
Logan River Projects, Logan, Utah

Riparian Improvement

Project Implementation Plan

FY 2017

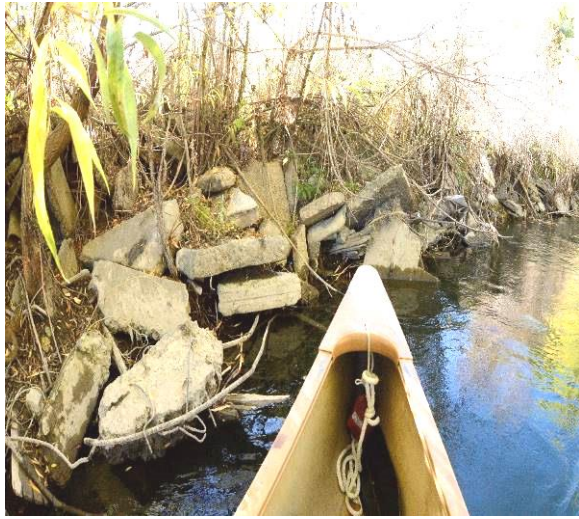


Figure 1: Logan River debris. Logan, Utah.

EPA 319 Water Quality Financial Assistance

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1 Report of Progress

1.1 Project Summary

This project implementation plan presents the tasks, timeline and budget required to address the concern of phosphorus loading, as identified in the Middle Bear River and Cutler Reservoir TMDL (DWQ, 2010) and Logan River Watershed Implementation Plan (WIP) (BIO-WEST, 2016). The WIP lists urban, recreational, and agricultural strategies for reducing phosphorus and sediment proposed in the Conservation Action Plan (CAP) (LRTF and BIO-WEST, 2016), and describes loads and estimated load reductions with proposed Logan River Project implementation. The goals of the CAP, in part, are to reduce the nutrient and sediment load entering Cutler Reservoir from the Logan River drainage through full implementation of the proposed projects in the CAP and to ultimately keep Logan River drainage off of the 303(d) List of Impaired Waters.

The Logan River Task Force (LRTF) is composed of a group of about 30 professors, government officials, and interest group representatives, including but not limited to Logan City, Utah Division of Water Quality (DWQ), Utah Division of Wildlife Resources (DWR), Utah Division of Water Rights (Stream Alterations), Natural Resources Conservation Services (NRCS), Utah Association of Conservation Districts, Trout Unlimited, Bridgerland Audubon Society, Cache Valley Anglers, USU Extension, USU College of Natural Resources, USU College of Engineering (Water Lab), residents, and stakeholder interest groups. Their focus is to make significant contributions to improving and better utilize Logan River, and have worked diligently to provide economically viable, socially acceptable, environmentally conscious, and generally sustainable solutions to issues on and surrounding this river. Together with local environmental consulting firms and the Nature Conservancy, the LRTF has produced the Conservation Action Plan; compiling goals for over 10 projects along the lower section of Logan River.

Logan River is divided into upper and lower reaches. The upper reach from the head waters to Third Dam in Logan Canyon is not impaired. The Logan River's lower reach (third dam to Cutler Reservoir, not including Blacksmith Fork) was listed on the 2014 Utah 303(d) list for exceeding the total phosphorus (TP) criteria associated with the reservoir's 3B and 3D, or warm water fishery and protected waterfowl, shore birds and other water-oriented wildlife (respectively), beneficial use classifications. This listing was removed as a result of dissolved oxygen (DO) levels above water quality limits, but high TP concentrations influence DO and biological organisms, and may result in increased oxygen issues and/or decreased biological activity. More than 10% of water samples taken in the 2014-2015 intensive monitoring session had TP concentrations higher than acceptable limits.

This section of Logan River has sections of residential, commercial, recreational, and agricultural segments along its 20-mile stretch through Logan City and Cache County. Logan River is part of the Middle Bear River and Cutler Reservoir, where a Total Maximum Daily Load (TMDL, 2010) was established to protect these designated beneficial use classifications. Appendix I of the TMDL provides the City of Logan Adaptive Management Plan for Middle Bear River and Cutler Reservoir TMDLs (2009), where it lists Phosphorus management strategies and implementation techniques focusing on wastewater treatment and effluent management, with little focus on Nonpoint Source management practices. Rapid urban and suburban development is anticipated along the Lower Logan River. The purpose of these NPS projects is to protect and enhance these areas, and to avoid the fate of poor water quality, which is visibly encountered in many other watersheds along the Wasatch Front.

The proposed projects address a cross section of BMPs, including clearing debris from the river and riparian corridor, bank stabilization, channel improvements and meander restoration, riparian and floodplain vegetation restoration and improvement, bank stabilization in urban, residential and agricultural areas, improved stormwater management, and river access management. Total budget to implement the proposed best management practices (BMPs), provide technical and administrative assistance, monitor, and to provide education and outreach is calculated at \$1,664,852. EPA’s 319 funds will cover \$558,630 of the total budget. Table 1 provides a budget summary. A complete description of BMPs and budget allocations are provided in sections 3, 4, and 6.

Table 1: Summary budget of the three riparian projects, outreach, and administration.

Logan River Project Budget	319 Funds	Non-Federal Match	2017 Total
Reduce TP and TDS loads into Cutler Reservoir			
<i>Agricultural Streambank</i>	\$191,264	\$50,000	\$241,264
<i>Recreational Section</i>	\$293,778	\$1,046,222	\$1,340,000
<i>Residential Streambank</i>	\$50,000	\$10,000	\$60,000
Admin, Monitoring, Education	\$23,588		\$23,588
TOTAL COSTS:	\$558,630	\$1,106,222	\$1,664,852

1.2 Approved Funding

Logan City has secured \$600,000 from DWQ’s Willard Bay Mitigation Funds to be spent on design and implementation of the Logan River Rendezvous Park project. In 2016, \$80,000 in NPS funds were also approved for Denzil Stewart Nature Park along Logan River, upstream from Rendezvous Park. Logan City has committed to match an additional \$377,500 for these projects. These funds, along with the approved EPA 319 grant to fund the 100 East Residential, Rendezvous Park, and 1000 West Agricultural Projects, will help protect water quality and the

designated beneficial uses along Logan River in 2017. Seven additional projects proposed in the Logan River WIP (2016) and CAP will continue pattern of improvements into the near future (2018-2020) as funding becomes available, with the intention of preventing Logan River from being included in the 303(d) list of impaired water bodies, and decreasing TP loads into Cutler Reservoir.

2 Statement of Needs

2.1 Project Water Quality Priority

Under the Clean Water Act, every state must establish and maintain water quality standards designed to protect, restore, and preserve the quality of waters in the state. These standards consist of narrative criteria that include designated uses; specific chemical and biological criteria necessary for protection of the designated uses; and anti-degradation provisions. When a lake, river or stream fails to meet water quality standards, section 303(d) of the CWA requires that the state place the waterbody on a list of “impaired” waters and prepare an analysis called a Total Maximum Daily Load (TMDL).

