

Edmiston Spring Channel Enhancement
Summary Report
January 2019

Background and Project Development

Edmiston Spring is a small, spring-fed tributary to Fish Creek that flows through the town of Wilson (Figure 1). The Creek crosses Highway 22 and flows adjacent to the Wilson Elementary School and a dozen or so private parcels and serves as valuable nursery habitat for juvenile Snake River cutthroat trout (SRC). Jackson Hole TU partnered with the Wyoming Game and Fish Department, Teton Conservation District, local non-profits Friends of Fish Creek and the Snake River Fund, as well as stream-adjacent landowners within the project reach to complete access agreements, a sub-watershed management plan, and implement the project. Process and relationships developed throughout this life of Edmiston Spring Channel Enhancement will ideally translate to future restoration work throughout the Fish Creek drainage.

Increased sedimentation and changes in stream dynamics have degraded instream fish habitat as demonstrated by increased width-to-depth ratios and aquatic vegetation densities. The Edmiston Spring Channel Enhancement Project sought to improve stream stability, pattern, and profile, as well as increase the quality of habitat available for SRC, with an emphasis on juvenile life stages. Project goals were as follows:

- 1) Increase habitat for juvenile Snake River Cutthroat Trout (SRC);
- 2) Optimize fish habitat in late winter flow conditions;
- 3) Maintain existing wetland and riparian habitats.

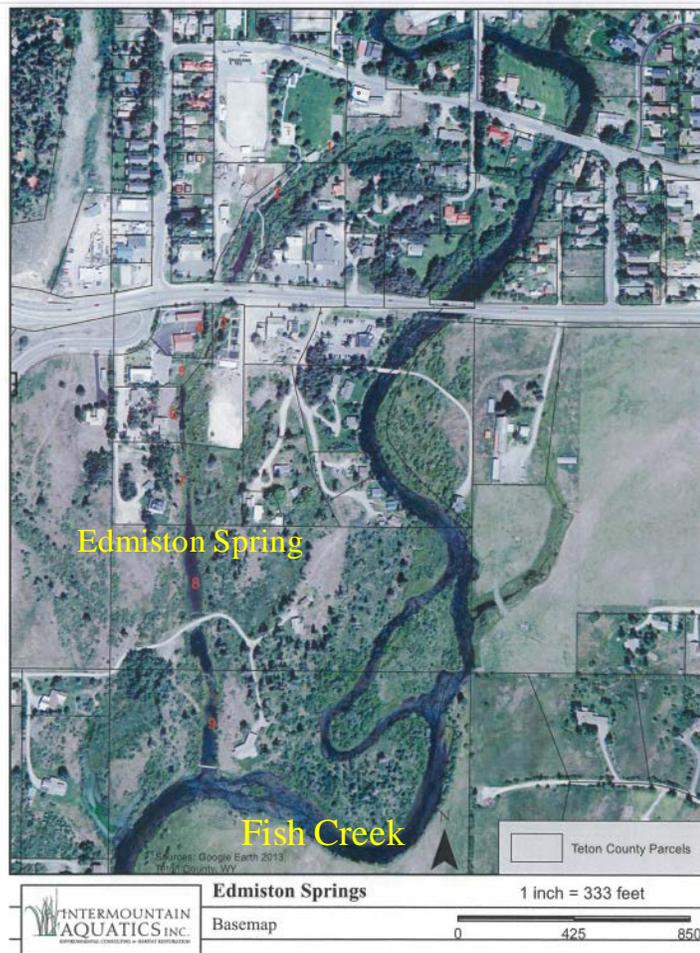


Figure 1. Edmiston Spring project area aerial map.

Implementation

Final designs, landowner access agreements and permits were acquired during the fall of 2015. Construction took place during late November and early December using undersized, tracked equipment and hand crews. The project design preserved wetlands, marginal and lateral slack water habitat while encouraging flows in the center of the channel to keep gravels clear for spawning and maintain small, shallow pools for juvenile resting habitat (Photo Series 1 and 3). Willow slash and mattress structures were placed to further encourage this hydrological pattern as well as provide cover and security habitat for juvenile cutthroat trout (Photo Series 2). Restoration activities accomplished in 2015 included:

- Placement of 155 cubic yards of spawning gravels to create or enhance approximately 4,184 sq ft of riffle habitat,
- Excavation of 7 small pools, up to 3 feet in depth, in appropriate locations to provide resting velocities for spawning fish,

- Placement of 14 willow slash and 8 willow mattress structures to promote stable stream pattern and sediment transport while providing juvenile fish habitat,
- Planting 70 potted willows within the riparian zone in the downstream extent of the project reach where willows had been historically removed,
- Construction of 655 ft of temporary wildlife exclusion fencing to encourage success of potted willow planting,
- Removal of 3,500 sq ft of canary reed grass.

