



HABITAT PROTECTION AND RESTORATION PROJECT FINAL REPORT GUIDELINES

Final reporting requirements consist of (1) a completed profile of the grant for posting to the public Great Lakes Fishery Trust (GLFT) website (see below), (2) a narrative response to GLFT final report questions (see following section), and (3) a final financial report (form and instructions attached).

PROJECT PROFILE

Your profile should be no more than three pages in length (preferably two). As the profile will be published to the GLFT website, please strive to communicate in language accessible to a general audience. The primary intended purposes of the profile are to (1) provide an overview of the work funded by GLFT and characterize results and achievements in an accessible manner, and (2) help interested parties access further resources or materials germane to the effort. The profile should follow this format:

Synopsis

- **Project Title:** Restoring Lake Michigan's Globally Rare Groundwater-Fed Cold-water Streams GLFT Grant #2018.1801
- **Grantee Organization** – Conservation Resource Alliance
- **Project Team** (Please list all members of the project team who should be credited with contributions to the work, including name and institutional affiliation.)
Lake County Road Commission, Prein and Newhof, AECOM, Mason-Lake Conservation District, Knoop Excavating, Michigan Department of Natural Resources, Pere Marquette Watershed Council, Conservation Resource Alliance
- **Contact Person** (Please identify the person(s) who should be contacted with questions about the work, providing a name, institutional affiliation, and e-mail address for each.)
Nate Winkler, Project Manager – CRA, nate@rivercare.org
Kira Davis, Program Manager – CRA, kira@rivercare.org
- **Grant Amount**
\$105,000
Time Frame 6/1/2018 to 12/31/2020

- **Focus Areas – Lake Michigan**

- **Brief Project Summary** (In 100 words or less, provide a summary of the project, including its purpose and key results.)

The Conservation Resource Alliance expanded both its holistic approach to watershed management and its service area by completing a road/stream crossing inventory on the Lincoln River watershed. CRA also worked with project partner the Mason-Lake Conservation District to stabilize the single largest streambank erosion site in the entire Pere Marquette watershed. All of this while simultaneously restoring complete connectivity to a Pere Marquette River tributary, Blood Creek, an ecologically intact headwaters and wetland complex valued for its pristine aquatic habitat opportunities.

Project in Context

This orientation to the project should provide key background information on its purpose, location (where appropriate), and broader significance. You may wish to consider:

- Background research identifying a need for the work
- Stakeholder identification of a need for the work
- Specific focus of the work as it relates to Great Lakes ecology/resources
- Relationship to other related products/services/programs
- Intended audience/population to be served

Goals of the Effort

In this section, identify the key goals and/or the specific purpose of the effort.

Ecological connectivity between the Great Lakes and their tributaries is a focal point of not only CRA's mission but that of partner organizations like the Michigan DNR and the Mason-Lake Conservation District. The accomplished goals of this particular effort will 1. directly benefit important fish species, including brook trout as well as macroinvertebrates, by reconnecting habitat that has been fragmented for years, 2. eliminate warming as a result of impounded water, and 3. reconnect floodplains and prevent excess sedimentation to systems that are already overburdened with legacy sediments commonly attributed to the late 19th and early 20th century logging era.

Excessive sand sediment bedload is a particular detriment to many, if not all, rivers in our region. Common sources of excess sand include historic logging practices, road development (poorly designed and inadequate road/stream crossings), the construction and operation of dams, incompatible agricultural and livestock practices, residential and industrial development, and excessive recreational use, among others.

Both the Pere Marquette and Lincoln rivers support valuable ecological and economic resources, especially resident and adfluvial salmonid populations that require gravel for spawning and cold water temperatures to maintain their populations. Too much sand sediment bedload compromises the instream habitat by smothering gravel habitat utilized both by salmonids and macroinvertebrates. Excess sand sediment alters the morphology of the stream channel and increases water temperature by filling pool habitat, burying in-stream wood debris, and causing

channels to aggrade (become wide and shallow) which exposes more of the stream's water to solar gain.

By stabilizing an approximately 350' long by 80' high eroding bluff known as the Chinnery Rollway on the lower section of the Pere Marquette River west of Scottville, MI, CRA and partners Mason-Lake Conservation District will prevent up to 15 tons of sediment from entering the PM river annually. This quantity alone comprises 40% of the entire annual sediment load on the lower mainstream of the river. The Pere Marquette River has a geographically prominent watershed and is an ecologically significant tributary to Lake Michigan, spanning 4 counties in northwest Lower Michigan. It is renowned for its world-class salmonid fishery and is unique as one of the only major tributaries without dams on its entire mainstem. The Pere Marquette watershed encompasses 380 miles of tributaries and mainstem with much of it designated a federal Wild and Scenic River and state designated Natural River.