The key natural resource problems in the Logan River watershed identified in the CAP from First Dam to Cutler Reservoir are nutrient loading and sedimentation. The Logan River drainage, included in the Bear River-Cutler Reservoir TMDL and on the Utah 303(d) impaired water bodies list is estimated to contribute a phosphorus load of 5,642 kilograms per year to Cutler Reservoir (UDWQ 2010). As described in the TMDL study (UDWQ 2010), Cutler Reservoir was listed on Utah’s 303(d) list of impaired waters in 2002; the TMDL was approved by the Environmental Protection Agency in February 2010. Pollutants of concern are low dissolved oxygen (DO) and excess total phosphorus. Implementation of the TMDL aims to protect the designated beneficial use classifications of the reservoir: 3B (warm water fishery) and 3D (waterfowl, shore birds, and other water-oriented wildlife). Utah’s 2012-2014 Integrated Report (UDWQ 2014) continues to list Cutler Reservoir for both low DO and excess phosphorus. The 2014-2015 intensive monitoring period showed that TP concentrations are above the exceedance limits in more than 10% of the samples measured at the Mendon Road Bridge.

The Logan River, an integral part of the greater Bear River ecosystem, originates within the Cache National Forest, in the headwaters of Logan Canyon and terminates at its confluence with the Little Bear River in Cutler Reservoir. The river is an asset to residents of Logan City and Cache County and has historically supported many beneficial uses. The Logan River was an important resource for Native Americans and pioneers, and it remains a valuable asset today. Cache Valley citizens are attracted to the river and enjoy the aesthetics, recreational values, and wildlife resources associated with this high-quality river, which supports fish, wildlife, and many plant

species unique to riparian and wetland habitats. The Logan River also provides water for irrigation, municipal water supply, and hydroelectricity.

To protect the Logan River from degradation and the growing threats of floodplain development, a Conservation Action Plan (CAP) has been drafted for the portions of the Logan River from First Dam (at the mouth of Logan Canyon) through Cache Valley to the confluence with the Little Bear River at Cutler Reservoir (Figure 1). The development of a short- and long-range vision for the river was needed to coordinate and prioritize conservation efforts and ensure a sustainable river system for future generations. The LRTF worked with environmental consultants (BIO-WEST Inc. and Allred Restoration Inc.) to prepare the Logan River CAP and preliminary designs for restoration demonstration projects along the river that will help to improve water quality while addressing flooding and bank stabilization issues.

In response to these water quality needs, and to be eligible for Incremental Section 319 Funds the Logan River Watershed Implementation Plan (WIP) was prepared for the Logan River (BIO-WEST, 2016) which addressed the nine elements required by EPA to be considered an acceptable watershed plan.

2.2 Water Body Information

The Logan River Watershed is located mostly within Cache County, Utah, HUC 160102030308. The head waters of Logan River originate in Franklin County, Idaho near the Idaho-Utah border in the Bear River Range (Figure 1). The river flows down Franklin Basin for 9.5 miles before entering Logan Canyon where it is joined by a tributary, Beaver Creek. The river continues down Logan Canyon for 23.8 miles, picking up flows from nine tributaries, until it emerges in Cache Valley.

The lower reach of Logan River is located within Cache County (Figure 1). It begins at First Dam, flows 3 river miles through a residential section (urban), 2.5 miles through a commercial and recreational segment (recreational), and 14.5 miles through agricultural lands (agriculture) before spilling into the Cutler Reservoir.

From first dam the Logan River flows through what is known as the “Island” area--the historic floodplain between the Old Main Hill and Cliffside benches. Approximately 1.9 miles below the mouth of Logan Canyon, Little Logan River splits from the main stem. Today, flows at this split are managed with the Crockett Diversion irrigation control structure. The Little Logan River rejoins the main stem west of 1000 West (State Route 252). Spring Creek, and Blacksmith Fork are tributaries into the Logan River near the Logan River Golf Course and the intersection of U.S. Highway 89/91 and Park Avenue (600 West). Logan River continues for 20 miles beyond the

mouth of Logan Canyon before joining with the Little Bear River in the inundation zone of Cutler Reservoir.

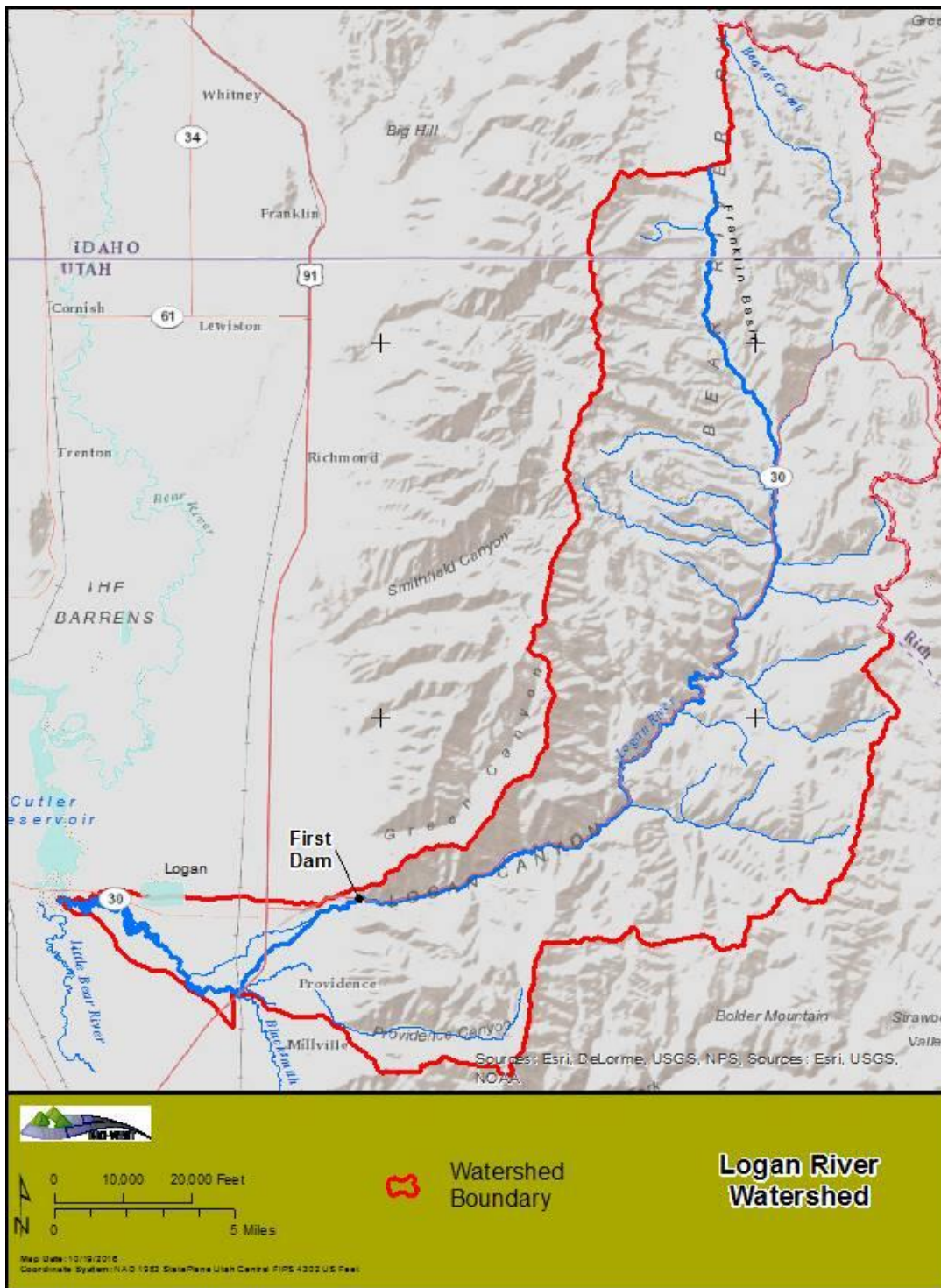


Figure 1. Logan River Watershed. The Lower section of the river is downstream of First Dam.

