

Big Pipestone Creek Watershed  
Restoration and Jefferson Slough Eurasian  
Watermilfoil Control Progress Report

Submitted by

Jefferson County and the Jefferson River  
Watershed Council

August 20, 2019

# Table of Contents

Page 1	Big Pipestone Creek Jefferson Slough Project History & Introduction
Page 2	Jefferson Slough Eurasian Watermilfoil Control Projects Summary
Page 3	Jefferson Slough Herbicide Application Summary Environmental Assessment Summary Jefferson Slough Flow Study
Page 4	Eurasian Watermilfoil Genetic Analysis & Monitoring Projects Summary
Page 5	Phase One Jefferson Slough Channel Realignment Project Summary Jefferson Slough Flow Management Plan Summary
Page 6	Phase One Jefferson slough Channel Realignment Project Summary Casagrande By Pass Project Summary Slaughter House Slough Diversion Project summary Davis Diversion Project Summary
Page 7	Big Pipestone Creek Project summary
Page 8	Headwaters Trail Maintenance Project Summary Jefferson Canal Diversion Project summary
Page 9	Jefferson Canal Project Summary
Page 10	Jefferson Canal Blow Out Pre-& Post Construction Photos
Page 11	Kountz Ranch Riparian Area Project Summary
Page 12	Smith & Capp Ranch Project Summaries
Page 13	Town of Whitehall Flooding Projects Summary
Page 14	Dave Smith diversion Project Summary & Pre-& Post Construction Photos
Page 15	Montana Rail Link Sediment Removal Project Photos
Page 16	Kountz Road Bridge Re & Post Construction Photos
Attachments	Project Over View Maps & Project Costs

## Introduction

Extensive human activities have changed the character of the Big Pipestone Creek channel near the town of Whitehall Montana. With the advent of trapping, the beaver were removed from the stream system. In late 1800s, the building of the railroad straightened a significant portion of Big Pipestone Creek. In the late forties, the landowner of the stream reach above Whitehall straightened a significant length of the creek. This immediately began a series of head cuts which have left significant portions of the creek cut to a depth of 15 to 20 feet causing a huge sediment deposit in Big Pipestone Creek. This results in aggravating flooding in Whitehall, loss of agricultural land, loss of access to permitted irrigation water as well as the filling in of the Jefferson Slough with sediment. The increased sediment in the Jefferson Slough provides a perfect nursery for the growth and spread of Eurasian Water Milfoil, an invasive aquatic weed, which now threatens the Upper Missouri River basin.

In 2012, in response to these issues, Jefferson County and the Jefferson River Watershed Council (JRWC) carried out a watershed assessment of the Jefferson Slough and the main stem of Big Pipestone Creek with the goal of defining specific restoration projects.

Big Pipestone Creek has been identified as the second largest sediment producing stream in the State of Montana in large part due to the stream straightening in the late 1940's and has been listed as impaired by the Montana Department of Environmental Quality TMDL process. Addressing these issues is a significant and challenging undertaking. From the start the intention is to treat the source of problems rather than symptoms.

The majority of the planned projects had widespread landowner and stakeholder support. The projects planned for completed or currently underway include:

- Control and ultimate eradication of Eurasian Watermilfoil in the Jefferson Slough,
- Restoration of channelized reaches to former locations on Big Pipestone Creek ,
- Creation of a flow management plan capable of implementing flushing flow,
- Herbicide treatments in the Jefferson Slough
- Replacement of numerous culverts and irrigation diversions on both Big Pipestone Creek & the Jefferson Slough
- Riparian land use management, and
- Complementary projects under taken by Montana Rail Link, & the U.S. Forest Service

The 2013 Montana State Legislature provided Jefferson County approximately 1.8 million dollars to begin to address the sediment and Eurasian Watermilfoil issues in Big Pipestone Creek watershed and the Jefferson Slough. In 2015 the Montana State legislature provided Jefferson County one million dollars to implement phase one of Jefferson Slough channel relocation. Phase one project is now completed.

