 310, Floodplain, and 404 permits) and draft QAPP-SAP were prepared by RDG and submitted on 9/13/10 (initiated prior to receiving DEQ funds). The 310 permit was approved by FCD on 9/22/12 and completed on 10/5/12. The Floodplain and 404 permits were issued on 10/12/12 (all permits are in Attachment D). The final QAPP-SAP was approved by DEQ on 10/12/12 (Attachment E), and they issued the Notice to Proceed on the same day. (Attachment Q).

**TASK 2 – IMPLEMENT FLOODPLAIN RENOVATION DEMONSTRATION PROJECT DESIGN**

**Task 2 Description-** Contractor shall implement the design for the floodplain renovation finalized under Task 1. Implementation includes the following sub-tasks: 1) excavation of stream terraces in order to create new floodplain surfaces; 2) installation of woody material along the toe of stream banks to inhibit lateral stream channel erosion; 3) planting a large quantity of willow cuttings (approximately 5 cuttings per foot) along the stream bank; 4) spreading mulch on newly established floodplain surfaces; 5) seeding newly established floodplain surfaces with a wetland plant seed mixture; 6) planting containerized alder, black cottonwood and sandbar willow on the newly created floodplain surfaces; and 7) installing weed mats and browse protectors around the containerized plants.

**Task 2 Summary of activities.**

The floodplain renovation demonstration project construction began on 10/15/12 and continued through November of 2012. The subcontractor, RDG, oversaw all construction and planting activities. RDG staked the project excavation limits and cut and fills using survey grade GPS. Their subcontractor, Glacier Excavating, Inc., performed all construction-related activities, which included the excavation of stream terraces to make new floodplain surfaces and the installation of bank restoration structures (e.g., toe wood along streambanks; Figure 4). RDG checked and certified the as-built elevations and assisted with the orientation and layout of the structures. Volunteers from Flathead Valley Trout Unlimited helped cut willow stems to plant along the streambank. Students from Whitefish High School's Project FREEFLOW (Flathead River Educational Effort for Focused Learning in Our Watershed) planted the containerized riparian vegetation (Figure 5). Members of the Montana Conservation Corps (MCC) also helped plant containerized plants, and they installed weed mats and browse protectors (Figure 5). Construction for Site 5 differed from the other sites because it employed the DEQ-requested soil lift/willow hedge brush and conifer fascine technique instead of toe wood. Representatives from DEQ and FWP visited the site on 10/25/12 to oversee the installation of this technique by the subcontractors. In addition, members of MCC provided labor, volunteer management, and supervision for the harvesting of smaller willow stems for this site and construction of the conifer fascine. Both Sites 2 and 5 were lengthened slightly to improve the results. Finally, the floodplain was seeded with a wetland plant seed mixture in December 2012. All the re-vegetation efforts were in accordance with NRCS riparian buffer guidelines, and efforts were made to prohibit sediment from entering the creek during construction. Photographs of the treatments for each site are provided in the final monitoring report prepared by RDG (Attachment I).

**Figure 4.** Construction activities during the Haskill Creek floodplain renovation; November, 2012.

**TASK 3 – EFFECTIVENESS MONITORING**

**Task 3 Description:** Contractor shall conduct monitoring to estimate sediment load reductions and document establishment of native vegetation in the riparian area, as identified in the DEQ –approved Sampling and Analysis Plan. Contractor shall use the monitoring data to evaluate and report on project effectiveness.

**Task 3 Summary of activities.**

RDG conducted pre-construction geomorphic surveys in 2012 to document existing streambank conditions and to establish pre-restoration erosion rates. Surveys (channel surveys and streambank profiles) were conducted both before and after the seasonal high flow period, and the results are included in the final QAPP-SAP (Attachment E). A survey was also conducted immediately following project construction in November 2012 to document as-built streambank conditions. Data from the as-built survey serve as a baseline for evaluating project response over time. A final geomorphic survey was

conducted in July of 2014 to assess how well the treatment met project goals and objectives. Bank erosion rates were estimated using the BANCS model, which incorporates the BEHI and an estimation of near-bank stress (NBS; see SAP for complete details.).