In addition to restoration activities, two community education and outreach events were hosted in 2015. One was a volunteer effort organized by Trout Unlimited and the Snake River Fund leveraging community volunteers to cut and stage willows used to construct the slash and mattress structures. The other community activity hosted in 2015 was a Wyoming Game and Fish and Teton Conservation District classroom demonstration of watersheds, river processes and water quality. Wilson Elementary fourth graders learned about the Columbia River watershed, practiced water quality testing and experimented with a stream simulator to evaluate the effects of riparian vegetation on stream channel shape and erosion rates.

Edmiston Spring construction was completed in 2016. Final touches included the placement of wetland sod berms within the active channel throughout the project reach. These treatments concentrate flows within the channel and delineate flowing from back water habitats.

Monitoring and Results

Monitoring consisted of three tasks: redd counts, photo points, and electrofishing of willow slash and mattress structures (see Habitat Unit # 12, Appendix A).

Redd counts

Edmiston Spring has been walked each June along the Owen Bircher Park and school parcels (upstream of Highway 22) to look for trout redds. To date, no redds have been detected. While the creek is apparently functioning as rearing habitat (see electrofishing results), no evidence of trout spawning has been detected by WGFD. Either we are failing to locate redds or the juvenile trout are migrating into Edmiston Spring from Fish Creek. Anecdotal information from property managers at the downstream project extent suggests there is a small amount of spawning occurring within Edmiston Creek itself.

Photo points

Photo points were established pre-project and have been visited between 2 or 3 times post project to document construction activities as well as the longevity of treatments (Appendix A). Qualitative evaluations reveal that stream morphology, such as pool depths, riffle location and riffle particles have been maintained three years post construction. The passive and minimalist techniques reduced impacts to existing riparian and wetland vegetation. Potted and transplanted willows have experienced minimal browse impacts due to fencing. Three years post placement, the majority of sod mats are still in place. Those that were installed on the downstream-most property where backwater ponding is frequent, however, have succumb to inundation and mortality. In the future living sod mats should not be placed in areas that experience regular inundation. Locations such as these may not be good candidates for the two-pronged approach employed elsewhere throughout the creek: maintain slack water habitat while also delineating a flowing center channel.

Electrofishing

The final component of monitoring consisted of investigating use of installed willow slash cluster and mattress structures by juvenile cutthroat trout. Initial observations of the creek indicated that juvenile fish were using aquatic vegetation growing in the stream margin as habitat, in the absence of other forms of cover. Concentrations of juvenile fish tended to be in shallow stream habitats, away from the deep pools occupied by larger, carnivorous fish. Willow structures (See Habitat Unit # 12, Appendix A) were sampled in February of 2016-2018 using one backpack electrofishing unit. The number of each species captured are listed in Table 1. Three years of sampling reveal that the willow structures provide reliable refugia for age 0 and 1 trout. Willow slash cluster and mattress structures were constructed in two concentrations, one upstream and one downstream of the Highway 22 road crossing (Table 1). Landowner access to sample the downstream structures was not obtained in 2016-2017. Data collected from downstream structures in 2018 revealed relatively low numbers: 9 Brook Trout (BKT) and 58 Snake River Cutthroat Trout (SRC) sampled from 10 structures. While no data exist to support the claim, anecdotal information from some landowners and resource managers coupled with site observations suggest that reduced trout catch rates downstream of Highway 22 are explained by reduced habitat quality associated with storm water inputs from road maintenance and snow

storage activities. Sediment inputs appear to be settling in willow structures and filling in interstitial spaces that would otherwise be occupied by small fish. However, over time, these sediment deposits may form point bars and encourage willow growth. Establishment of mature riparian vegetation would further delineate stream flows and provide additional habitat benefits in the form of overhead cover, terrestrial invertebrate inputs and temperature regulation.