Blood Creek, a second-order tributary to the Pere Marquette River, boasts cold water temperatures and provides habitat for a robust population of brook and brown trout, amphibians, plants, microorganisms, and invertebrates that use both upstream and downstream habitat during one or more stages of their life cycles. The creek is a 2.8 mile long tributary that, prior to this project, exhibited two severely undersized road/stream crossings which created velocity barriers at both locations for bidirectional passage of juvenile salmonids and smaller sized forage fish species. They also impeded the natural transport of sediment and wood debris downstream, a major factor in decreasing stream channel heterogeneity. The completed project was critical in reversing the negative effects listed above through replacement of both undersized barriers with properly aligned and bankfull-spanning structures (bottomless arch culverts).

As proven in the Pere Marquette and other regional watersheds, a comprehensive road/stream crossing inventory is the most valuable tool resource managers have to identify possible projects which reverse the negative effects of crossings. Metrics assessed on a site level basis include geographic location, stream velocity, stream width and depth, water temperature, structure size and material construction, and whether the structure outlet is perched above the downstream water level (among others). Often overlooked in favor of more famous rivers to the north and south, the Lincoln River watershed drains a significant amount of landscape (64,981 acres) and is valued locally as a brook trout fishery. As such, the Lincoln River was long overdue as an addition to CRA's roster of 15 watershed road stream/crossing inventories completed throughout northwest Lower Michigan. As a result of the detailed road/stream crossing field inventory accomplished with GLFT funding, partners may now track tributary and mainstem connectivity restoration needs and accomplishments while at the same time, properly planning for investments into the watershed. Because CRA was integral in the development, testing, and review of the Great Lakes Road Stream Crossing Inventory, the ability to provide our expertise in an undervalued watershed was extremely helpful.

Results

In this section, briefly summarize the key findings or results of the project. Identify the results (e.g., fishery habitat restored, products developed, outreach engaged in, participation/use of materials achieved, feedback received).

The completed project is anticipated to provide multiple ecological benefits. First, a survey of the road/stream crossings in the Lincoln River watershed will enable stream restoration practitioners to identify and prioritize crossing replacements that optimize habitat connectivity for aquatic species that reside within and adjacent to the stream. At this writing, it is too soon to have replaced any of the crossings identified in the survey but if history is any guide, it won't take long. Because the process of identifying, funding, and replacing crossings can be lengthy, we expect that after consultation with the road commission and funders, we should start seeing construction occurring within the next two to three years (if not sooner).

Second, an eroding bluff site contributing an enormous volume of sediment to the Pere Marquette River has been stabilized. This will allow the Pere Marquette River, over time, to manage both contemporary and legacy sediment bedload more efficiently. Follow up active revegetation of the bluff through planting of native seedling species will assure the bluff's structural integrity is maintained in the future, especially important as an unpredictably changing climate results in more frequent and higher flood volumes. Similar to above, empirical effects of the bluff stabilization on downstream channel conditions have not been realized. This is not surprising given the volume of sediment present in the Pere Marquette River and as such, the century-old degradation of river habitat cannot be expected to reverse immediately. What the partners can say with confidence is that an incredibly large amount of sediment has been removed from the conveyor which, when coupled with watershed-wide efforts to do the same, the effect is and will continue to be positive.

Third, two new bottomless arch culverts now allow natural transport and passage of wood debris, sediment and aquatic organisms within a tributary to the Pere Marquette River. Most importantly, this positive change to linear connectivity allows full bidirectional passage for aquatic species during all life stages during both ordinary stream flows and high water events. Currently, natural stream and floodplain functions are returning and channel dimensions are gradually stabilizing at both locations with large wood material formerly smothered by sand sediment having immediately been exposed through the restoration of sediment transport processes.

Regarding the Blood Creek crossing replacement in particular, construction progressed overall as anticipated with the following major tasks completed by the Lake County Road Commission:

- Culvert removals
- Stream re-routing, site dewatering, concrete footings poured
- Bottomless pipe arch culverts placed and secured on cured footings
- Bridge guardrail installation
- Completion of paving, road run-off spillways, rock placement, and erosion control measures
- Opening of bridges and roads to vehicle traffic occurred in late fall of 2020

Future fish population and geomorphic surveys are planned for Blood Creek to document positive effects gained by completing the project and will be shared with stakeholders, funders, and other partners as those data become available.