(owned by Logan City) is approximately 2.0 miles up the canyon, and Third Dam (also owned by Logan City) is another 1.5 miles up the canyon. There are three hydroelectric generation plants and associated run-of-the-river dams on the Logan River. First Dam is located at the mouth of Logan Canyon (owned by USU), Second Dam (owned by Logan City) is another 1.5 miles up the canyon. These dams temporarily divert water to operate hydroelectric generators, but return these flows to the river. Therefore, spring peak flows below First Dam are relatively natural. In contrast, irrigation diversion significantly reduces summer flow in the river channel. Use of Logan River water for irrigation purportedly began the first summer of Mormon settlement, 1859.

Water quality upstream of First Dam is very good but becomes increasingly poor as the river approaches Cutler Reservoir, picking up constituents and sediment originating from developed and agricultural portions of the watershed within Cache Valley. Most of the pollution in the lower Logan River watershed is the cumulative result of runoff from urban stormwater, in-stream erosion due to poor riparian conditions, and agricultural areas and grazing lands. Spring runoff causes erosion, depositional in-stream banks, and flooding. Irrigation is a major use of the river water, and low summer flows are a challenge throughout the river. More detailed information about the Logan River can be found in the Logan River WIP (2016).

2.3 Project Statement

The Blacksmith Fork Conservation District (BFCD), in cooperation with Logan City, are proposing to coordinate restoration projects along the lower half of the Logan River (from First Dam to the confluence at Cutler Reservoir). The goals and objectives of these projects, as stated in the Logan River WIP, and the Logan River CAP, are to improve and protect the overall condition of the Logan River, and reduce current and future phosphorus and sediment loads to Cutler Reservoir resulting in water quality improvements. The BFCD and Logan City have secured funding from Willard Bay Mitigation Funds and Utah NPS Funds and are requesting partial funding from the EPA section 319 to conduct this restoration.

Project goals will be accomplished through reducing bank erosion, addressing sedimentation issues, improving floodplain and riparian corridor condition, and reducing direct stormwater runoff. The proposed projects will provide the stated benefits of reduced phosphorus and sediment loads to Cutler Reservoir and improve the overall stream corridor. Cutler Reservoir is currently impaired by excess total phosphorus and insufficient dissolved oxygen concentrations and any reduction in phosphorus and sediment would benefit water quality. This plan provides an outline of: the three restoration projects proposed to be accomplished with EPA 319 funds, restoration-related activities, anticipated project costs, and future management strategies.

2.4 Area of Focus

The Logan River conservation action plan (CAP) compiled goals for over 10 projects along the lower section of Logan River. The Logan River Task Force (LRTF) worked diligently to provide economically viable, socially acceptable, environmentally conscious, and generally sustainable solutions to issues on and surrounding this river.

The area of focus of the Logan River Projects for the 2016/2017 years includes four projects: Stewart Nature Park, 100 East Residential properties, Golf Course and Rendezvous Park, and 1000 West Agricultural property (Figure 2). The Stewart Nature Park project is funded by 2016 Utah NPS funds, with match from Logan City, and is not a part of this 2017 EPA 319 grant. Construction at Stewart Nature Park is scheduled to begin in Nov 2016, and will be finalized in spring 2017. Funds from this EPA 319 grant will assist in the completion of the other three projects.

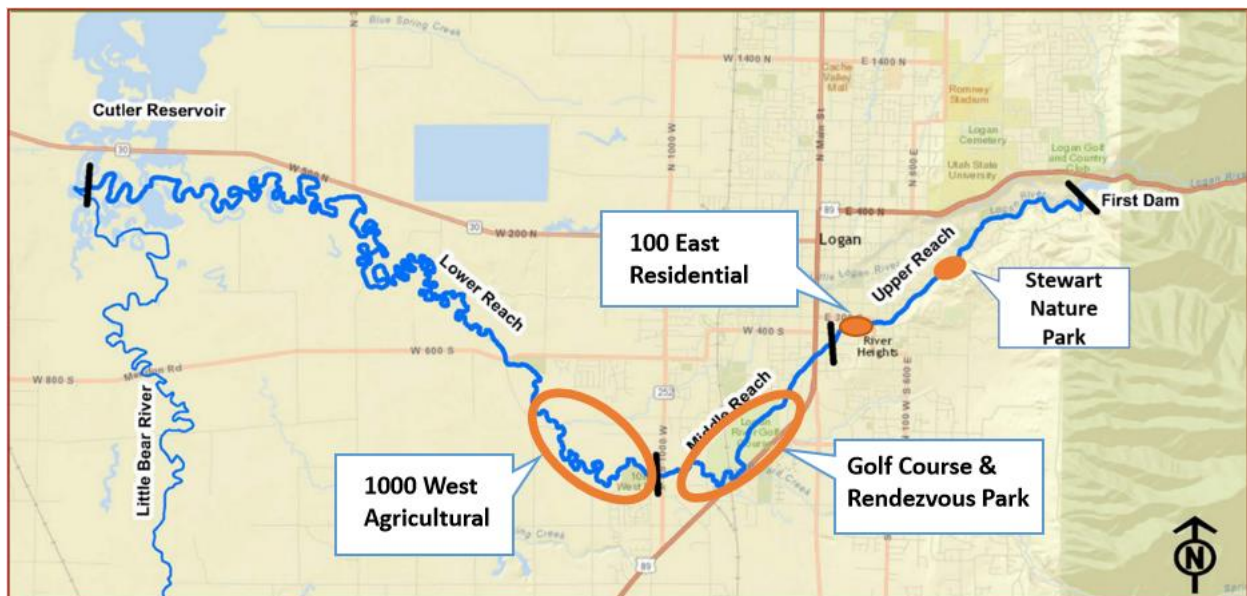


Figure 2: Lower Section of Logan River from First Dam to Cutler Reservoir. The location of the four projects taking place along the River in 2016/2017 are noted.

Two adjacent landowners have committed to complete stream restoration at the 100 East Residential properties, along the southern edge of 1200 linear feet of river. One of these landowners has also applied for the 2017 NRCS EQIP program to include additional riparian, grazing, and wildlife enhancements in their overall project scope.

The Golf Course and Rendezvous Park are owned and maintained by Logan City. Logan City hired BIO-WEST Inc. and Allred Restoration in 2015 to gather public opinion/participation and to complete preliminary plans for this project. Logan City also successfully acquired \$600,000 in

UDWQ Willard Bay Mitigation funds for this large scale project that. With additional funding from this 2017 EPA 319 grant the complete project will restore meander in the river, improve flood plain function, and addresses sediment deposition. Construction will begin in spring 2017, and the project is expected to be completed in 2018.

One private landowner has committed to continue stream restoration along 1.5 river miles at the 1000 West Agricultural project location. This project has received \$42,000 in NRCS funds in 2015, to clear and snag dead trees and debris above and in the river, stabilize eroding banks, and eradicate weed species, but additional restoration is needed. In addition to addressing water quality concerns, this section of river will serve as a water quality improvement demonstration area for agricultural landowners in Northern Utah. Each of these projects are discussed in detail in Section 3.1.

2.5 Project Purpose

Many water quality benefits are expected from these projects along Logan River. The Logan River WIP (2016) has modeled an expected 32.8% TP load reduction in response to the proposed BMPs. The STEPL model results also indicate that N, BOD, and sediment loads will be reduced by 14.2%, 12.2% and 47.8%, respectively. Each project will primarily focus on clearing weak trees and debris, stabilizing embankments and highly erosive cut banks, and riparian planting. These activities will decrease erosion, limit suspended solids and TP concentrations, and abate downstream sediment deposition. Other benefits include increased fish and wildlife habitat, and shading of the stream. Increased shade will reduce temperatures which will help stabilize DO concentrations when adequate flows are in the river.