The following progress report summarizes the actions to date on both Big Pipestone Creek & the Jefferson Slough.

## Jefferson Slough

### Eurasian Watermilfoil Control Projects

The Jefferson Slough is the highest point of Eurasian Watermilfoil infestation in the Upper Missouri River Watershed. Heavy Eurasian Watermilfoil exists in 4.6 miles of the Jefferson Slough. Since its accidental introduction to US waterways in the 1940s, Eurasian Watermilfoil (*Myriophyllum spicatum* Milfoil) has spread across North America to more than 45 states and much of Canada. Once established, this rapidly spreading freshwater weed out competes most native plants and interferes with recreational activities, wildlife habitat, and facilities having water uptake systems.

It has been estimated that prior to the ongoing Eurasian Watermilfoil projects underway in the Jefferson Slough that annually 17,000 lbs. of Eurasian Watermilfoil fragments were contributed to the Jefferson River. These fragments then created Eurasian Watermilfoil infestations in other areas in the upper Missouri River.

Uppermost point of Eurasian watermilfoil in Missouri River watershed



### Jefferson Slough Flow Study

The Jefferson Slough flow study was funded by the Montana State legislature in 2103and was completed in December of 2104. The study was used to create a Jefferson Slough Management Plan for the control of Eurasian Watermilfoil and the prevention of its reoccurrence. The plan was developed cooperatively with the Jefferson Slough landowners and key state and federal agencies. The goal of the projects underway or completed after the study was to obtain a 95% reduction of the Eurasian Watermilfoil within a five-year period with a long-term goal of eradication.

Key elements of the plan included:

- Improvement of existing diversions to allow for flushing flows to remove existing sediment,
- Chemical herbicide applications in the affected reaches of the slough, and,
- Channel modifications in key reaches of the slough to help improve sediment transport.

### Environmental Assessment & Herbicide Application

In 2015 an environmental assessment was completed for the first herbicide application in 2016. The second herbicide application was completed the summer of 2017. As a result of the monitoring it was determined the need for the additional channel relocation work and a third herbicide application the summer of 2018 was required. A visual effectiveness monitoring study conducted the spring of 2019 to determine the effectiveness of the channel relocation and the 2018 herbicide application. Another herbicide application was carried out in 2019. A comprehensive monitoring program is scheduled to continue through 2020 using existing baseline data.

### Herbicide Applications 2016, 2017, 2018 & 2019



## Genetic Analysis and Establishment of Eurasian Watermilfoil Monitoring

Genetic analysis was conducted on 26 milfoil samples collected in September of 2014 from permanent sampling points in Jefferson Slough. The purpose of the collection and analysis was to determine if there were different biotypes/hybrids present in the system and gather pre-treatment baseline distribution and abundance data on milfoil biotypes. This information was important since hybrid milfoil may respond differently to management actions. One hundred permanent sampling points are established on Jefferson Slough from the uppermost point of the Eurasian Watermilfoil infestation downstream to the confluence with the Boulder River. All the sampling points have been sampled for analysis. Sampling and genetic analysis occurred through 2017. Visual monitoring for establishing the success of herbicide treatments has occurred since 2017.

### Pre-Herbicide Treatment Jefferson Slough 2017



### Post Herbicide Treatment Jefferson Slough 2018



## Flow Management Plan

Jefferson County worked with the Jefferson Slough Water Users Association to reinstall stream gauges used in the development of the Hydrologic study to allow the water users to develop flow management plan. In addition, Jefferson County and the Jefferson River Watershed Council provided training and other necessary equipment to the water users for, data collection and flow managing plan implementation. A key element of the plan is the implementation of flushing flows to transport sediment through the slough. In 2019 an automated flow/temperature device was installed in the slough to provide real time temperature and flow data to monitor the effectiveness of the phase one project and improve the effectiveness of the Flow Management Plan.