Re-vegetation in the riparian buffer was monitored at Sites 2 and 5. Site 5 was considered a desirable monitoring location because it utilized the soil lift/willow hedge brush and conifer fascine treatment, which was an alternative streambank protection technique requested by the staff at DEQ. Site 2 was selected for monitoring because it was considered representative of the woody debris jam method employed at the four remaining sites. Although the two-site monitoring methodology differed slightly from the SAP, it was considered adequately comprehensive for estimating vegetation establishment and survival across the project reach. In addition, the monitoring team made visual assessments of the vegetation at the three remaining sites, and they noted consistency in plant survival across the reach.

Establishment of vegetation in the riparian buffer was monitored using belt transects and plots, which were established in 2012, immediately following treatment construction. Transect and plot locations were delimited with survey grade GPS and pin flags for visual reference. Vegetation monitoring was completed two years following construction, in July of 2014. Twenty belt transects were located at each site to assess willow cutting success. Transects were 5 ft wide and extended from the bank toe to the top of the bank. Percent leafy cover of the willow cuttings was estimated. One 10-foot by 10-foot plot was established in the floodplain of each monitoring site to assess survival of the containerized plantings. Plant status (live or dead) was recorded, and percent survival was calculated. Approximately 80 of the containerized plants died during the first year after construction. These plants were replaced in 10/2013, but differences in survival between the first- and second-year plantings were not tracked.

In addition to the geomorphic and vegetation surveys, channel substrate particle size distribution and photo points were also assessed as part of the effectiveness monitoring. Substrate particle size distribution was characterized in the channel at Sites 2 and 5 (Attachment I). Monumented photo points were established at all of the treatments sites to document vegetative success, and photos were taken before construction in 2010, May 2012, and July 2012. Photos were also replicated 1- and 2- years post-construction (2013 and 2014).

Project effectiveness was evaluated in the final monitoring report submitted by RDG (Attachment I). The sediment reductions varied from site to site, but reductions of up to 80% were observed when comparing pre- and post-construction conditions. Two years post-construction, percent leafy cover of the willow cuttings (belt transects) varied between the two monitoring sites (0% to 25% at Site 2, 30% to 100 at Site 5). The variability was attributed to differences in the diameter distribution of the cuttings at the time of installation; nevertheless, active willow growth from the cuttings was observed throughout the project reach. Complete survival (100%) of containerized plants within the floodplain plots was observed two years following construction. Channel substrate particle size distribution differed minimally following the treatment implementation. Monumented photo points at each site are included in the monitoring report (Attachment I) and the photos with GPS locations are on the thumb drive provided with Attachment I.

**TASK 4 – EDUCATION AND OUTREACH (E & O) ACTIVITIES**

**Task 4 Description:** Contractor shall facilitate applied science and service learning through project participation by Whitefish High School's Project FREEFLOW students in site assessment, monitoring, and restoration. Contractor shall facilitate Haskill Basin Watershed Council (HBWC) monthly public meetings.

Contractor shall facilitate additional community outreach efforts of HBWC, including but not limited to activities with city staff and Whitefish city council. Contractor shall contribute to the development of a newspaper article in a Whitefish newspaper and/or a television segment on a Whitefish television station on the Reimer reach floodplain renovation project. Contractor shall update Flathead Conservation District website with information about HBWC activities.

**Task 4 Summary of activities**

Students from Whitefish High School's Project FREEFLOW participated in assessment, monitoring, and restoration aspects of this project, including the initial installation of containerized vegetation in 2012 and the planting of 80 replacement plants in the fall of 2013. They conducted water quality monitoring activities during the construction phase (fall 2012; Figure 5) and when they planted the replacement vegetation (fall 2013). Regular contact between the teacher/FREEFLOW leader and the staff of FCD ensures that project monitoring at this site will continue indefinitely; indeed, ideas are being discussed for a GIS-based vegetation monitoring project in the spring of 2015.

Employees of the FCD facilitated regular monthly public meetings of the HBWC. Six meetings were held during the grant period in 2011; nine in 2012, seven in 2013, and eight in 2014 (Attachment J). The HBWC meeting agendas and minutes are updated regularly on the FCD website, as are HBWC activities (Attachment K).