The BFCDD has agreed to work in partnership with Logan City, and private landowners, and will provide cooperative support with Federal and State agencies. The BFCDD will cooperate with the NRCS, UDWQ, Utah Division of Wildlife Resources (UDWR), and the Utah Department of Agriculture and Food (UDAF) to restore stream bank functions along the lower portion of the Logan River.

Designs for the three projects have been produced by professional stream restoration consultants, the Bear River Watershed Coordinator, and NRCS conservation planners, with direct input from the LRTF, private landowners, and the community at large. The BFCDD and NRCS will provide administrative and engineering support, as appropriate.

2.6 Water Quality Problems

The Logan River, from First Dam to Cutler Reservoir, is characterized by steep, eroding banks and an unconnected flood plain. During spring runoff, large sections of the banks are known to slough off, and are prone to down-cutting.

The Middle Bear River and Cutler Reservoir TMDL (2010) included water quality and limnological testing of Logan River sub-watershed. This study concluded that Cutler reservoir is eutrophic, where phosphorus is the limiting nutrient for algae and aquatic plant growth. Some Logan River samples (2000-2015) also found total phosphorous (TP) concentrations to be above the 0.05 mg/l limit for rivers and streams. In the lower reach of the Logan River, where agricultural return flows reenter the river, a decline in water quality is clearly visible.

The Logan River WIP (2016) lists urban, recreational, and agricultural strategies for reducing TP. The proposed 3 projects will address a cross section of these BMPs, including clearing dead and/or dangerous trees within the river, expansion of flood plain with riverbank benching or removal of dredge piles to allow flow into expanded flood plain areas, river bank stabilization, fencing of livestock, and enhanced riparian vegetation. These activities will decrease erosion, limit suspended solids and TP concentrations, and abate downstream sediment deposition.

2.7 Key Wildlife Species

The Logan River is an integral part of the greater Bear River ecosystem. Wildlife resources associated with this high-quality river include fish, wildlife, and many plant species unique to riparian and wetland habitats. Two fish species, the Leatherside chub (*Lepidomeda copei*) and Bonneville cutthroat trout (*Oncorhynchus clarkia utah*), are listed as Utah threatened, endangered, and sensitive in the Logan River watershed (Utah DNR, 2016). A full list of the 29 total plant and wildlife species for the Logan Quad are listed in Appendix B.

The lower portion of the Logan River watershed is part urban, part recreational, and part agricultural, yet it supports a diverse wildlife community. Fishing is popular along this stretch of the river, although access is limited without a land owner's permission. Public access points are located below the First Dam or where the river crosses under US 89/91, with more access points being planned in the near future.

Utah Division of Wildlife Resources has issued Management Plans for wild turkey, pheasants, elk, moose, mule deer, in addition to other big game and upland game species. A list of wildlife included in Utah's Wildlife Action Plan for Cache County is provided in Appendix B. Some species, such as muskrats, can become a nuisance, while other species are listed on the Utah Threatened, Endangered, and Sensitive Species List.

3 Project Descriptions

Three projects are included in this Logan River Project Implementation Plan (Figure 1); one agricultural project, one recreational project, one residential project. See Appendix A for detailed project descriptions. The goals, objectives, and tasks for each of the three projects, education and outreach components, monitoring, and project administration are described below.

3.1 Planned Implementation: Objectives, Tasks, and Estimated Expenditures

Project signups, planning, permitting, design, and implementation have been and will continue to be coordinated by the Bear River Watershed Coordinator in partnership with Logan City, the LRTF, and the North Logan NRCS field office. The watershed coordinator currently works in the NRCS office and has a close working relationship with the District Conservationist and conservation planners. This partnership provides the NRCS with additional planning capacity which allows the field office to complete additional conservation practices that would otherwise not be feasible. The Utah Division of Water Quality Non-Point Source funding has been used as state match and in areas where Section 319 funding cannot be expended.

GOAL 1: Reduce TP and TDS loads flowing into Cutler Reservoir through streambank stabilization, fencing to prevent cattle access to river, and locating an intentional deposition pond, and improve riparian habitat to decrease temperature.

Objective 1: Plan, design and implement an *agricultural* riparian restoration project in along the Logan River (Appendix A1). The specific tasks listed below will reduce sediment and nutrient loading, improve floodplain functions, increase stream shading, reduce stream temperatures, and improve the cold water fishery habitat.

Cost: \$241,264 **319:** \$191,264 **Other:** \$50,000

Task 1: Improve riparian conditions of the river. This includes correcting eroding banks and the associated sediment and phosphorus loading, stabilizing undercut banks with woody riparian vegetation, in-stream rock and woody structure, increased cover for fish habitat, and improved floodplain functions. Stream restoration will be accomplished by a) laying back the highest banks, b) protecting these areas with fencing and revegetating with native grasses, shrubs and trees, c) creating filter strips for non-point source pollution control from agricultural property, d) clearing snags and debris, and e) treating weeds along the banks for at least three years following revegetation or until desirable species are dominant.

Task 2: Improve livestock management adjacent to the river, when appropriate. BMP's for livestock management will include fencing, off-stream watering sites, rest/rotational grazing, and timing and season of use.

Objective 2: Plan, design and implement a riparian restoration project in along the Logan River (Appendix A2) in the **recreational** reach. The specific tasks listed below will address sediment deposition, river meander restoration, provide locations for sediment traps, and restore floodplain function.

Cost: \$1,340,000 **319:** \$267,000 **Other:** \$1,073,000

Task 3: Expand floodplain and floodplain functions. This includes removing portions of the dredge pile levees on one or both banks to create an expanded flood plain through undeveloped sections of the golf course. The expanded flood plain will be contained by elevated golf cart and/or walking paths located at variable distances from the river. Eroding banks and the associated sediment and phosphorus loading will be addressed by improving floodplain functions and riparian vegetation conditions. This creates filter strips for non-point source pollution control in areas adjacent the Golf Course and US-89/91.

Task 4: Provide sediment deposition pool to catch sediment and debris carried within the channel from the upstream portion of the river (1st Dam to Golf Course) to protect the downstream agricultural reach and to remove a significant amount of the TP carrying sediment from the residential portions of the river. This will be accomplished by realignment of the river to ensure appropriate water velocity, and construction of a sediment deposition pool that will be maintained as needed by Logan City.

Objective 3: Plan, design and implement a riparian restoration project in the **residential** section of the Logan River (Appendix A3). The specific tasks listed below will secure the embankment as necessary to prevent erosion, and provide riparian vegetation enhancement.

Cost: \$60,000

319: \$50,000

Other: \$10,000

Task 5: Decrease bank erosion and provide demonstration river bank stabilization options. Eroding banks and the associated sediment and phosphorus loading will be addressed by improving floodplain functions and riparian vegetation conditions. This creates filter strips for non-point source pollution control from the adjacent pastures.

GOAL 2: Increase public awareness through education, outreach, and information.

Objective 1: Education and outreach has been vital in developing the Logan River CAP and will continue to be essential in developing and implementing proposed and future projects. The LRTF is committed to providing consistent outreach for each project, and informing the community at large of project outcomes. Citizen science projects, both existing projects such as Utah Water Watch, and planned efforts under the CAP, will be a key aspect of keeping the community involved with improvement of the watershed.