## Phase one Jefferson Slough Channel Relocation



**Pre-construction**



**Post Construction**

Construction of the phase one stream relocation project was completed in October 2018. A total of 3,600 feet of channel were relocated. The old channel which contained the Eurasian Watermilfoil was filled using the materials from the new channel and materials from borrow areas near the slough. Phase 2 stream channel relocation will be completed through the Tim Mulligan ranch and additional linear feet if additional funding is achieved in the 2019 Montana State Legislature.

### **Casagranda Bypass Flushing Project**

The first sediment reduction project was installed in December 2014. The project involved the flushing of sediments behind the Davis Dam into a gravel pit on the Casagranda property to reduce the sediment transported in the slough.



### **Slaughter House Slough Diversion**

The Slaughter House Slough diversion plays a key role in the ability of the Jefferson Slough water users to create flushing flows down the Jefferson Slough. Redesign of the Slaughter House Slough diversion is completed. Construction could begin when funding is secured

### **Davis Diversion**

The Davison diversion another key component of implementation of flushing flows was redesigned the summer of 2017. Construction could begin upon securing required funding.



## Big Pipestone Creek

Extensive human activities have changed the character of the Big Pipestone channel near the town of Whitehall. With the advent of trapping, the beaver were removed from the stream system. In late 1800s, the building of the railroad straightened a significant portion of Big Pipestone Creek. In the late forties, the landowner of the stream reach just above the town of Whitehall straightened a significant portion of the stream reach of big Pipestone Creek. This immediately began a series of head cuts which have left significant portions of the creek cut to a depth of 15 to 20 feet causing a huge sediment deposit in Big Pipestone Creek. This resulted in:

- Becoming the second highest sediment load in a Montana stream, with approximately 7,900 tons of sediment sent down stream annually
- Aggravating flooding in Whitehall,
- Loss of agricultural land, loss of access to permitted irrigation water
- Filling in of the Jefferson Slough with sediment which provides a perfect nursery for the growth and spread of Eurasian Water Milfoil, an invasive aquatic weed, which now threatens the Upper Missouri River Basin.



## Headwaters of Big Pipestone Creek Trail Maintenance & Erosion Mitigation Activities

The United States Forest Service (USFS) completed trail maintenance work on several high priority stream crossings on the Big Pipestone Creek drainage on USFS lands. In cooperation with the USFS, JRWC contracted with Water and Environmental Technologies, Inc. (WET) to complete a sediment assessment on Halfway Creek to determine sediment load reductions because of the USFS trail improvement work completed in 2014. WET worked with the Butte Ranger District and Beaverhead-Deer lodge National Forest's hydrologist to develop the model used in the assessment. A copy of the completed sediment assessment for Halfway Creek is available from the JRWC.



### Jefferson Canal Headgate

The inability to regulate the flows from the canal back into Big Pipestone Creek created a large blowout on Big Pipestone Creek in turn creating massive sediment flows in to Big Pipestone Creek at the junction of the Jefferson Canal return flows into the creek.