HBWC, in collaboration with FCD, continuously works with the City of Whitefish on water conservation-related issues that affect Haskill Creek. For example, HBWC is concerned about the water from Haskill Creek that is diverted for the City's municipal water supply. Some of this water is spilled over the reservoir dam, and, consequently, it is unused and permanently removed from the watershed. In 2012, the City of Whitefish, at the request of HBWC, agreed to hire a contractor to measure the amount of water spilling over the reservoir dam. HBWC formed a subcommittee to work with the City on a Reservoir Dam Management Plan, and this collaboration is ongoing. FCD and HBWC also facilitated the funding procurement and installation of a gaging station on Haskill Creek (at the Monegan Road crossing near Whitefish; downstream of the project). FCD and the City of Whitefish each contributed half of the installation cost of the station, and the Whitefish Lake Institute secured the contract for gage installation and calibration. This gaging station will allow the partners to monitor creek flow rates, and, ultimately, estimate nutrients loadings.

**Figure 5.** Students from Project FREEFLOW and members of MCC installed containerized vegetation in November, 2012. *Upper* – John Muhlfeld of RDG (subcontractor) discusses floodplain dynamics with volunteers. *Lower* – FREEFLOW students working with MCC members.

The Haskill Creek – Reimer Reach Floodplain Renovation project was featured in two local newspaper articles during the construction phase – one in the Flathead Beacon (11/14/12) and one in the Whitefish Pilot (11/7/12; Attachments M and N, respectively). Both articles included photographs of students installing the containerized plants. In addition, FCD highlighted the project's accomplishments in its monthly advertisement in the Flathead Beacon in August, 2014 (Attachment O).

The project was included in the Montana Watershed Coordination Council-sponsored Northwest Projects Tour. Agency personnel (from FWP, DNRC, DEQ, and the Environmental Protection Agency) and private consultants visited the project site on 8/7/14 (Figure 6). Ronald Buentemeier, of the FCD and HBWC, co-led the tour, and Kurt Reimer, the landowner, also visited with participants and described his personal experiences with the project. Reimer relayed how was initially skeptical of the project, but members of the HBWC convinced him to get involved, and he has been extremely pleased with the results. The tour participants commented that the Haskill Creek floodplain renovation was the best project they visited.

**Figure 6.** Participants of the Northwest Projects Tour visited the Haskill Creek – Reimer Reach Floodplain Renovation project site on 8/7/14.

**TASK 5 – CONTRACT ADMINISTRATION**

**Task 5 Description:** Contractor shall provide contract administration services which consist of: 1) ensuring contract requirements are fulfilled as defined in SECTION I: SERVICES of the Contract; 2) reporting on project progress and budget tracking to DEQ through status, annual, and final reports; 3) maintaining contact with the DEQ contract manager regarding contract and project implementation; 4) keeping accurate financial records; 5) ensuring that state procurement regulations are followed; 6) compiling accurate billing and non-federal match statements for submission to DEQ; 7) ensuring that all tasks are completed in a timely manner and on budget.

**Task 5 Summary of activities**

Project annual reports were completed in a timely manner, as were the billing and non-federal match reports. Billing reports included status reports with documentation of how funds were expended and were in accordance with DEQ guidelines. The project stayed within budget and exceeded its match contribution. This document, and associated attachments, constitute the required final report.

**TASK 6 – WILLOW/SOIL LIFT TECHNIQUE DEMO**

**Task 6 Description:** Contractor shall implement a demonstration soil lift/willow hedge brush/ and fascine stream bank toe protection within the Reimer reach of Haskill Creek, identified in Task 2. The stream bank length for this demonstration technique shall be approximately 150 feet. Contractor shall have the assistance of DEQ staff on-site during the installation of the demonstration technique.

**Task 6 Summary of activities**

The demonstration soil lift/willow hedge brush and conifer fascine streambank toe protection was installed at Site 5 on the Haskill Creek – Reimer Reach Floodplain Renovation project during the construction activities in the fall of 2012. DEQ staff Elena Evans and Jeff Ryan, as well as FWP staff Beau Downing, were on the site on 10/15/12 to oversee the installation of Site 5. Members of MCC harvested willow cuttings and constructed the conifer fascine for this treatment, and RDG provided oversight for

the MCC crews. The final treatment length was 175 feet, which exceeds the minimum requirement for this task. Pre- and post-construction photographs are included in Attachment I.

**TASK 7 – WATERING AND MAINTENANCE**

**Task 7 Description:** Contractor shall provide two days of total labor of watering of riparian installation, two total days of labor for weed control and herbicide application and replacement of 80 containerized plants.