Cost: \$7,338

319: \$7,338

Other:

Task 1: Construction-phase outreach will include a) project informational signs for construction sites, b) stakeholder meetings for local residents and interested citizens, c) Logan City website information, d) fact sheets, e) citizen planting days/educational workshops, as described in Section 4.3 below.

Task 2: Post-construction outreach will include a) website updates, b) permanent interpretive signs, and c) demonstration workshops, as described in detail in Section 4.3 below.

GOAL 3: Monitoring and maintenance.

Objective 1: To monitor, document, and provide access to the water quality of, and health improvements to the Logan River, and maintain equipment.

Cost: \$5,000

319: \$5,000

Other:

Task: Monitor flow, water quality, calculated loads, benthic macroinvertebrates, and riparian vegetation. This data will be collected as part of the iUtah data collection, and Chevron funded monitoring. All data will be maintained in publicly accessible databases.

GOAL 4: Project administration.

Objective 1: The UACD will administer the 7% administrative fees on behalf of Blacksmith Fork Conservation District, to track funds, expenditures, and compile match records. Support for compiling pre and post monitoring data will also be provided.

Cost: \$11,250

319: \$11,250

Other:

Task: Track funds and compile match record.

3.2 Milestone Table

EPA 319 funding will allow these proposed projects to begin in 2017, early summer.

Table 1: Timetable showing dates of completion for the three riparian projects, outreach, and administration.

Tasks	Output	2017												2018											
		M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A						
Goal 1: Reduce TP and TDS loads flowing into Cutler Reservoir																									
Task 1: Improve agricultural riparian conditions	Reduced sediment and nutrient loading, increased stream shading, reduced stream temperatures, and improved cold water fishery habitat					X	X	X	X							X	X								
Task 2: Improve livestock management where appropriate	Reduced sediment and nutrient loading, increased stream shading, reduced stream temperatures, and improved cold water fishery habitat						X	X	X						X	X	X	X							
Task 3: Expand recreational floodplain and floodplain functions	Creation of extended floodplain, contained by elevated golf cart paths, and reduced bank erosion				X	X	X	X	X					X	X	X									
Task 4: Realignment of river and creation of sediment deposition pool	Appropriate water velocity is ensured to catch sediment and debris carried from upstream, to prevent unintended flooding		X	X	X	X	X	X	X						X	X									
Task 5: Improve residential floodplain functions and riparian conditions	Prevention of erosion and riparian vegetation enhancement					X	X	X																	
Goal 2: Increase public awareness																									
Task 1: Construction-phase outreach	Increased public awareness of need and purpose of riparian improvements		X		X				X					X		X									
Task 2: Post-construction outreach	Showcase Logan River projects, and continue public awareness of riparian health benefits														X	X	X								
Goal 3: Monitoring and maintenance																									
Task: Monitor and document water quality of Logan River	Provide publicly accessible database of Logan River health and water quality	X		X			X	X					X		X		X	X							
Goal 4: Project Administration																									
Task: Track funds and compile match record	Grant administration	X			X			X			X			X				X							

3.3 Permits and Surveys

All appropriate permits and surveys either have been or will be secured as needed. Project sponsors will ensure compliance with all local, state, and federal regulations pertaining to project activities outlined above. This includes preserving sensitive habitats or cultural sites, and protecting wetlands. Pursuant to EPA grant regulations, copies of any CWA related permits, such as the Nationwide 27 permit, 404 permits, and other stream alteration permits issued by the State Engineers Office shall be sent to Utah DWQ.

3.4 Lead Sponsor

The Blacksmith Fork Conservation District (BFCO) is the local board charged with soil, water, plant and animal conservation in Cache County, and will act as the lead sponsor in the riparian work associated with the Logan River projects. Logan City is the project co-applicant and will work closely with the BFCO to ensure proper adherence to the terms of this project.

3.5 Assurance of Project Operation and Maintenance

Logan City has subcontracted BIO-WEST and other Environmental Consultants to aide with completion, including outreach, designs, and permitting with the Rendezvous Park/Golf Course Project. Cultural clearance was conducted by Commonwealth Cultural Assessment; Threatened, Endangered, and Sensitive Species Assessment was conducted by WMR Environmental; and

Engineering documents were prepared by Logan City engineers. Permit clearances are expected to be received in early November, 2016 for this section of the project. NRCS and Logan City will engineer the river restoration sections through the agricultural and residential properties. The NRCS will provide the required cultural assessment.

Signed contracts between the BFCO and private landowners will have the assurance of project operation and maintenance for the duration of the practices implemented, based on NRCS project life spans.

4 Coordination Plan

4.1 Cooperating Organizations

The compilation of these projects along Logan River are proposed as the result of numerous collaborations. The LRTF participating agencies (as described in section 1.1), environmental consultants, local landowners, and many others have worked diligently to provide economically viable, socially acceptable, environmentally conscious, and generally sustainable solutions to issues on and surrounding this river. The success of the Logan River Restoration Project will rely on providing viable, healthy, and beautiful assets within a socially and economically diverse landscape. The Blacksmith Fork Conservation District (BFCO) and North Cache Conservation Districts (NCCD) are appointed with conservation of soil, water, air, plants, and animals for this region. The BFCO will work in partnership with NCCD to coordinate efforts that sustain the momentum of public awareness and current enthusiasm toward these projects. These districts have been vital in sharing information between the LRTF, federal, state, and local agencies. This collaboration has generated increased project interest, scope, and outputs. Together, BFCO and Logan City have applied for EPA 319 funding. BFCO will provide individual contracts with the three private landowners that have committed to participate in this comprehensive water quality enhancement project. These private landowners are also expected to participate with NRCS' EQIP program. BFCO, Logan City, and/or NRCS will provide engineering support and finalize designs as appropriate.

Federal Agencies

Natural Resource Conservation Service: Engineering of stream restoration project, wetland delineations, cultural resources, threatened and endangered species, and EQIP funding for agricultural and residential projects

U.S. Army Corps of Engineers: Nationwide 27 permitting

U.S. Environmental Protection Agency: Clean Water Act Section 319 Funding

State Agencies

Utah Department of Agriculture and Food: Conservation District support

Utah Division of Water Rights: Clean Water Act section 404 permitting

Utah Division of Water Quality: NPS funding, chemical monitoring, SVAP monitoring, and MIM's monitoring, *LRTF active member*, and guidance in the Logan River CAP

Utah Division of Wildlife Resources: Threatened and endangered species information, and temperature monitoring, *LRTF active member* and guidance in the Logan River CAP

Utah State University: cooperation and technical knowledge support, iUtah monitoring station data

Non-governmental Agencies

Logan River Task Force: Multiple agency collaboration and support, preliminary meetings, volunteer coordination, stakeholder meeting administration.

Nature Conservancy: LRTF active member and guidance in the Logan River CAP

Trout Unlimited: LRTF active member and guidance in the Logan River CAP

Bridgerland Audubon Society: LRTF active member and guidance in the Logan River CAP

Cache Valley Anglers: LRTF active member and guidance in the Logan River CAP

Local Agencies

Blacksmith Fork Conservation District: Project co-lead, project support and coordination, permit completion, photo-point monitoring, volunteer coordination, *LRTF active member* and guidance in the Logan River CAP

Logan City: Project co-lead, coordination, permit completion, project funding assistance, in-stream work crews, consultant coordination, design, construction management, permitting, public outreach, primary post project monitoring, *LRTF active member* and guidance in the Logan River CAP.