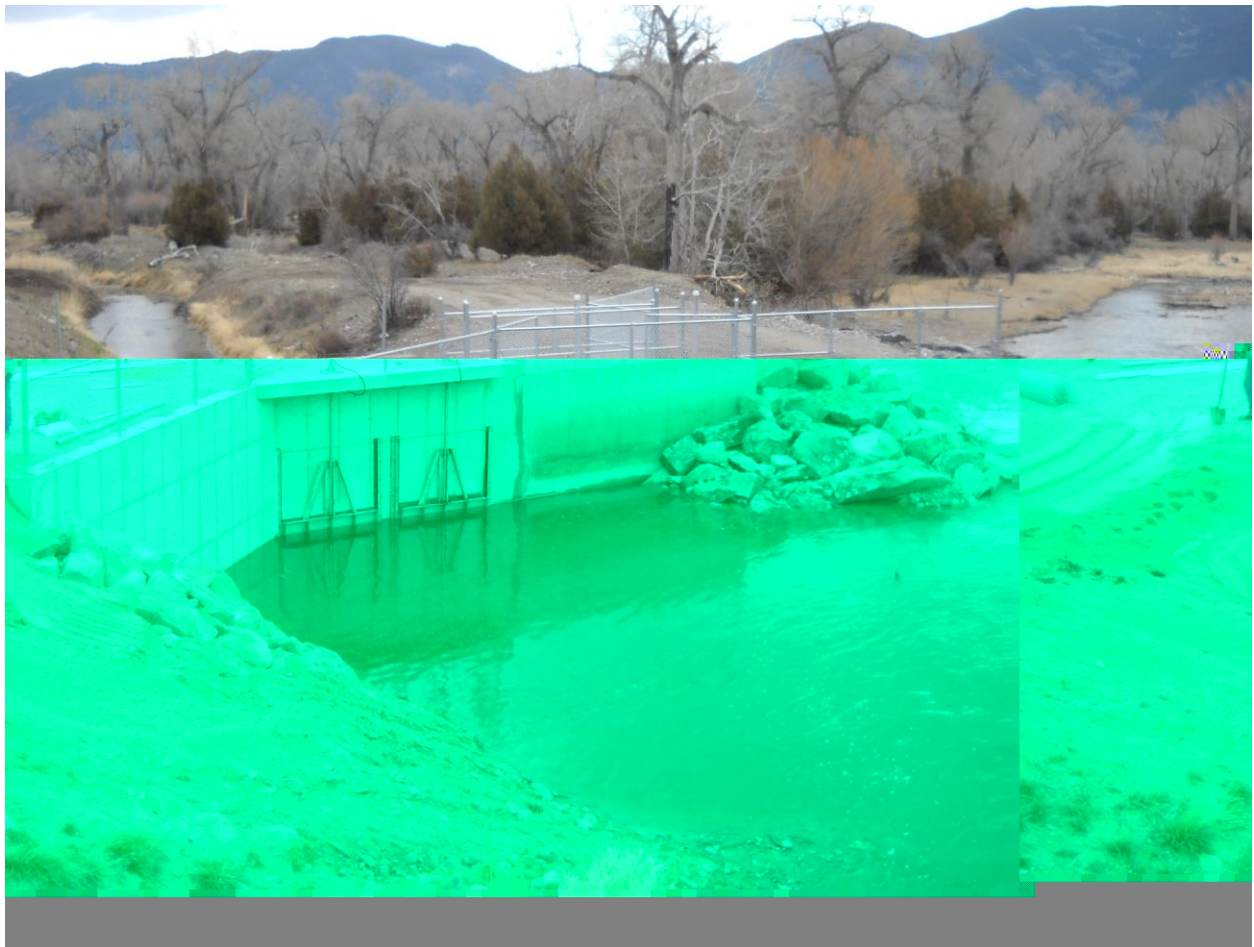
Before the Jefferson Canal blowout on Big Pipestone Creek could be addressed the Jefferson Canal headgate needed to be replaced. The total cost for this project was \$190,000. Via the sponsorship of a grant by the Jefferson Valley Conservation District, the Montana Department of Natural Resources and Conservation awarded a \$100,000 grant toward the effort as well as the Jefferson Canal Company contributed \$70,000.00.

The project reconstructed the head gate to provide reliable irrigation flows, regulate canal flows efficiently and accurately, and reduced structure operation and maintenance demands.

Completion of this project allowed other DNRC funded work on Big Pipestone Creek to begin.

This project will conserve water by accurately controlling irrigation flows in the Jefferson Canal. It will also improve the ability to manage diverted flows in times of high and low river stages. Additionally, this project will preserve and protect many natural resources from further impairments. The Jefferson Canal Blowout project was completed in 2017. Due to a seeding failure the project is scheduled to be reseeded in 2019.