With the success of the Blood Creek project appreciated by the partners and residents of rural Lake County communities, relationships were strengthened and experience is gained to tackle the next important restoration needs in the overall Pere Marquette River watershed.

Products and Resources

List, and provide addresses for, related websites developed for or through the project or that provide additional information. Provide site title, full address, and a brief (one- to two-sentence) description of the relevant content.

List any other communications outlets, publications, media coverage, etc. for the work. If these are available online, please hyperlink the listing. Items that are *planned* or *in process* should be so designated.

- <https://www.rivercare.org/>

This is the Conservation Resource Alliance’s website, and contains updated information on the Lincoln River road stream crossing inventory, Chinnery Rollway stabilization, and Blood Creek crossing replacement projects. CRA has and continues to do email outreach to their database of 5,000 of the “Pere Marquette River Homewaters” update that includes the links to these materials.

- <http://www.northernmichiganstreams.org/lincolnrx.asp/>

This website (Northern Michigan Streams) contains the data obtained via the Lincoln River road/stream crossing inventory which are available to the public and governmental agencies alike.

FINAL NARRATIVE REPORT

Background/Overview

1. Briefly summarize the project description as outlined in the original proposal.

The Conservation Resource Alliance is expanding its holistic approach to watershed management by completing a road/stream crossing inventory on the Lincoln River Watershed. CRA is also working with project partners the Mason-Lake Conservation District to stabilize the single largest stream-bank erosion site in the entire Pere Marquette Watershed, while simultaneously restoring complete connectivity to Blood Creek, an intact headwaters and wetland complex valued for its pristine aquatic habitat opportunities.

2. Was the project completed as originally intended? If not, indicate how the final outcome(s) differed from what was anticipated. Does your experience suggest that original expectations were realistic? What factors hindered or helped progress?

The Blood Creek project was completed as intended with the construction timeframe being the primary difference that triggered the need to extend the GLFT grant to December 31, 2020. This was due to a requirement of the US Forest Service under Section 7 of the Wild and Scenic Rivers Act. This entailed a botanical survey of the Blood Creek crossings prior to construction to determine the presence or absence of protected plant species. The botanical survey could not be completed until green-up in late spring of 2020 which resulted in pushing back the construction schedule a couple months later than anticipated.

With the exception of the delay at Blood Creek, the project components all were accomplished as expected. This can be attributed to a very solid, positive working relationship between the partners. CRA has learned over the years to be nimble and to anticipate uncertainty when planning and funding projects. Because of this, we have been able to overcome uncertainty and potential delays through a combination of patience and negotiation.

Outcomes

4. Whether they were intended or unintended, what do you consider the most important benefits or outcomes of this habitat restoration project?

With regard to intended consequences, every single outcome was pleasantly expected, from the expansion of CRA's knowledge of rivers not in our regular service area (Lincoln River), to stabilizing the single largest source of excess sedimentation on the Pere Marquette River, to watching the restored channel evolve in both Blood Creek road crossing projects. In particular, the amount of scour in Blood Creek upstream of 72nd Street exposed a surprising amount of submerged wood which we normally would have had to spend precious resources and time to install.

The most beneficial outcome as a result of an unintended event was the bolstering of CRA's institutional knowledge with the departure of Paul, allowing Nate to expand his experience in the Pere Marquette watershed. While CRA makes every effort to cross-train staff between watersheds, it becomes difficult with heavy workloads to maintain that effort. In this case, Nate had not been working in the Pere Marquette watershed but did have tangential experience, both with CRA and on a personal level. With Paul's departure, the gap was filled in the watershed with Nate and it provided a broader level of experience in both the habitat found there and the local stakeholders and agency personnel that work on the river. Given the size of the watershed and varying river and tributary habitat, this has been a boon to individual staff development and valuable experience in keeping the organization nimble.

5. What activities were pursued in relationship to intended outcomes, and to what extent did you achieve the intended outcomes listed in your proposal?

Outcome #1 Collaborated with the Mason-Lake Conservation District to stabilize an approximately 350' long by 80' high eroding bluff formerly known as the Chinnery Rollway on the lower reach of the Pere Marquette River west of Scottville, MI.