North Cache Conservation District: Project support and coordination

Cache County: Project support and coordination

4.2 Local Support

The Logan River Task Force (LRTF) is a local group cooperatively formed by Logan City, Utah Division of Water Quality (DWQ), Utah Division of Wildlife Resources (DWR), Utah Division of Water Rights (Stream Alterations), Natural Resources Conservation Services (NRCS), Utah Association of Conservation Districts, Trout Unlimited, Bridgerland Audubon Society, Cache Valley Anglers, USU Extension, USU College of Natural Resources, USU College of Engineering (Water Lab), residents, and stakeholder interest groups. Their task is to develop a short- and long-range vision for the river, and to coordinate and prioritize conservation efforts that ensure a sustainable river system for future generations. The LRTF has worked alongside environmental consultants (BIO-WEST, Inc. and Allred Restoration, Inc.) to gather public opinion, enhance local

participation, present up-to-date information, and garner public support at four highly attended public meetings. To protect the Logan River from degradation and the growing threats of floodplain development, a Conservation Action Plan (CAP) has been drafted by the LRTF for the Lower Logan River (First Dam to Cutler Reservoir).

After this thorough integrative process the CAP has been presented to all involved parties, including local stakeholders and the general public, and is widely supported. Three landowners that have actively participated in this process have committed to performing water quality BMPs with EPA and NPS funding assistance. These residential and agricultural landowners have permitted various tours and field trips to take place on their property to demonstrate local stream restoration and riparian improvements. Additional landowners have already expressed interest and are expected to participate in the next funding cycle.

4.3 Education and Outreach - Detailed Activities

Education and community outreach has been a vital part of developing the Logan River CAP and will continue to be an important component of developing and implementing proposed projects using 319 money and other funding sources (Section 3.1, Goal 3). Participants in the Logan River Task Force and the Logan River WIP team will conduct outreach for each proposed project and also keep the community informed of progress after construction. Citizen science projects, both existing projects such as Utah Water Watch, and planned efforts under the CAP, will be a key aspect of keeping the community involved with improvement of the watershed.

Construction-phase outreach will include:

a. Project informational signs for construction sites

A project information sign showcasing the planned improvements for the projects along Logan River will be designed, manufactured, and installed at each of the project locations. These temporary signs will outline the proposed project and highlight water quality improvements.

b. Stakeholder meetings for local residents and interested citizens

The LRTF will continue to hold quarterly open, public meetings. Emails and flyers will be sent to Local residents and prior meeting attendees.

c. Logan City website information, on-line story maps

d. Fact sheets

A fact sheet will be developed and dispersed to adjacent landowners prior to project construction. This fact sheet will contain information about the challenges and opportunities in the Logan River watershed, and will detail project improvements, and expected recreational, ecological, and water quality enhancements. Copies of these fact sheets will be made available at the site entrance, city and district offices, and will be distributed at future public meetings.

e. Citizen planting days/educational workshops

Volunteers will provide planting support when appropriate. Additionally, outdoor education and nature center programs will be invited to provide platforms and speakers for educational workshops to educate the community on Logan River ecology and restoration efforts.

Post-construction outreach will include:

a. Website Updates

Project information, including restoration designs, ecological and social benefits, links to water quality data, volunteer opportunities will be posted online and updated by Logan City.

b. Interpretive signs

Permanent signs showcasing the improvements for each of the projects along Logan River will be designed, manufactured, and installed at Rendezvous Park, Stewart Nature Park, and other prominent locations, to highlight water quality improvements. Upon permission of landowners, additional smaller signs identifying installed BMPs will be erected throughout the watershed.

c. Demonstration workshops

Workshops will provide landowners with practical knowledge on Logan River ecology, natural and appropriate bank stabilization methods, and ways to prevent or reduce erosion and water pollution from landscaping practices and use of household products with toxic chemicals.

5 Monitoring and Evaluation Plan

5.1 Sampling and Analysis Plan

A sampling and analysis plan for the Logan River Projects is provided in Appendix D. Partners involved with monitoring include the Logan City, USU, USU Extension, iUtah, BCFD, NCCD, Utah DWQ, Utah Association of Conservation Districts, and UDAF. Utah Water Watch provides training and volunteer monitoring support to collect photo-points, SVAP, MIMs, EColi testing, and water samples for analysis.

5.2 Monitoring Strategy

The Logan River Conservation Action Plan (LRTF and BIO-WEST, 2016) lists 21 indicators for rating existing and desired conditions short-and long-range conservation efforts, using The Nature Conservancy's science-based planning framework. Of these indicators this project will focus on monitoring flow, water quality (and therefore the calculated loads), benthic macroinvertebrates, and riparian vegetation.

Multiple water quality and flow monitoring sites currently exist along the Logan River and provide data on flow and other water quality constituents to describe and better understand existing conditions. Data collected at these Utah DWQ, iUTAH and Logan City monitoring stations provide a pre-project baseline and will provide post-project monitoring to evaluate the effects of the projects on water quality and their effectiveness in reducing phosphorus and sediment loads.

Logan City has committed to installing two additional monitoring stations; near 1000 West and one on Spring Creek upstream of the confluence with the Logan River. These water quality monitoring sites will provide data to better identify pollutant sources, and quantify and separate storm water, agriculture, and urban/municipal loads. An additional monitoring station is currently being installed at the confluence of Blacksmith Fork with Logan River by USU and another is proposed in the reservoir-influenced area of the Logan River, downstream of Mendon. The LRTF is discussing these possibilities with the iUTAH project and the Utah Division of Water Quality.

In addition to in-situ water sampling stations, water quality improvements will be tracked with photo documentation on the BMPs installed; continued bi-yearly MIMs/SVAP monitoring (2018 and 2020); and water quality grab samples taken per historic DWQ sampling procedures and analyzed for TP, DO, and pH. Repeated photo points or photo and GPS documentation of proposed project sites (pre and post implementation) for visual documentation of project success/failure is a concept being developed as a USU student monitoring program. This method is a quick and easy way to track vegetation establishment and channel improvements qualitatively.

5.3 Data Management, Storage and Reporting

Logan River Project data is and will continue to be maintained in accessible common databases. Data collected at existing iUTAH and Logan City monitoring stations provide a pre-project implementation baseline and will provide post project monitoring to evaluate the effects of the project(s) on water quality and effectiveness in reducing phosphorus and sediment loads. The Utah DWQ database will have all water quality and other relevant data electronically transferred, or a link will be provided in the STORET data storage system.

Data will be compiled, analyzed and used in completing progress reports to the State NPS coordinator, Utah Water Quality Task Force, DEQ, and EPA. This data will be available to all interested parties, and organizations. Quality assurance and quality control will be conducted according to the guidelines established in the Utah Water Quality Manual. Only data that meets QA/QC standards will be entered into the project database.

5.4 Long Term Funding Plans for Operation and Maintenance

The BFGD, Logan City, and the LRTF will continue to seek funding sources to continue the scope and proposed trajectory of water quality improvement and protection projects along the lower section of the Logan River based on the Logan River WIP. Future agricultural projects in the agricultural section of the river, a large embankment stabilization project, and additional residential projects have all been discussed as appropriate candidates for 2017 and/or 2018

Utah NPS grant applicants. NRCS will continue to work with private and public landowners to apply for EQIP funds, to offset project costs and provide engineering/cultural resource services.