**Post construction**



## Jefferson Canal Blowout

Pre-Construction



## Jefferson Canal Blowout Post Construction



## Riparian Area Management

Riparian area planning has been completed on Big Pipestone Creek below the US Forest Service boundary. Major stream restoration work has been completed or is currently being planned and implemented on the above and below highway 2. Healthy riparian areas, the vegetation that grows along streams and other water bodies are crucial for successful restoration and long-term stream health. Woody riparian species such as willows, dogwoods and alders, have strong roots that stabilize stream banks and add roughness to help slow down water near stream banks.

Practices that can help restore healthy riparian areas include: riparian fencing, riparian plantings, grazing management plans, off-stream water, hardened crossings and water gaps, and, removal of instream irrigation ponds.

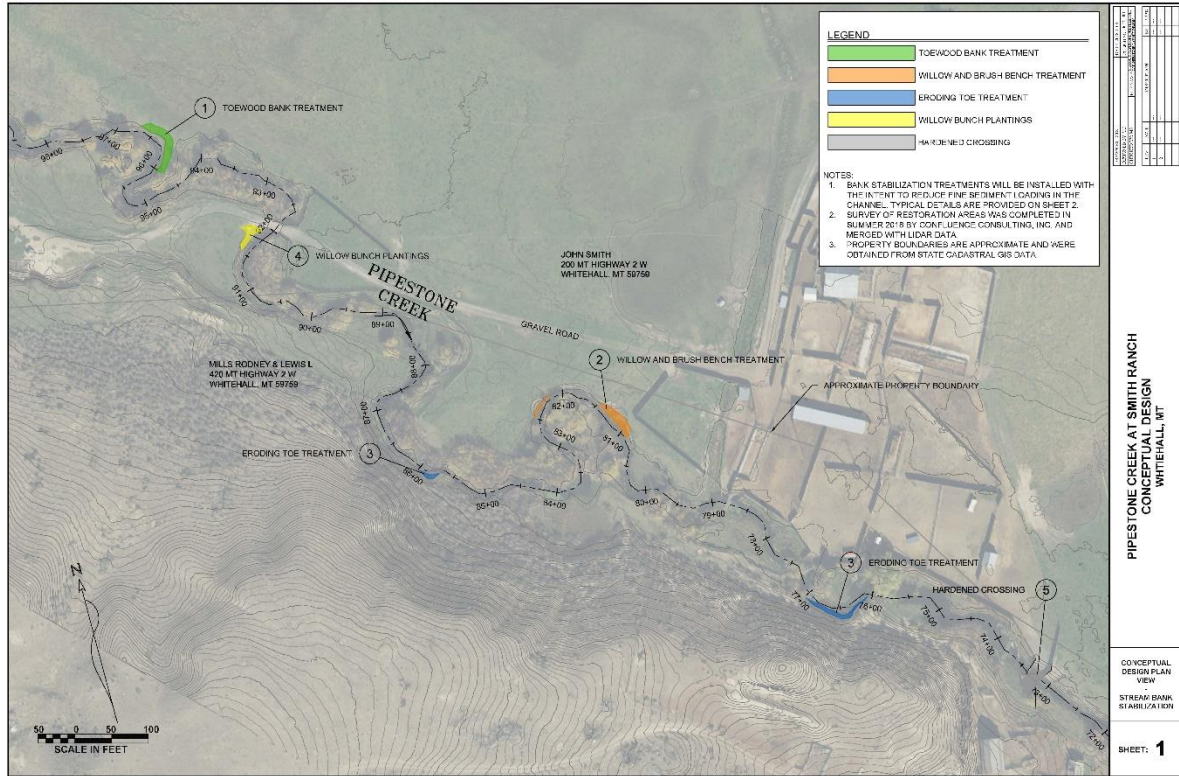
## John Kountz Riparian Area Project Big Pipestone Creek

In the fall of 2014, John Kountz implemented a project on Big Pipestone Creek which installed 1700 feet of fencing protecting 12 acres of riparian area in combination with creating a hardened stream crossing and two large pastures under separate grazing strategies. The total project cost was approximately \$11,636.00 which John Kountz contributed all the funds.