**Task 7 Summary of activities**
Members of MCC watered the riparian plantings and weeded on 8/21/13. In the fall of 2013, the Confederated Salish and Kootenai Tribal Nursery donated 80 containerized alders to replace those that had died in the first year since project construction. FCD staff, HBWC members, and Project FREEFLOW students helped install the new containerized plants, including associated weed mats and browse protectors on 10/23/13 (Attachment P). The Flathead County Weed Department sprayed herbicide on the weeds on three occasions in 2014: 7/1, 7/17, and 10/31. Plantings were watered by FCD staff and the Flathead River Steward (a Big Sky Watershed Corps member) on 7/15/14. Watering was not required in the fall because of timely rainfall.

## SECTION 5.0 PARTNERS

The conception and implementation of this project was primarily facilitated by the solid partnership between FCD and HBWC. Members of HBWC are driven by their commitment to improving the integrity of Haskill Creek. In turn, FCD supports HBWC's work by securing funding resources, recruiting volunteers, and administering projects. Through hard work and good communication, this partnership was successful in implementing this floodplain renovation on Haskill Creek.

The subcontractor on this project, RDG, was also instrumental to the success of the project. RDG has comprehensive knowledge of Haskill Creek because it performed one of the initial watershed assessments in the early 2000s, and it developed the restoration plan that identified priority sites. Prior to procuring 319 funds, RDG developed the design for the floodplain renovation on the Reimer Reach. They were later awarded the contract for the renovation work, wherein they oversaw all construction and planting activities, and they conducted post-construction effectiveness monitoring and reporting. They acquired the services of Glacial Excavating, Inc. for the construction, and they purchased containerized vegetation from Confederated Salish Kootenai Tribal Nursery (the Nursery later replaced 80 plants that died during the first year free of charge). Throughout this project, RDG has communicated well with FCD and HBWC and provided all deliverables on schedule, both of which have ensured measurable success in the partnership and in the project.

The partnership developed between the landowners, Kurt and Kent Reimer, and the project administrators (FCD and HBWC) has perhaps been the most integral part of achieving success. The Reimers were initially skeptical about project, but members of HBWC took time to discuss the project with them and explain how it would benefit the water quality in the creek and alleviate the bank erosion on their property. The Reimers had been struggling with bank erosion for more than three generations, but they were overwhelmed by the time and resources required to fix it. Their partnership with HBWC and FCD finally allowed them to undertake the project. In the initial proposal, the Reimers agreed to provide construction labor and equipment as part of the match requirement. Although this ultimately

did not work out, it demonstrates their commitment to completing the project. Now that the project is installed, they continue to ensure its success by adhering to the LA.

Several state agencies partnered on this project. DEQ provided significant funding through its 319 program. In addition, DEQ staff provided valuable technical expertise and input, especially in the implementation of the soil lift/willow hedge brush and conifer fascine treatment at Site 5. Communication between DEQ and FCD was sometimes inconsistent and misunderstood, and changes in personnel over time at both agencies created confusion. However, ultimately, both parties persevered in getting the project done, and a successful partnership was achieved. Other agency support came from FWP, who provided letters of support for the project and technical guidance. FCD also secured an FWP-sponsored Future Fisheries Improvement Program grant for $10,909.54. This funding supplemented the 319 funding to help cover project construction costs.

Many other volunteer groups provided labor for project construction and maintenance. Volunteers from Flathead Valley Trout Unlimited cut willow stems to plant along the streambank. Students from Whitefish High School's Project FREEFLOW program planted containerized riparian vegetation at two time points: during the initial project construction and again in the following year, when replacements were planted because of significant mortality. Members of MCC provided labor, crew supervision, and volunteer management for the willow cutting and the construction of the conifer fascine for Site 5. They also planted containerized vegetation and installed weed mats and browse protectors. In 2013, after plant mortality was observed, an MCC crew visited the site to water vegetation and pull weeds. The Flathead River Steward (Big Sky Watershed Corps member) also helped water the vegetation in 2014. Grant funds paid for herbicide applications in 2014 by the Flathead County Weed Department to help control weed populations at the project site.