6 Budget

The Blacksmith Fork Conservation District has calculated a total project budget of \$1,664,852 to implement the following three BMPs, provide technical and administrative assistance, monitor, and to provide education and outreach. Non-federal match funds are provided from Logan City, In-kind match, and Willard Bay Mitigation Funds:

EPA section 319/Non-Federal Budget	319 Funds	Non-Federal Match	2017 Total
Goal 1: Reduce TP and TDS loads into Cutler Reservoir			
<i>Objective 1: Agricultural Streambank</i>	\$191,264	\$50,000	\$241,264
<i>Task: Improve agricultural riparian conditions</i>			
<i>Task: Improve livestock management</i>			
<i>Objective 2: Recreational Section</i>	\$293,778	\$1,046,222	\$1,340,000
<i>Task: Expand recreational floodplain</i>			
<i>Task: Realign river and create sediment deposition pool</i>			
<i>Objective 3: Residential Streambank (Jablonski/Ellis)</i>	\$50,000	\$10,000	\$60,000
<i>Task: Improve floodplain and riparian conditions</i>			
Goal 2: Increase Public Awareness			
<i>Task: Construction-phase outreach</i>	\$7,338		\$7,338
<i>Task: Post-construction outreach</i>			
Goal 3: Monitoring and Maintenance			
<i>Task: Monitor and document water quality</i>	\$5,000		\$5,000
Goal 4: Administrative Assistance			
<i>Task: Track funds and compile match record</i>	\$11,250		\$11,250
TOTAL COSTS:	\$ 558,630	\$1,106,222	\$ 1,664,852

Break-down of Match Funds:	Logan City	\$ 406,222
	In-kind	\$ 100,000
	Willard Bay Mitigation Funds	\$ 600,000

7 References

BIO-WEST. (2016). "Logan River Watershed Implementation Plan." Under EPA review.

Logan River Task Force and BIO-WEST. (2016). "Logan River Restoration. Conservation Action Plan." May 2016

<http://www.loganutah.org/docs/loganriverrestorationconservationactionplanMay2016.pdf>

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State of Utah Natural Resources, Division of Wildlife Resources. (2015). "Utah Sensitive Species List by County." <http://dwrcdc.nr.utah.gov/ucdc/ViewReports/sscounty.pdf> Accessed 10-6-16.

Utah Division of Water Quality. (2010). "Middle Bear River and Cutler Reservoir Total Maximum Daily Load (TMDL)." Report prepared by SWCA Environmental Consultants, Salt Lake City, Utah. February 2010.

APPENDIX A: Project Descriptions

APPENDIX A1 Agriculture Riparian Restoration - 1000 West to Trapper Park

Agriculture in Cache County contributes beef, milk, and cheese products from numerous production and processing facilities, and is one of the highest contributors of agricultural products in the state. Not surprisingly, 14.5 miles of the lower Logan River flows through agricultural lands. The farm located from 1000 West to Trapper Park has 174 acres of land directly draining into the river, and flows for 1.5 river miles. This land is grazed seasonally, during late fall through early spring. Numerous creeks and springs occur on this property. Crack willow has encroached into the channel, eroding bank stability, and creating huge dead wood debris piles. Some banks are covered in concrete rubble, debris is scattered throughout, the bankline is mostly bare of understory vegetation, and channelization (little to no fishing habitat) is present (Figure A1).

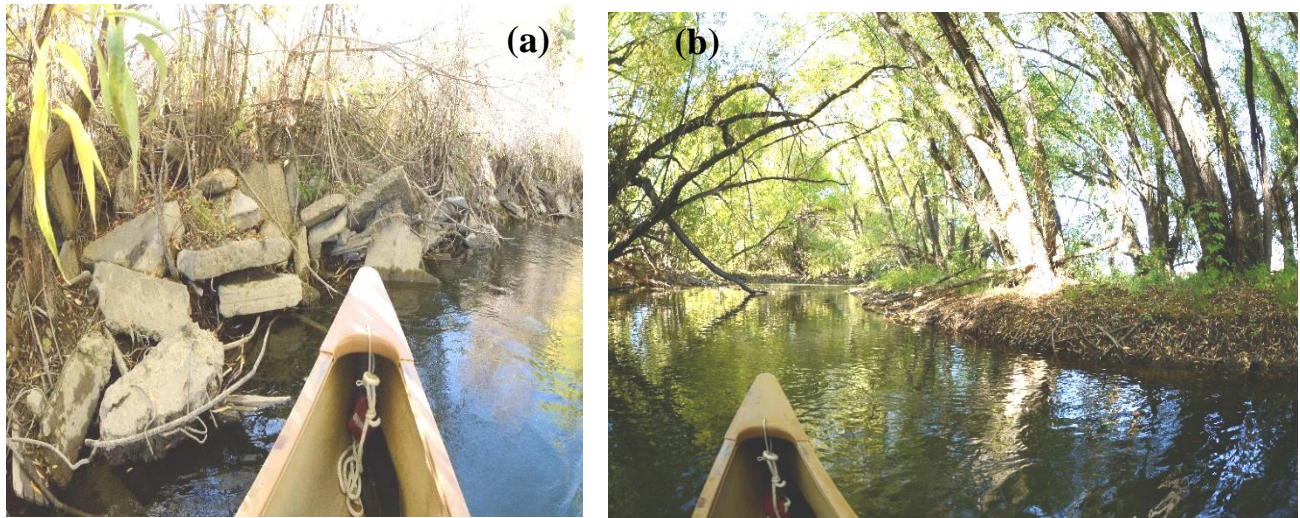


Figure A1: Debris and concrete rubble (a) and the eroded banks (b) on the 1000 West to Trapper Park agricultural property. Clearing fallen trees, concrete rubble, litter, and debris will provide safer river access for kayakers and other river floaters, and bank stabilization practices will decrease sediment deposition and provide land stabilization along the stream bank. The riparian restoration budget includes complete riparian restoration demonstration areas near 1000 West.

APPENDIX A2 Recreation Riparian Restoration - Golf Course and Rendezvous Park

Upstream of the Agricultural farm the Logan River flows through a Logan City owned recreational section, specifically a golf course, and a highly popular trail and dog park. Here the river was straightened in the 1980's and dredged. The slope of the river dramatically decreases from the upstream portion, causing the channel to initiate a more dominant meandering pattern with considerable sediment deposition. This sediment deposition has caused Logan River and Spring Creek to meander to today's location, running adjacent to US89/91 for 500 feet. Historically, dredged materials were simply piled along the bankline, creating a levee (Figure A2), causing the adjacent riparian forest to be cut off from the channel, and preventing the surrounding area from being an active floodplain. In 2011, during a 25-year storm event, sediment deposition was responsible for backing water up to the Golf Cart Bridge, causing the gravel levee to blow out, and severely damaging the Golf Course.



Figure A2: Photo of dredge pile levee along the bank of the Logan River in the Golf Course. Logan River is located to the right in the picture.

Specific tasks within this section will address sediment deposition, river meander restoration, provide locations for sediment traps, and floodplain function (Figure A3).