To stabilize this bluff and improve the health of the river, Knoop Excavating out of Reed City was contracted for the earth work using engineered plans designed by AECOM, an engineering-design firm out of Traverse City. Crews used heavy equipment to regrade the area from its existing near 45 degree slope to about 30 degrees, which will be less prone to erosion. The base of the slope was further stabilized with fieldstone, to a depth of 5'. This helps to fortify the toe of the slope and redirect the river's energy downstream from the project area. Once that work was complete, a crew of Mason-Lake Conservation District employees, North Country Cooperative Invasive Species Management Areas employees and volunteers further stabilized the bank by seeding the area with native grasses and forbs and staking in more than 8,000 sq. yards of mulch erosion blankets. During the following spring, dormant cuttings of dogwoods and willows were planted along the river's edge to further the revegetation efforts. With completion of this project, the remaining river downstream to Lake Michigan will benefit from improved habitat as a result of the decreased sand sedimentation.

This site was the final restoration project in a multi-year grant funded not only by the GLFT but also the National Fish and Wildlife Foundation's *Sustain Our Great Lakes Program*, Mason County, and Amber Township. And the project could not have been possible without the support and access provided by the landowners, the Conrad Family.

Outcomes #2 Protect, rehabilitate, and enhance Blood Creek habitat by replacing two undersized culverts with properly aligned, bankfull-spanning structures.

Blood Creek is a second order tributary to the Pere Marquette in Yates Township, Lake County, near the historic village of Idlewild. Two crossings, 72nd Street and Broadway Avenue, constituted the only road crossings of the approximately 3 mile long stream. Both crossings prior to this project were served by undersized and misaligned corrugated metal pipes which impeded the natural flow regime of the stream. The project included replacing those structures with bottomless aluminum arch culverts protected at the inlet and outlets by natural fieldstone and steel sheetpile. The spans of the new culverts were designed to accommodate the bankfull width of the channel and provide bidirectional fish passage for non-jumping fish species primarily brook trout and sculpin.

Sequence of construction included removal of existing culverts with heavy equipment, then pouring concrete footings on which to set the new structures. Once the concrete had cured, the replacement culverts were set on the footings and sheetpile wingwalls and fieldstone was installed. The design for this work was performed by Prein and Newhof, an engineering firm out of Cadillac. The dirt work and culvert removal and replacement were performed by the Lake County Road Commission.

At 72nd Street, to accommodate proper channel alignment, the new culvert was placed approximately 30' to the east. Prior to this, the stream ran hard against the road bed and hooked west before entering the inlet of the prior culvert. The stream then proceeded from the outlet and

mirrored the path on the upstream side before continuing on its way. This alignment provided more opportunity for road fill to enter the stream and contribute excess sediment to the channel.

Outcome #3 CRA hired two interns to assist the Mason-Lake Conservation District during the 2019 field season to complete the first comprehensive road/stream crossing inventory in the Lincoln River watershed. This inventory will serve as a guide for prioritizing future road/stream crossing improvements in the Lincoln Watershed.

Experience garnered from similar inventory work performed in other watersheds across the region has shown the effectiveness of this simple tool in illustrating the need for crossing replacements. By loading the inventory onto the Northern Michigan Streams website, interested partners may see how frequently roads cross streams and subsequently, how large an impact inadequate structures can have on linear connectivity.

6. What audience(s) were you particularly hopeful of reaching? To what extent did you reach them? Did you receive any feedback?

The target audiences were varied and included:

1. Public and private entities related to river management throughout the Great Lakes region
2. Residents of Mason and Lake counties
3. Pere Marquette Watershed Council
4. Community leaders of municipalities in Mason and Lake counties
5. Pere Marquette and Lincoln river watershed landowners
6. Pere Marquette and Lincoln river recreationists (anglers, river guides, hunters, hikers, paddlers, snowmobilers)

These audiences were reached through a variety of avenues including but not limited to:

1. Partner meetings facilitated by CRA
2. Announcement of awards through the National Fish and Wildlife Foundation *Sustain our Great Lakes* and the *Bring Back the Natives* programs
3. Mason Lake Conservation District and CRA Facebook page announcements
4. *Northern Michigan Streams* website
5. Projects were highlighted in outreach materials with CRA (winter and spring 2021 newsletters, River Care Maps, and www.rivercare.org)

7. What relationships or opportunities were developed or strengthened through the work?

CRA worked with and solidified partnerships with the following:

- Pere Marquette River Watershed Committee

- MDNR Fisheries Division
- US Forest Service Huron Manistee National Forest
- Lake County Road Commission
- Mason-Lake Conservation District
- Private landowners

8. Was an evaluation included as part of this project? If so, what were the key findings? (Please attach a copy of the evaluation report.)

CRA anticipates MDNR or Little River Band of Ottawa Indians completing post monitoring after project completion. With regard to geomorphic surveying of Blood Creek in the vicinity of the crossing replacements, CRA staff will perform longitudinal and cross sectional surveys in 2021 to illustrate the evolution of the stream channel as it achieves equilibrium.

