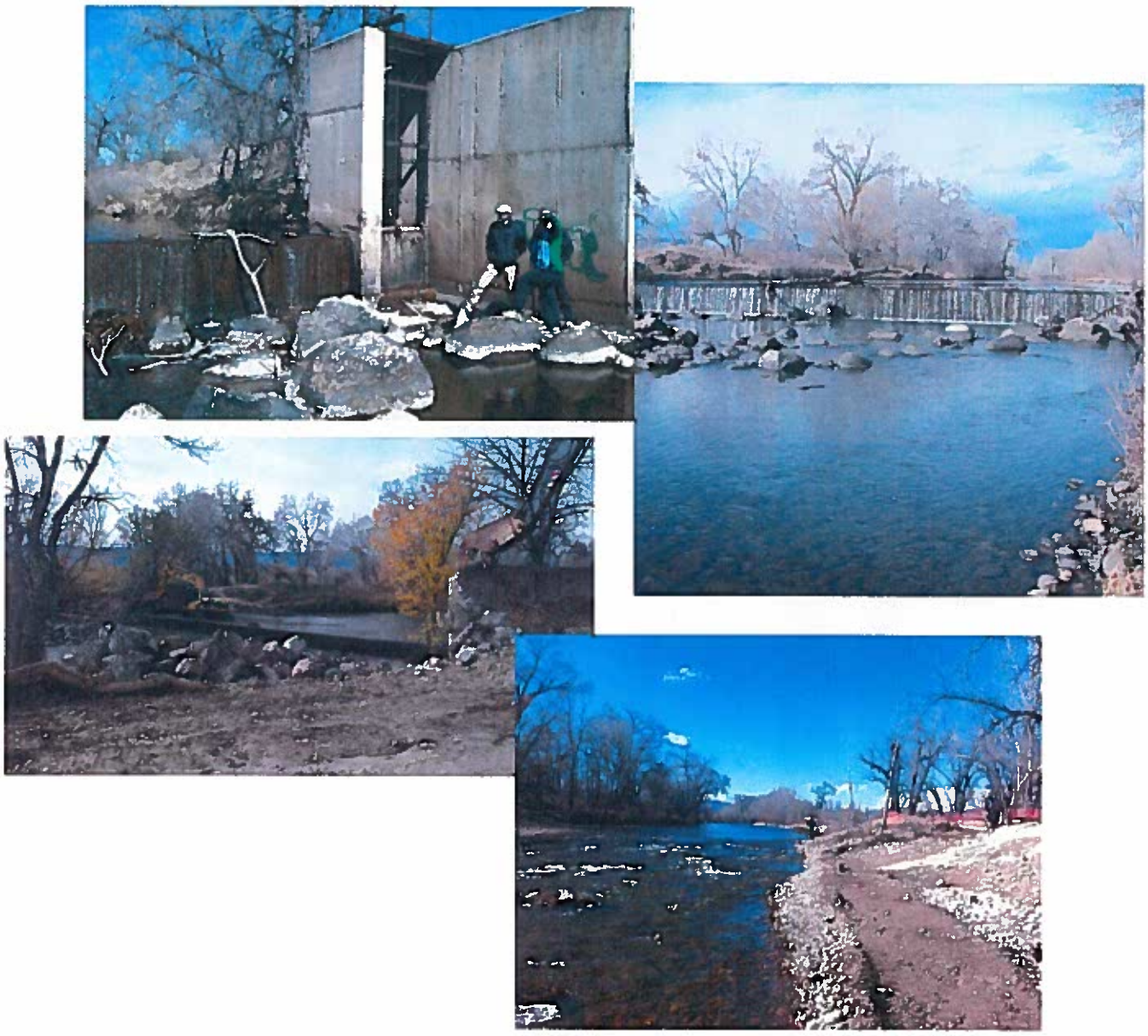
Josh Ames Diversion Deconstruction and North Sterling Pond Restoration

Final Report, April 2016



Prepared by the Colorado Water Trust in cooperation with the City of Fort Collins Natural Areas Department, Tessara Water, and BioHabitats.

COLORADO WATER TRUST

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Exhibits

I. Introduction and Background

The Josh Ames Diversion Deconstruction and Sterling Pond Restoration has begun to restore aquatic habitat in half a mile of the Cache La Poudre River and to restore 5.7 acres of riparian and wetland habitat. Water Supply Reserve Account ("WSRA") funds were used to deconstruct the Josh Ames Diversion structure, last used in 1971, formerly spanning the full breadth of the Poudre River. The riverbed and riparian area are being restored throughout the project site.