## SECTION 6.0 COMPLICATIONS

This project was altered from the initial proposal two times because of unanticipated complications. The first modification occurred when DEQ requested the implementation of soil lifts/willow hedge brush and conifer fascines at several of the project sites. This was complicated because the subcontractor, RDG, had never used that technique before; moreover, it was more expensive to install. Ensuing discussions among representatives from DEQ, FCD, and RDG led to a compromise that 1) the technique would be implemented at only one of the sites (Site 5) and 2) representatives from DEQ would assist with the treatment construction. The contract was subsequently modified (Modification 1) to include a new Task 6 – Willow/Soil Lift and Fascine Technique Demonstration. Additional funding and an extension of the project completion date was also added. At this point in time, it is not clear which technique (the soil lifts/willow hedge brush and conifer fascine or the originally planned woody debris jams) has been better at achieving project goals; the effectiveness monitoring indicates that both treatments have had successful outcomes. It can be noted, however, that the willow cuttings used in at Site 5 were variously sized in diameter (small and large) while those used at the other sites were consistently large in diameter. Two years after construction, comparisons of willow cover between Site 5 and Site 2 suggest that the various-sized willow cuttings established at a higher rate than the larger ones (see Monitoring Report, Attachment I), although this cannot be confirmed statistically. It is possible that using a variety of cutting sizes facilitates greater willow establishment success than relying solely on larger cuttings.

The second project modification occurred during the first summer following project construction. The contractor liaison from FCD observed significant mortality of the containerized plants during a routine

on-site visit in July of 2013. Eighty-one plants had died (survival rate: 74%), probably as a result of excessively hot and dry conditions. In addition, the vegetation appeared heavily browsed, and weeds were establishing at the site. The contract was then modified (Modification 2) to include a new Task 7 – Watering and Maintenance, and funding was added to complete the task. This modification added watering of the riparian plants, herbicide application, and replacement of the containerized plants that died. It enhanced the project outcome in two ways: 1) the overall survival of the containerized plants increased (documented in the Monitoring Report, Attachment I), and 2) herbicide applications in 2014 reduced the cover of noxious weeds.

The partners encountered difficulties with garnering community involvement in the project. On several occasions, verbal volunteer commitments were made to help with willow cutting and construction, but no follow-through occurred. In the end, the partners were especially grateful to the Project FREEFLOW students and their teachers for exceptional volunteer efforts that made the project successful.

The requirement to procure a floodplain permit from the City of Whitefish was not expected by the partners or the subcontractor because the requirement had been waived for a similar project upstream from the Reimer's several years prior. Thus, upon learning of this requirement, there was a delay in the project implementation, an unanticipated permit application cost, and the unforeseen hassle of assembling the permit application.

Finances were well-managed over the course of the project, and DEQ provided additional funding when complications arose (e.g., funds for herbicide applications). However, in the summer of 2014, there was insufficient funding remaining to pay RDG to complete the final monitoring report. Fortunately, the FCD Board of Supervisors agreed to pay the overage cost to RDG ($2,793.91).

## SECTION 7.0 RECOMMENDATIONS

The project partners, especially FCD and HBWC, have learned many lessons from both the complications and successes of this project. Above all, they have learned to be patient when working with multiple agencies and permitting processes. Moreover, they recommend that the landowner(s) understands the anticipated timeline and can be patient throughout the process. HBWC acknowledges the considerable amount of time and effort contributed by the FCD staff, and they note that projects of a similar magnitude and complexity would not be completed without a dedicated, paid professional to manage them. In addition to patience and commitment, the project partners also note that in future projects, they will work to anticipate complications, such as the plant mortality during the first year following construction. Although it may be difficult to foresee all possible complications, consistent monitoring and awareness of adverse conditions that could impact the project should be a high priority.

HBWC and FCD look forward to future project collaborations in the Haskill Basin. They will work with Project FREEFLOW to continue monitoring the Reimer Reach Floodplain Renovation in an effort to learn what techniques were effective and why they worked. They will also seek out new projects to complete; currently, they are initiating a culvert replacement project on Haskill Creek (upstream from the Reimer Reach), and they are discussing another high priority reach downstream from the Reimer's property. Members of the FCD Board of Supervisors note that the current floodplain rules are increasingly restrictive. Thus, floodplain permits more difficult and expensive to procure, and associated projects are harder to commence. They support continued dialogue with agency personnel in regard to this issue.