## Post construction



## Smith Ranch Riparian Restoration Projects



Projects scheduled to be carried out in 2019 include:

- Removal of Headgate Diversion Structure from the stream and instillation of a Pin & Plank Diversion and sump pump
- Channel narrowing treatment
- Three stream bank stabilization projects
- Willow Plantings
- Off stream water
- Riparian fencing

## Capp Ranch Big Pipestone Creek Stream Restoration Project

The Capp Ranch worked with Jefferson County, and the Jefferson River Watershed Council to develop two strategies for reducing the sediment deposition in Big Pipestone Creek in the Town of Whitehall and the Jefferson Slough. A design plan for relocation of Big Pipestone Creek in its historic channel or the development of an inset flood plain in the degraded channel have both been completed. The Capp Ranch has declined to implement either of the plans. The Capp Ranch is the only landowners that have declined to work with the program.

## Town of Whitehall Flooding Projects

In the late 1980's a floodplain study by the then Soil Conservation Service identified that high sediment loads in Big Pipestone Creek in the town of Whitehall were creating increased flooding in the town during high runoff years. In the 2012 Watershed assessment identified that in addition to the necessary stream restoration projects ups stream of Whitehall three (3) projects on the East side of Whitehall were necessary to address the flooding issue in Whitehall. Those projects were the removal of a stream diversion on the Dave Smith Ranch replacement of the Kountz road bridge and removal of sediment under a Montana Rail Link stream crossing. These were completed in 2015, 2016 and 2017.



## Dave Smith Diversion Project

Dave Smith Diversion Removal Pipestone Creek Dave Smith in cooperation with Jefferson County and the Jefferson River Watershed Council is helping to remove a diversion on the Big Pipestone Creek East of Kountz Road. When completed, this project will help reduce the backup of flood waters into the Town of Whitehall. The project is designed to be completed in conjunction with the installation of a new bridge on Kountz Road by Jefferson County. In addition, Montana Rail Link will modify their railroad siding on the east side of Whitehall to increase flood flows through that section of Big Pipestone Creek.

**Pre-Construction**



**Post construction**





Montana Rail Link Siding Bridge East side of Whitehall 2011 Flooding from Big Pipestone Creek



Post Sediment Removal

**Kountz Road Bridge  
Pre- Construction**



**Post Construction**



# Attachments

,

## **Project Costs**

Beaver Mgt. Planning	\$6,942.00
Capp Ranch Project	\$486,734.79
Casagrande By Pass Project	\$66,263.25
Davis Diversion Project Planning	\$8,705.03
Floodplain Bypass Channel planning	\$8,032.49
Headwaters Trail Maintenance Project	\$25,000.00
Intial Watershed Assesment 2012	\$70,000.00
Jefferson Slough Hydrology & Sediment Analysis	\$176,850.00
Jefferson Slough Flow Management Plan	\$6,000.00
Jefferson Slough Eurasian Watermilfoil Genetic Analysis Environmental Assessment, Monitoring Hand Pulling & Herbicide Application	\$123,435.00
Slough AIS Management Plan	\$209,525.00
Jefferson Slough Channel Realignment Project Phase One & Phase Two Planning	\$1,000,000.00
Jefferson Canal Diversion Project	\$190,000.00
Jefferson Canal Blow Out Project	\$66,905.22
Kountz Ranch Riparian Area Project	\$22,500.00
Kountz Road Bridge Project	\$256,700.10
Riparian Management Planning	\$15,329.57
Slaughter House Slough Diversion Project Planning	\$29,976.00
Smith Ranch Project budgeted not yet constructed	\$364,423.00
Dave Smith Diversion Project	\$88,000.00
Legislative Tour 2013	\$314.85

Lidar mapping Big Pipestone & Jefferson slough	\$51,886.15
Montana Rail Link Sediment Removal	\$5,000.00
Total Appropriated Big Pipestone Creek/Jefferson Slough	\$3,307,878.00
Total Project Costs Including Matching Funds	\$3,663,522.10