Multiple project collaborators (Colorado Water Trust, City of Fort Collins, Larimer County and CDOT) have realized efficiencies of scale and cost savings in this area by undertaking the river channel reconfiguration (narrowing/filling a segment of braded channel), wetland enhancement (reclaimed gravel pit), levee removal, riparian restoration, stormwater outfall, North Shields Avenue Bridge replacement, trail and parking enhancements, and removal of an unused diversion structure, all at the same time. This two minute video explains how the project came together: https://www.youtube.com/watch?v=EebE_HUlwkI.

The WSRA grant to the Colorado Water Trust (the "Water Trust") requires six-month updates and a final report (*See* Exhibit A). This report is our final report; it does not include the final Letter of Map Revision because of ongoing partner work in the reach. We will submit the final upon receipt.

II. Description and Narrative of Project

Since 2010, the Water Trust has been investigating project opportunities in and along the Cache la Poudre River. The Water Trust is a nonprofit dedicated to restoring and protecting streamflows in Colorado using voluntary, market-based tools. From its canyon mouth down to where it crosses under I-25, the Cache la Poudre is a transitional fishery, moving from cold-water habitat to a warm-water habitat. That same stretch has been heavily channelized in the last century.[1] The nature of this cold-to-warm transition has been studied by fish scientists, as well as the U.S. Army Corps of Engineers.[2] The river has a native fish population, including longnose dace, black bullhead, walleye, and non-natives, including brown trout, common carp, largemouth bass, and rainbow trout. The plains minnow, endangered in Colorado and Iowa darter, a species of concern, have also been collected within this reach.[3] And the river in this reach is segmented, both by physical structures and by low flows resulting from the normal administration of the river.

In 2012, the Water Trust learned of a rumored-abandoned diversion structure that formerly diverted water into the Josh Ames Ditch. The ditch supplied farms, and later a sugar beet factory, with water. The ditch originally relied on a cobblestone structure to push water into the ditch, but in 1966 the ditch company built the much larger concrete structure and raised the north bank of the river to prevent the river from meandering. In the early 1970s, Fort Collins bought the Josh Ames' senior water rights and moved them off the structure; however, the concrete dam across the Poudre remained. It stood eight feet high and spanned nearly 120 feet across. At its headwall on the north bank it reached 20 feet in the air. *See* Exhibit B.

The Water Trust began conducting outreach to learn more of the dam, its history, and whether any water users knew of its owners or continued use. In particular, the Water Trust met with the Cache la Poudre Water Users Association and the Poudre's current and former Water Commissioners. As a part of that outreach, the Water Trust also met with Fort Collins Natural Areas Department ("Natural Areas"). According to Natural Areas' 2014 Master Plan, the Poudre River Corridor is one of Natural Areas' local focus areas, a strip where the agency had already protected 1,500 acres of riparian and floodplain land.[4]

As part of that effort, Natural Areas had acquired North Shields Ponds Natural Area, a 54-acre parcel on the north side of the Poudre near Shields Street Bridge, a space that included the site of the Josh Ames diversion structure. Natural Areas had begun

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[1] Kevin R. Bestgen and Kurt D. Faush (1993).
[2] Kurt D. Faush and Kevin R. Bestgen, Ecology of the Fishes Indigenous to the Central and Southwestern Great Plains (1997); Army Corps of Engineers, Northern Integrated Supply Project Draft Environmental Impact Statement (2008)
[3] NISP DEIS (2008)
[4] http://www.fcgov.com/naturalareas/masterplan/pdf/final-2014-natural-areas-master-plan.pdf

a restoration effort of that area, reconnecting the river to its floodplain and constructing a wetland area. *See* Exhibit C1 & C2. One area that was not going to be remediated was the berm surrounding the tall headwall of the diversion structure. Upon discussion, Natural Areas and the Water Trust agreed to slot the removal of the diversion structure into Natural Areas' larger project, allowing Natural Areas to do a more complete riparian restoration of their property.

Natural Areas had already hired BioHabitats to design and manage the restoration project, and they modified their plans to accommodate the diversion removal, including the channel re-grading. The Water Trust hired Tessara Water to design and manage the removal and to bid out the deconstruction. We eventually chose the same contractor who was doing the earth work for Natural Areas, Ward Construction, a local company.