Legend

-  Rendezvous_Area_Ponds_SedTrap
 -  Rendezvous_Old_Channel_Wetland
 -  Possible_Trail_Alignment
 -  Rendezvous_Plug
 -  New Channel
 -  Rendezvous_Added_Parking
 -  Rendezvous_SedTrap_Access
- Rendezvous_Berm_Lines**
-  New_Berm
 -  Remove_Berm

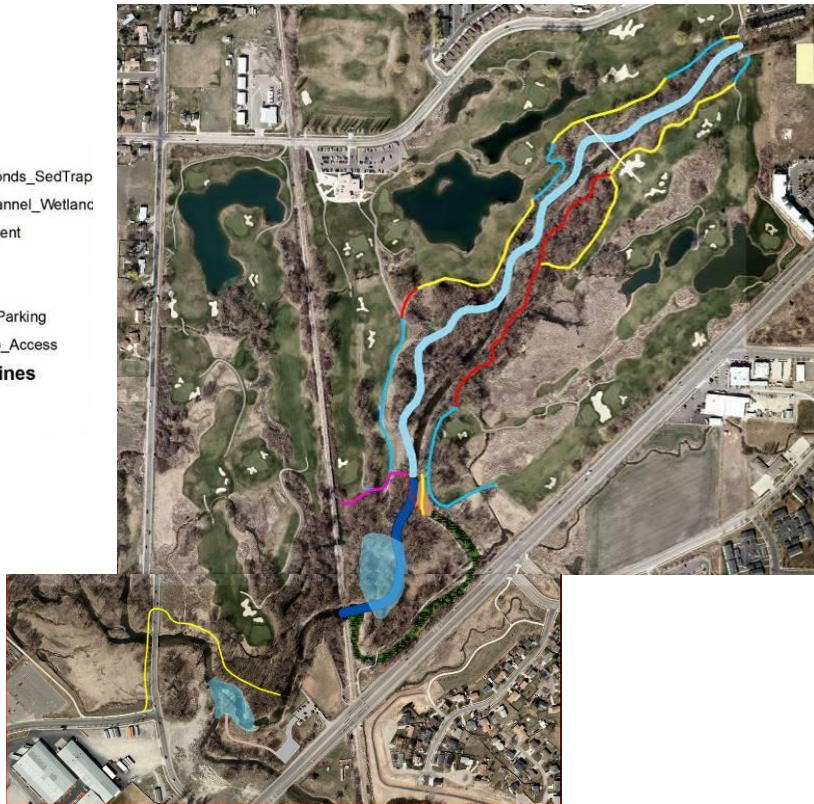


Figure A3: Concept drawing for the southern section of Rendezvous Park. This concept includes realignment of river (dark blue), flood zone berm location (pink), construction of sediment deposition pools (light blue), and pedestrian paths (yellow). Limited areas of dyke removal and an enlarged floodplain will ensue upstream of this section.

APPENDIX A3 Residential Riparian Restoration - 100 East Residential Properties

East of 100 East Street three residential properties border the Logan River's southern edge. In the past, minks were farmed in this area and evidence of battered mink cages still remain in the river embankments. Overhanging trees dangerously overhang the river, teasing to fall into the river and flooding the upstream landscape (Figure A4). These properties will secure the embankment as necessary to prevent erosion, and provide riparian vegetation enhancement.



Figure A4: Crack Willows and other large trees growing along the river bank, and over the river. These fast-growing, weak soft-woods are prone to breaking, posing dangers to river floaters, and structures. Down branches/trees can dam the river and cause upstream flooding.

APPENDIX B: Fisheries and Wildlife

The Logan River serves as a popular fishing destination. Slower and warmer water provide chances of catching large Brown Trout and Whitefish, which dominate the lower section of the river (Figure B1).



Figure B1: Photos of Logan River's Rainbow Trout (left), and a fly fisherman (right).

Fish are one small part of the complex web of wildlife that live and/or visit this watershed. Wildlife are frequently found in the Logan River watershed, where they look for shelter, food, and water (Figure B2).



Figure B2: Images of local wildlife found in Cache County, and throughout northern Utah.

Utah Division of Wildlife Resources has issued Statewide Management Plans for wild turkey, pheasants, elk, moose, mule deer, in addition to other big game and upland game species. A list

of wildlife included in Utah’s Wildlife Action Plan for Cache County is provided below in Table B1. Some species, such as muskrats, can become a nuisance, while other species are listed on the Utah Threatened, Endangered, and Sensitive Species.

Table B1: List of Utah Sensitive Species listed for Cache County (Utah DNR, 2015).

Cache County		
Common Name	Scientific Name	State Status
American Three-toed Woodpecker	<i>Picoides dorsalis</i>	SPC
American White Pelican	<i>Pelecanus erythrorhynchos</i>	SPC
Bald Eagle	<i>Haliaeetus leucocephalus</i>	SPC
Black Swift	<i>Cypseloides niger</i>	SPC
Bluehead Sucker	<i>Catostomus discobolus</i>	CS
Bobolink	<i>Dolichonyx oryzivorus</i>	SPC
Bonneville Cutthroat Trout	<i>Oncorhynchus clarkii utah</i>	CS
Brown (Grizzly) Bear	<i>Ursus arctos</i>	S-ESA
Burrowing Owl	<i>Athene cunicularia</i>	SPC
California Floater	<i>Anodonta californiensis</i>	SPC
Canada Lynx	<i>Lynx canadensis</i>	S-ESA
Deseret Mountainsnail	<i>Oreohelix peripherica</i>	SPC
Fringed Myotis	<i>Myotis thysanodes</i>	SPC
Grasshopper Sparrow	<i>Ammodramus savannarum</i>	SPC
Great Plains Toad	<i>Bufo cognatus</i>	SPC
Greater Sage-grouse	<i>Centrocercus urophasianus</i>	SPC
Least Chub	<i>lotichthys phlegethontis</i>	CS
Lewis's Woodpecker	<i>Melanerpes lewis</i>	SPC
Long-billed Curlew	<i>Numenius americanus</i>	SPC
Lyrate Mountainsnail	<i>Oreohelix haydeni</i>	SPC
Northern Goshawk	<i>Accipiter gentilis</i>	CS
Pygmy Rabbit	<i>Brachylagus idahoensis</i>	SPC
Sharp-tailed Grouse	<i>Tympanuchus phasianellus</i>	SPC
Short-eared Owl	<i>Asio flammeus</i>	SPC
Townsend's Big-eared Bat	<i>Corynorhinus townsendii</i>	SPC
Western Red Bat	<i>Lasiurus blossevillii</i>	SPC
Western Toad	<i>Bufo boreas</i>	SPC
June Sucker	<i>Chasmistes liorus</i>	S-ESA
Least Chub	<i>lotichthys phlegethontis</i>	

APPENDIX C: Project Implementation Plan Team

Management actions of reducing sediment loads will be implemented by the Blacksmith Fork Conservation District, Logan City, the Logan River Task Force, Utah Division of Water Quality, and the Natural Resources Conservation Service (Table 1). The Blacksmith Fork Conservation District and the Natural Resources Conservation Service can be contacted at 435-753-5616 for information and assistance about this management action. The Watershed Implementation Team (Who, Contacts) and the Watershed Management Plan (what, where, when) are listed in Table A1.

Table A1: Logan River Watershed Implementation Team and Management Plan.

Goal	Who	Contacts	What	Where	When
Project construction and regulations	Logan City, Blacksmith Fork Conservation District	Jon Hardman Bracken Henderson	Erosion Control, Stream-bank Clearing and Restoration	Lower section of Logan River (First Dam to Cutler Reservoir) watershed	2017-2020
Facilitate multi-agency collaborations and public participation	Logan River Task Force	Frank Howe	Schedule and lead LRTF and public participation meetings		
Reduce sediment and nutrient loading, achieve narrative standards for sediment loading	USU Extension, UDWQ, NRCS, Northern Utah Conservation District	Margie Borecki 435-753-5616 ext 136 Mike Allred 801-536-4331	Continue programs and projects related to outreach/education, BMP implementation, habitat conservation, and to seek funding support		

APPENDIX D: Sampling and Analysis Plan