## SECTION 8.0 DELIVERABLES

| Task No. | Deliverable | Status/Date Completed | Notes/Comments |
|---|---|---|---|
| 1 – Project Planning | A written summary of the early 2011 field discussion | Completed (9/15/11) | Attachment A |
| | Existing baseline data for the project | Completed (7/11/12) | Attachment B |
| | Draft final design for floodplain renovation | Completed (9/13/10) | Attachment C |
| | *Prior to final design plan approval by DEQ, Contractor shall provide to DEQ:* | | |
| | Copies of approved necessary stream permit applications | Completed (10/2012) | Attachment D |
| | Draft and final (DEQ approved) copies of SAP | Completed (9/15/12; 10/12/12) | Attachment E |
| | Copies of any limited solicitations and sub-contracts (subject to DEQ approval). | Completed (8/21/12) | Attachment F |
| | Draft and final RMP | Completed (10/9/12) | Attachment G |
| | Landowner agreement | Completed (10/9/12) | Attachment H |
| 2 - Implement Floodplain Renovation Demonstration Project Design | Newly constructed and re-vegetated stream bank and floodplain as planned and approved by DEQ. | Completed (11/2012) | 1200 feet of riverbank was restored using primarily bioengineering-based treatments, including vegetated soil lifts, conifer and willow fascines and riparian plantings. Photos are included in the Final Monitoring Report (Attachment I) |
| 3 – Effectiveness Monitoring | Written report with analysis of project effectiveness based on monitoring data | Completed (11/24/14) | Attachment I |
| 4 - Education & Outreach | *Documentation of Contractor's involvement with and facilitation of E & O activities such as field trips, meetings, tours, and website updates.* | | |

| | | | |
|---|---|---|---|
| | HBWC meeting minutes | Completed (throughout) | Attachment J and regularly posted on FCD website |
| | FCD website updates | Completed | Attachment K |
| | Northwest Projects Tour | Completed (8/7/14) | Attachment L |
| | *Documentation of at least one news media event for the Reimer reach floodplain renovation project.* | | |
| | Article in the Whitefish Pilot | Completed (11/7/12) | Attachment M |
| | Article in the Flathead Beacon | Completed (11/14/12) | Attachment N |
| | FCD ad in the Flathead Beacon | Completed (8/20/14) | Attachment O |
| 5 - Contract administration | Status and Annual Reports<br>Billing and non-federal match | Completed (2/12/15) | |
| 6 - Willow/Soil Lift Technique Demo | Approximately 150-foot stream bank stabilized using a willow/soil lift and fascine technique | Completed (11/2012) | The technique was installed at Site 5. The total length was 175 feet. Pre- and post-construction pictures are included in Attachment I (monitoring report). |
| 7 – Watering and Maintenance | Photograph of new plantings and dates of watering and herbicide application | Completed | Herbicide applications: 7/1, 7/17, and 10/31 in 2014<br>Watering: 8/21/13 and 7/15/14 (timely rainfall precluded additional watering in the fall of 2014)<br>Photographs of the new plantings are in Attachment P |

# SECTION 9.0 FINANCES

The original project contract (June 2011) stipulated that $30,000 of the project funding would be granted by DEQ. The remaining $20,000 (total estimated cost: $50,000) would come from in-kind match. FCD would provide grant administration and management. The landowners, Kurt and Kent Reimer would provide in-kind labor and equipment for project construction. HBWC would provide project operation and maintenance, and other volunteers (Project FREEFLOW students) would contribute additional labor.

DEQ requested a modification to the project to include a demonstration of the soil lift/willow hedge brush and conifer fascine technique at two of the sites. This technique required additional funding to cover the cost of materials and labor. FCD used DEQ and FCD funds ($27,000 and $3,000, respectively) to leverage additional project funding from an FWP Future Fisheries Grant ($10,909.54), which was awarded in January of 2012. However, the project was still underfunded, so the DEQ contract was subsequently modified to add funding for an added Task 6 – Willow/Soil Lift and Fascine Technique Demonstration, which allocated additional funds. Some of the funding for this task came from unspent 319 funds from the Flathead River Commission ($8,400), which DEQ re-directed, and the rest ($5,600) came from match contribution. The construction work on Task 2 (project implementation) was complicated because the landowners were not able to provide construction labor or equipment as originally planned (the economic downturn had forced them to downsize their company). Fortunately, FCD agreed to fund the remaining construction costs ($15,248.39), and the subcontractor, RDG, wrote off a significant portion of their cost ($7,550).