In addition to CWCB funds, the Water Trust raised nearly $37,000 from a coalition of Fort Collins breweries, including New Belgium Brewing Company, Odell Brewing Company, Funkwerks Brewery, and Pateros Creek Brewery. The breweries had not considered funding projects as a coalition before, so this project was their inaugural effort.

Work began in 2013 with the removal of an unrelated but abandoned bridge just upstream of the Josh Ames. Then Ward began lowering the north riverbank. To deal with flow issues while the diversion structure removal took place, initially the Water Trust had arranged with an upstream diverter, Larimer and Weld Irrigation Company, to coordinate the ditch company's winter fill with the Water Trust's deconstruction, so that most of the river would flow into the ditch company's system.

However, massive precipitation that September resulted in some of the worst flooding in the Front Range's recorded history, and as part of an effort to reduce flood flows in the river, Larimer and Weld Irrigation Company opened their headgate and took ~1000 cfs for several days into their canal. They filled the reservoirs during the flood, preventing them from helping with flows during the Water Trust's deconstruction. While the flood destroyed many homes, roads, and operating diversion structures, the Josh Ames stood strong.

Deconstruction successfully took place on November 4, 2013. The rest of the details of the project, including the status of the regarding, reclamation, and monitoring are included in the next section.

Today, kayakers and stand-up paddle boarders enjoy the new wave that has formed as an unintended result of the dam removal. Once the remediation is complete, citizens will again enjoy the North Shields Pond Area, only this time as an example of an intact floodplain. The work even made American Rivers' dam removal list.[5]

[5] http://www.americanrivers.org/initiatives/dams/dam-removals-map/

III. Tasks and Deliverables

Task 1: Prior Tasks – Engineering and Permitting

Deliverables: Final design documents (*See* Exhibit B and C), 404 permit, Conditional Letter of Map Revision, USFWS Habitat Concurrence and Platte River Depletion

Progress Report: COMPLETE. The Water Trust and the City of Fort Collins obtained final design documents from Tessara Water for the deconstruction, a 404 Permit, and a USFWS Habitat Concurrence and Platte River Depletion. Larimer County did not require a full Letter of Map Revision ("LOMR") for this project because of work being completed just downstream on the North Shield Street Bridge. This project was wrapped into that effort for the LOMR.

In preparation for the removal, the Water Trust and Fort Collins tested the sediment that had accumulated behind the dam. Once the dam was removed, the project partners wanted to make sure we did not flush contaminated sediments downstream. On February 15, 2013, Kumar & Associates tested sediment from three different bores for a variety of contaminants: volatile organic compounds ("VOCs"); semi-volatile organic compounds ("SVOCs"); total petroleum hydrocarbons ("TPHs"); and RCRA metals. No VOCs, SVOCs, or TPHs were found, and the RCRA metals found were below the EPA regional screening level. *See* Exhibit D.

Task 2: Engineering Services During Construction

Deliverables: Progress reports and before, during, and after photographs

Progress Report: COMPLETE. The Water Trust received constant updates from Tessara Water as the deconstruction took place from November 4 to November 7, 2013. The Water Trust and the City have numerous before and after photos of the project. The City put together a time-lapse video of the deconstruction taking place, which can be found online at https://www.youtube.com/watch?v=BlwVqIIPcSQ&feature=youtu.be.

Task 3: De-Watering and Josh Ames Diversion Removal

Deliverable: The structure will be deconstructed per the final plans and specification and all materials will be removed from site to an appropriate landfill or concrete recycling processor.

Progress Report: COMPLETE. After many consultations with water users on the Poudre, including Shawn Hoff of the Larimer and Weld Irrigation Company, Ward

Construction began the removal of the Josh Ames structure on November 4, 2013. Ward built a cofferdam first on the south side of the Poudre River and used a 320L Excavator with a concrete muncher to remove the south section of the dam. Meanwhile, machines took out the tall headwall on the north side and began re-grading the banks in coordination with the Sterling Ponds restoration. After completing the south side, the machine moved north and removed the rest of the structure.

The removal of the dam took four days. Sediment trapped behind the structure was carefully managed and re-used to create a 200-yard riffle to meet goals for the river's slope. Ward removed the concrete to an appropriate Fort Collins concrete recycling center, and the rebar went to a local recycler as well. The headgate and wheel sit in the Water Trust's office.

Task 4: Grading and Wetland Construction

Deliverable: The project will be constructed such that the Poudre River will be stable with the structure removed and the river will be reconnected to its floodplain along the left bank.