Regarding the Lincoln River inventory, a baseline data set was acquired through evaluation of each discrete road crossing which provides the ability to monitor sites as year's progress. These data will enable managers to triage projects based on the crossing's level of readiness for replacement. This same process has occurred on other watersheds in CRA's region and has been an essential tool for identifying and prioritizing crossing replacements.

Related Efforts

9. Was this project a standalone effort or was there a broader effort beyond the part funded by the GLFT? Have other funders been involved either during the time of your GLFT grant or subsequently?

CRA worked with the Lake County Road Commission and the US Forest Service between 2011 and 2017 to replace the first 6 road/stream crossings on Sanborn Creek (Pere Marquette tributary) and its tributaries where perched culvert outlets prevented bidirectional fish passage. These completed projects allowed for the natural movement of fish and other aquatic species, along with wood material, nutrients, and sediment. At the Sanborn Creek and Kings Highway sites, gravel beds were exposed when the perched culverts were removed, providing spawning habitat for fish and colonizing substrate for aquatic macroinvertebrates. At the Sanborn Creek and Nelson Road sites, impounded sand washed through, revealing a sinuous channel upstream containing submerged wood material. Project partners and landowners were pleased to restore those reaches of Sanborn Creek to a more natural condition and we have already seen these same benefits realized at Blood Creek.

Communication/Dissemination

10. List publications, presentations, websites, and other forms of formal dissemination of the project deliverables, tools, or results, including those that are *planned* or *in process*.
- TV 9&10 News "Pere Marquette Receives \$210,000 Grant to Restore Aquatic Habitat" 13 June 19
 - CRA Spring 2020 "Catalyst"
 - Ludington Daily News "Lincoln River Watershed Inventory Road, Stream Crossing" 23 Sep 2019

11. Please characterize your efforts to distribute and encourage use of products, processes, programs, etc. developed through this grant.

CRA has and continues to provide email outreach to their database of 5,000 of the “Pere Marquette Homewaters” update that includes the links to both the Blood Creek project and overall watershed focus materials. The Blood Creek project is portrayed on CRA’s website with the photo report and fact sheet being currently developed, as well as the “Pere Marquette Homewaters River Care” map that highlights past, present and future restoration site needs. CRA emailed meeting agendas and notes, and regular project updates to the Pere Marquette River-specific component of the database throughout the overall project period which included fundraising, design, and construction.

Reflections

12. Please describe any unanticipated benefits, challenges or surprises, and/or important lessons learned over the course of the project.

As reported in January 2020, significant change to this overall project was that the lead CRA contact. Amy Beyer, Director, notified GLFT with a change from the lead grant manager transferring to Kira Davis, Program Director, from Paul Kogelschatz, Project Manager. Nate Winkler, CRA biologist, is assisting with components of the Blood Creek project as Paul had transitioned to other employment. Because CRA has a well-honed method for internally communicating project progress, it was only a minor problem to transition new staff into the management role. This became an opportunity for staff to branch into a watershed that they’d not much worked in prior and resulted in “cross training” of sorts, though many of the issues CRA deals with transcend arbitrary governmental boundaries or not-so-arbitrary landscape level boundaries.

13. What recommendations (if any) would you make to other project directors working on similar efforts or to the GLFT?

Based on the answer to question number 4 (above), the single-most important action project directors can perform is to make sure multiple staff are working in the same watershed and have some knowledge of each other’s projects. CRA accomplishes this to a certain degree during monthly staff meetings where project managers provide updates to the group on what’s going on in their particular projects. CRA also incorporates staff site visits where we can all put the face of the project with the name.

All of this said, CRA runs a lean operation and as noted prior, it’s tough to make time to really drill down on the intricacies of one another’s particular projects but we make every effort to do so.

Pictures

14. Provide at least three photos of the completed project (if applicable).

Please see attached photo pages, which visually portray the three projects.

15. The GLFT requires each project it funds to have suitable permanent public acknowledgement of GLFT assistance. If applicable, the GLFT will provide a sign to you (via mail) and requires photo verification of the posting of the sign before it will process your final reimbursement request.

CRA will work with the Lake County Road Commission and GLFT to post signs at the Blood Creek sites. Because the Chinnery Rollway is on private land and the road/stream crossing inventory would entail many signs for all the individual crossings, Blood Creek is the only viable option for sign placement.

Attachments

16. Please attach any reports or materials developed through the grant.