A second contract modification occurred in the summer of 2013, approximately 9 months following project construction. An on-site inspection revealed significant plant mortality and weed encroachment. Task 7 - Watering and Maintenance, was added, along with additional funds ($2000 DEQ and $750 match). Match requirements were exceeded for all of the tasks, and unused funds were returned to DEQ for Tasks 1 and 7.

| Task No. – Brief Description | 319 Funds | Required Match | Total | Actual 319 Funds Spent | Actual Match | Total (Actuals) | Other | Total (Actuals + Other) |
|---|---|---|---|---|---|---|---|---|
| 1 – Project Planning | $1,900.00 | $500.00 | **$2,400.00** | $1,898.00[a] | $1,796.59 | **$3,694.59** | | **$3,694.59** |
| 2 - Implement Floodplain Renovation Demonstration Project Design | $19,000.00 | $12,000.00 | **$31,000.00** | $19,000.00 | $16,627.07 | **$35,627.07** | $15,248.39 – Flathead CD paid RDG for work not covered by grant 12/2012; $7,550.00 – amount RDG wrote off 12/2012 = Total $22,798.39 | **$58,425.46** |
| 3 - Effectiveness Monitoring | $6,100.00 | $0.00 | **$6,100.00** | $6,100.00 | $0.00 | **$6,100.00** | | **$6,100.00** |
| 4 - Education & Outreach | $0.00 | $3,000.00 | **$3,000.00** | $0.00 | $3,343.84 | **$3,343.84** | | **$3,343.84** |
| 5 - Contract Administration | $3,000.00 | $4,500.00 | **$7,500.00** | $3,000.00 | $5,911.40 | **$8,911.40** | | **$8,911.40** |
| 6 - Willow/Soil Lift Technique Demo | $8,400.00 | $5,600.00 | **$14000.00** | $8,400.00 | $5,708.16 | **$14,108.16** | | **$14,108.16** |
| 7 - Watering & Maintenance | $2,000.00 | $750.00 | **$2,750.00** | $1,532.14[a] | $5,426.28 | **$6,958.42** | | **$6,958.42** |
| **Total** | **$40,400.00** | **$26,350.00** | **$66,750.00** | **$39,930.14** | **$38,813.34** | **$78,743.48** | **$22,798.39** | **$101,541.87** |

[a]Not all 319 funds were used to complete this task.

## SECTION 10.0 CONCLUSIONS

The HBWC and FCD coordinated the successful floodplain renovation of a 1,222-ft reach of Haskill Creek. The goal of the project was to improve terrestrial and aquatic habitat by reducing sedimentation and associated nutrients. Achieving this goal would have downstream benefits to Haskill Creek, as well as the Whitefish River and Flathead Lake (as the receiving basin). Two bank-stabilization techniques were employed as demonstrations at five sites along the reach. Four of the sites used woody debris jams with willow cuttings while the fifth site employed a soil lift/willow hedge brush and conifer fascine. High streambanks were excavated to create new floodplain benches, facilitating connectivity between the channel and the floodplain. A vigorous riparian buffer was planted with native species to improve overall riparian habitat and function. The subcontractor, RDG, oversaw all construction and planting activities, as well as effectiveness monitoring. Numerous volunteers, including students from Project FREEFLOW and members of MCC, contributed labor to the project. FREEFLOW students also helped with the initial site assessment and water quality monitoring, which provided them with valuable opportunities in applied science and service-learning.

The floodplain renovation and riparian buffer contributed to the reduction of bank erosion and associated sedimentation and nutrient inputs. Effectiveness monitoring revealed that sedimentation was reduced by approximately 74% across all five sites (total reduction: 97 tons/year). Concurrently, the BEHI rating dropped from between High to Extreme (pre-construction) to either Low or Moderate (2 years post-construction). High rates of native plant establishment were observed from both the willow cuttings and the planted containerized vegetation; in addition, a reduction in the cover of noxious weeds, including reed canarygrass and Canada thistle, was observed along the reach. Project longevity is ensured by the implementation of agricultural BMPs, as stipulated in a landowner agreement.

The partners will continue monitoring this site to assess which treatments were most successful. This information will guide future projects. Related monitoring activities are also being discussed with Project FREEFLOW, including a possible GIS project. FCD and HBWC will continue to collaborate on projects that will maintain and enhance the integrity of Haskill Creek.

## SECTION 11.0 ATTACHMENTS

Additional project documentation can be found in the attachments described below.

| Description | Notes |
|---|---|
| Notice to Proceed | Email from Elena Evans; Attachment Q |
| Project maps | Attachment R |

### SIGNATURE

[Name, Title] [Date]