Progress Report: COMPLETE.

Grading: Fort Collins finished grading nearly 0.5 miles of riverbank and channel to reconnect the Poudre River to its flood plain. To stabilize the river, BioHabitats did significant riverbed work described fully in Exhibit E. For bank stabilization, BioHabitats and Fort Collins built cobble benches and transplanted willows on top. On the slight bends in the river section, they constructed woody toes, consisting of trees and branches buried with placed boulders on top. *See* Exhibit F, Photo.

2014 Flooding: The 2014 snowmelt produced a peak discharge around 6000 cfs in the Poudre River, approximately a 10-year flow event. This high flow event eroded about 100 linear feet of the left bank between the former Josh Ames structure location and the ELCO water line. It also exacerbated about 200 linear feet of eroding bank at the upstream end of the Shields Pond Natural Area. The eroded bank just upstream of the former Josh Ames structure was repaired by installing about 20 tons of riprap along the toe and adding cobble bed material to reshape the bank. The top of the bank was also lowered about 18 inches to help reduce shear stress in this area. The eroded bank at the upstream end of the property was repaired by grading the near-vertical bank to a 2:1 slope and installing about 100 tons of riprap on the lower half of the slope.

In addition, the top of the bank near the upstream end of the property was re-graded to remove a high area that was created by preserving several cottonwoods. The cottonwoods were removed and transplanted before grading the area. Mature willows were transplanted onto the newly graded bank.

The high flow event also created a large sand deposit in the northwest corner of the Sterling Pond. Approximately 4,000 cubic yards of sand were removed from the pond to restore the wetland benches. (None of the wetland benches had been planted before the high runoff event.) The low area of the restored floodplain (that allowed out of bank flow to create the sand deposit) was raised about a foot so that high flows will access the floodplain just upstream rather than flowing directly into Sterling Pond.

This picture shows how when you reconnect a flood plain, you reconnect a flood plain.

In response, Natural Areas revised their designs as described in Exhibit K. Natural Areas excavated some of the sand down to the levels of their created wetland and left other parts of it to be naturally revegetated. That work is now complete.

Outlet Construction: Other work onsite included establishing stable outlets between the primary and secondary ponds to help control water level in the primary pond and establishing a stable outlet channel from the secondary pond to the river.

Task 5: Landscaping/Reclamation/Monitoring

Deliverable: The project will be installed such that a natural riparian buffer will be established along the left bank and within the newly created wetland zones. The Water Trust will prepare a monitoring report that describes before-the-project

conditions, and after-project conditions, to help CWCB determine the measurable results from the project.

Progress Update: COMPLETE. The Water Trust hired Biohabitats, Inc., to prepare a monitoring report to describe the results of the project pursuant to the *Standard Operating Procedures for Topographic Survey of Stream Channels*, February 2012. The report goes beyond those procedures to include a pebble count. The report, with the pebble count piece, is attached as Exhibits E, G, and H. We have monitoring reports now for 2014 (Exhibit H) and 2015 (Exhibit I).

In August 2014, approximately 5 acres of created wetlands were planted with about 41,000 emergent, wet meadow, and tall grassland plugs. The effort included installation of waterfowl exclusion fencing around the wetland in the primary and secondary pond. In September-October 2014, approximately 8000 additional wetland plants were installed in the sand deposition area. Over 1,800 5-gallon size trees and shrubs were planted on the restored floodplain. For design information and plant breakdowns, see Exhibit J, Sterling Planting As-Built.

Task 6: As-Constructed Documentation

Deliverable: The project area will be surveyed and a topographic plan of the project area will be produced. The new grades will be modeled to verify flood elevations.

Progress Update: PARTIALLY COMPLETE. BioHabitats surveyed the before and after bank, river profile, and structure elevations to show the reconnected flood plain, the absence of the structure, and a restored natural river grade. *See* Exhibit G. Project partners are working cooperatively to develop a new topographic plan and re-modeled flood elevations as part of a LOMR that includes the McMurray site, the North Shields Bridge project, and the Sterling Ponds. That project has been pushed back a year, because it is most cost-effective to simply wait for the LOMR for all the projects to be completed together. We will submit the final LOMR when available.

Task 7: Outreach, Communication, Contract Administration

Deliverable: Contracts will be administered. Outreach, site visits and presentations to stakeholders including Roundtable members, funders, and the public will be documented and shared with CWCB, the Roundtables and IBCC.

Progress Update: COMPLETE. The Water Trust engaged in outreach to the South Platte and Metro Roundtables, the Cache la Poudre Water Users Association, and the Larimer and Weld Irrigation Company. The City of Fort Collins and the association of Fort Collins breweries that helped fund the project presented on the Josh Ames project to roughly 200 attendees at the first ever Poudre Forum, held on February 8, 2014, at The Ranch Events Complex. In addition, the City created a time-lapse video of the deconstruction that can be found on YouTube at

https://www.youtube.com/watch?v=BlwVqIIPcSQ&feature=youtu.be. The link can be found on the City and the Water Trust's website. Another video tells more of the complete story, found here: https://www.youtube.com/watch?v=EebE_HUlwkI.

The Water Trust intends to conduct future outreach to the Roundtables that supported the project to show how their money was spent. The Water Trust received a recommendation not to take up the roundtables' time with just an update, but to give an update if the Water Trust applies for funding again.

IV. Lessons Learned

Monitoring:

The removal of a bank-to-bank dam presents a rare opportunity to show river restoration in a very dramatic way. The Water Trust took hundreds of photos before, after, even during construction. These photos do a good job telling the story of the removal. However, if the Water Trust were to do it again, we would add structure and precision to the photo process. We would mark out permanent photo locations with GPS and take photos from those points. We have good before and after pictures – but they could be improved with process.

Projects Beget Projects:

The Water Trust has found in the past that completing smaller, simpler projects often leads to the generation of larger projects. By showing a community what can be done, building trust, and allowing them to invest in it, we've found they then look for where more opportunities lie.

Once again this holds true. Our project partners and funders are actively seeking the next opportunity. The Water Trust was hired by Natural Areas to conduct outreach to nine ditch companies on the Poudre to discuss fish passage and low flow measurement and bypass at their ditches. The Water Trust has also signed a Memorandum of Understanding with the Cache La Poudre Water Users Association, Northern Water, and the Cities of Greeley and Fort Collins to explore stream flow restoration using the Colorado Water Conservation Board's acquisition authority.

Flexibility:

At several points during the development and deconstruction of the Josh Ames project the Water Trust and its partner had to reevaluate its vision for the project to meet other needs. For instance, we had a perfectly reasonable plan to dewater the Cache la Poudre River, coordinated with the Larimer and Weld Irrigation Company manager. Instead, Mother Nature provided the 2013 floods, and our contractor had to develop a new water management plan. That impacted not only our dewatering plan, but plantings on the Sterling restoration site as well. Our team was responsive enough to see how the flood had worked (having been dealt some real-time feedback to floodplain connectivity design), and modified the approach appropriately.

That was not the only change of course. During Fort Collin's outreach to East Larimer County Water District ("ELCO"), Fort Collins discovered ELCO runs a water line under the Poudre near the project site. We spent time trying to find the exact location, but in the end were unsuccessful. Because of ELCO's concerns the dam removal might somehow compromise their pipeline, the Water Trust agreed to leave the dam's toe in the river to protect ELCO's pipeline. While we did not then

remove every piece of the dam, the toe is only several inches high and does not represent a barrier in the river.

Our Brand:

We learned again that the Water Trust's brand opens doors. Our voluntary, collaborative history allowed us to bring a flow and river restoration project to a river in the midst of two major Army Corps of Engineers permitting processes.
Public/Private Partnerships:

This project featured a strong partnership between the City of Fort Collins Natural Areas Department and the Water Trust, a private nonprofit corporation. Both entities have strengths and weaknesses in terms of nimbleness and resources. Natural Areas already had funding available through its budget process for the project, whereas the Water Trust had to go out and raise funds as the project progressed. Conversely, the Water Trust has lower burdens in terms of process for contracting than a municipality would, making the Water Trust more nimble when expedience was needed.

We look forward to applying these lessons to the next project.

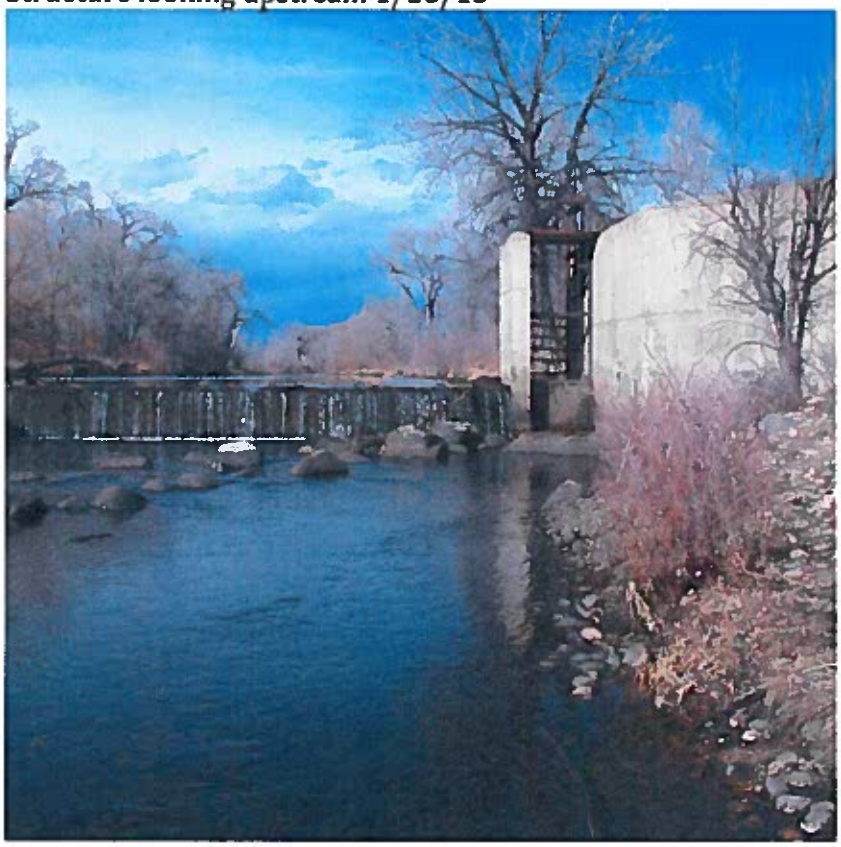
V. Photo Timeline

On top of structure, looking south 3/20/12

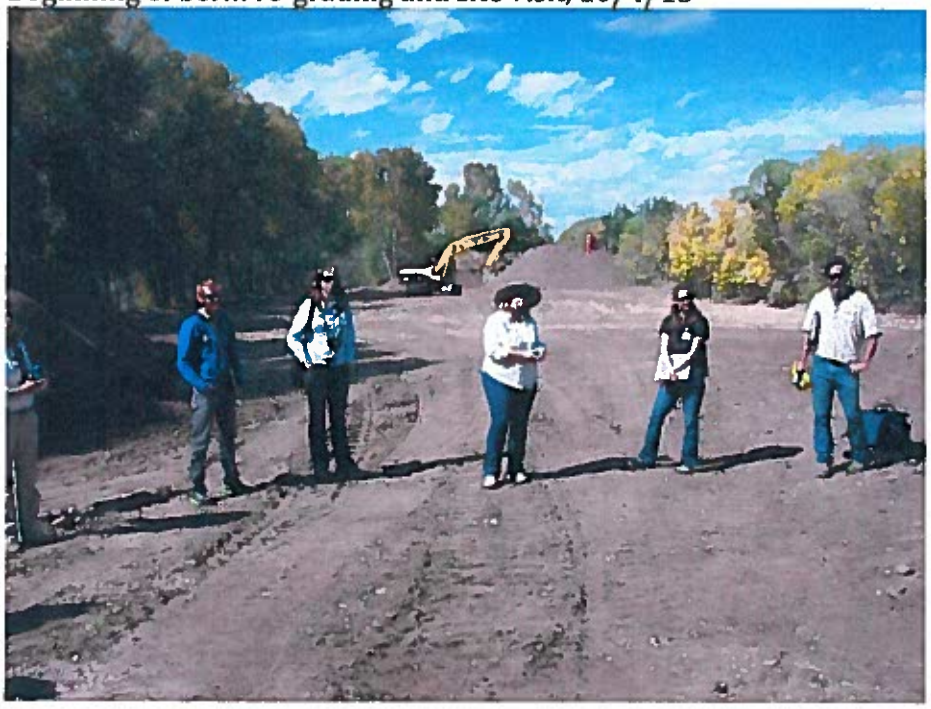
Structure looking southwest/upstream 3/20/12

Structure headwall, looking northwest/upstream 3/20/12

Structure looking upstream 1/28/13



Beginning of berm re-grading and site visit, 10/4/13



Site Visit, the Water Trust and Natural Areas 10/4/13

Demolition, creation of coffer dam 11/4/13

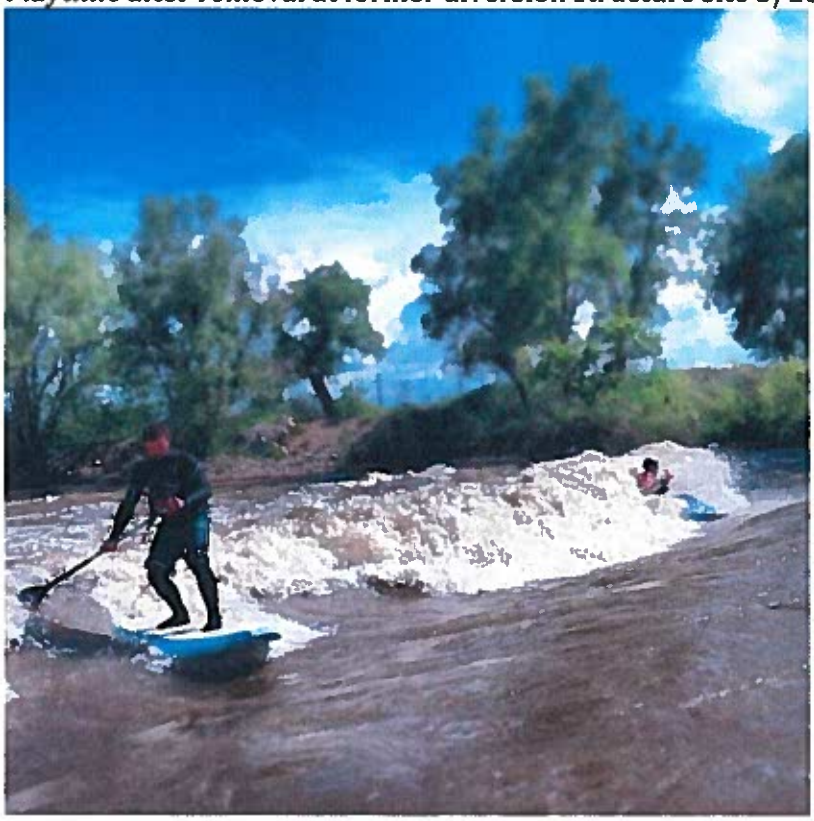
Project crew 11/4/13

Demolition 11/4/13

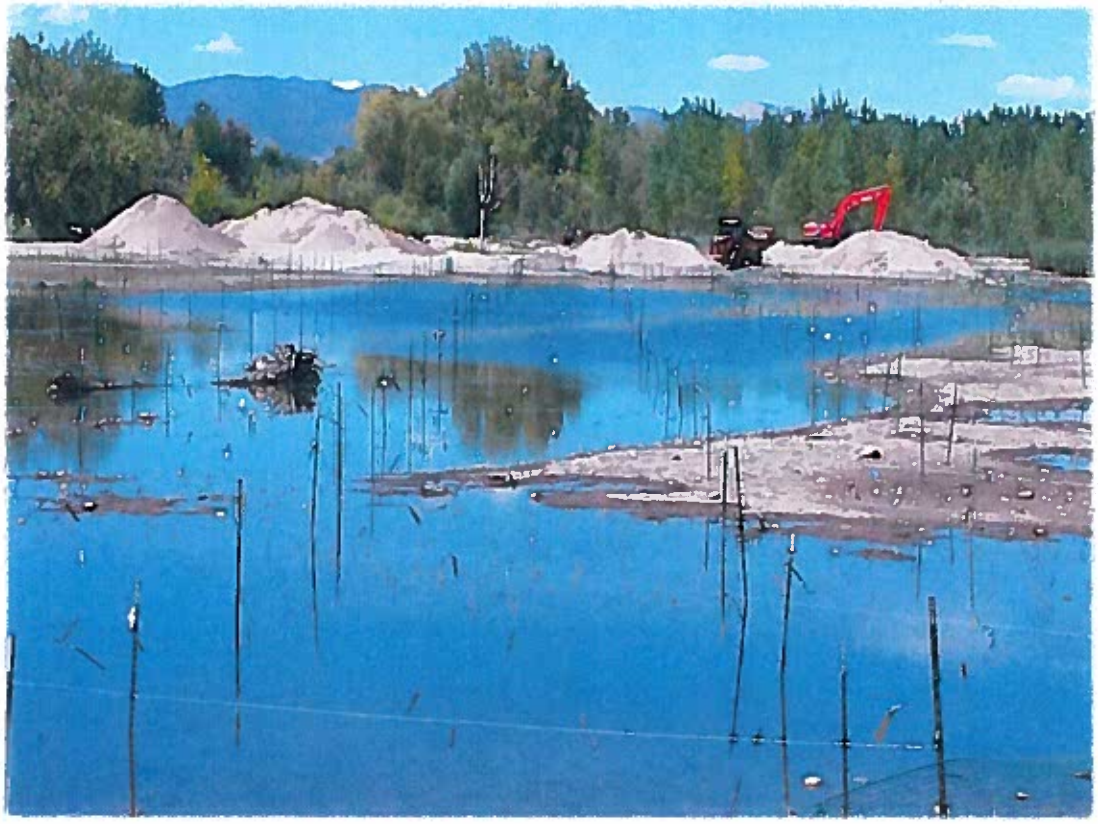
Demolition 11/4/13

Diversion site post-demolition 4/4/14

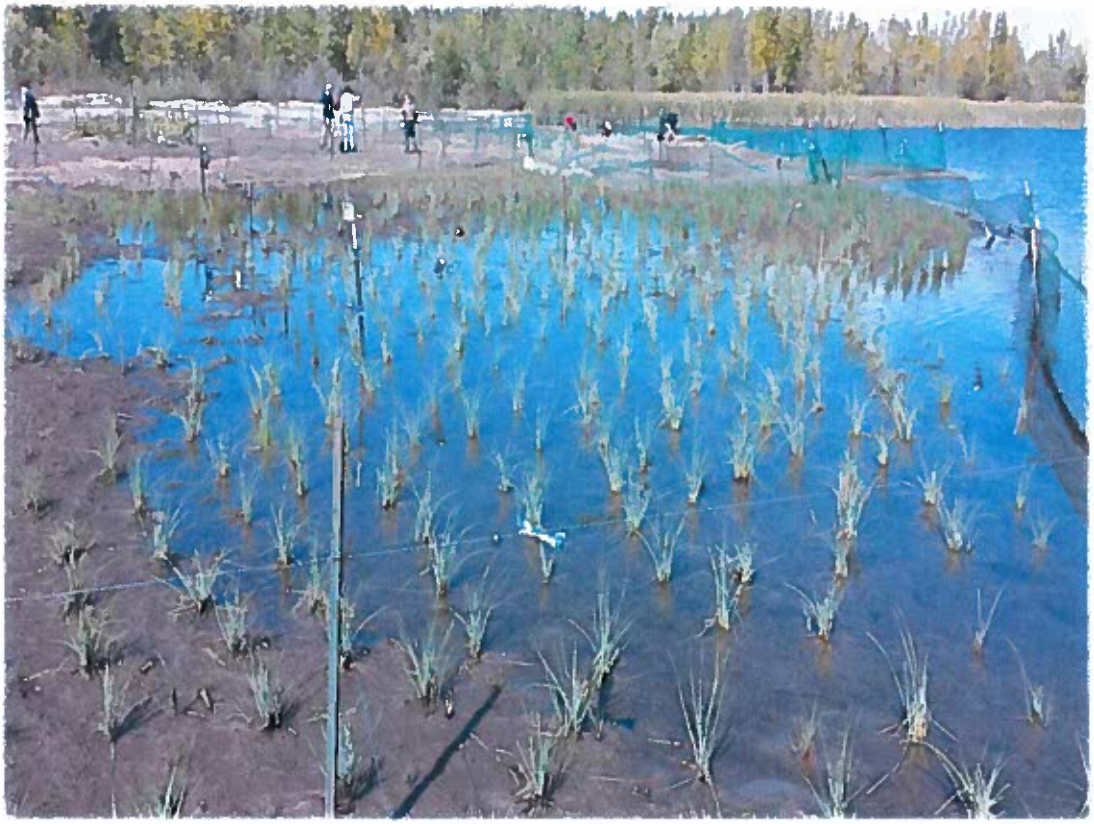
Playtime after removal at former diversion structure site 5/28/2014



Post Flooding, Spring 2014



Plantings Post-Flood, 2014



Josh Ames Diversion Dam, March 2012

Poudre River, same location, February 2014

Flyfishing at the former Josh Ames site – March 17, 2016