Table 1. Willow slash cluster and mattress fisheries sampling 2016-2018. The number of fish of each species, Brook Trout (*Salvelinus fontinalis*, BKT) and Snake River Cutthroat Trout (*Oncorhynchus clarkia*, SRC) sampled from constructed willow structures (See Habitat Unit # 12, Appendix A) are reported. Twelve willow slash cluster and/or mattress structures were sampled upstream of the Edmiston Spring Highway 22 road crossing.

Year	Species	
	BKT	SRC
2016	19	121
2017	26	89
2018	34	118

Conclusions

Goal 1: Increase habitat for juvenile Snake River Cutthroat Trout

Improvements to Edmiston Spring were done with juvenile SRC in mind. Treatments targeting this sector of the fishery include the installation of willow slash and mattress structures, restricting excavated pools to a maximum depth of two feet and maintaining backwater and wetlands habitat adjacent to the flowing portion of the creek. Fisheries sampling indicates that Edmiston Spring continues to function as a nursery for age 0 and 1 SRC.

Goal 2: Optimize late winter habitat conditions

Improvements to winter conditions were realized, but sediment inputs limit the potential gains. Delineating the main flowing portion of the Edmiston Spring channel, coupled with the stable temperature regime of the spring creek, will likely allow for the persistence of open water habitat throughout the winter. Anecdotal information suggests that the largest contribution to habitat impairment is the input of sediment beyond what the creek is capable of naturally routing, given inherent limitations of stream flow and channel geometry. The excess sediment is assumed to originate from road and snow removal maintenance activities. Significant aquatic habitat improvements may be realized by moving snow storage and stockpiles away from the creek and reducing the input of road sand and gravel from the Highway 22 bridge.

Goal 3: Maintain existing wetland and riparian habitat

Wetlands and riparian habitats were not removed or degraded in the course of project implementation. Sod mat placement and creek flow delineation were conducted in such a manner as to also maintain adjacent slack water, back water, bogs and fens. Initial assessment of the creek revealed that it functions as habitat for a myriad of wetland and riparian-dependent species, in addition to acting as a juvenile fish nursery. Project design elements focused on enhancing benefits to all species.

Appendix A
Edmiston Springs Photo points

Habitat Unit #2 – Low Gradient Riffle (10/30/2014)



Habitat Unit #2 – Low Gradient Riffle (12/09/2015)



Habitat Unit #2 – Low Gradient Riffle (12/09/2015)



Habitat Unit #5 – Low Gradient Riffle (10/30/2014)



Habitat Unit #5 – Spawning Riffle with Excavated Pools (12/9/2015)



Habitat Unit #5 – Spawning Riffle post Sod Placement (6/1/2016)



Habitat Unit # 5 – Spawning Riffle post Sod Placement February 2018



Edmiston Spring
Appendix A

Habitat Unit #6 – Glide (10/30/2014)



Habitat Unit #6 – Spawning Riffle (12/9/2015)



Habitat Unit #6 – Spawning Riffle post Sod Placement (6/1/2016)



Habitat Unit # 6 – Spawning Riffle Post Sod Placement February 2018



Habitat Unit #11 – Low Gradient Riffle (10/30/2014)



Habitat Unit # 11 – Spawning Riffle with Excavated Pools (12/9/2015)



Habitat Unit #11 – Spawning Riffle with Excavated Pools post Sod Placement
(6/1/2016)



Habitat Unit #12 – Glide looking upstream from bridge (10/30/2014)



Habitat Unit #12 – Slash Piles and Brush Mattresses added (12/9/2015)



Habitat Unit # 12 – Slash Piles and Brush Mattresses February 2018



Habitat Unit # 13 – Low Gradient Riffle (10/30/2014)



Habitat Unit # 13 – Spawning Riffle and Excavated Pool (12/9/2015)



Habitat Unit #13 – Spawning Riffle and Excavated Pool post Sod Placement
(6/24/2015)



Edmiston Spring
Appendix A

Habitat Unit # 13 – Spawning Riffle and Excavated Pool post Sod Placement
February 2018



Habitat Unit #14 – Glide (10/30/2014)



Habitat Unit #14 – Slash Piles and Willow Mattresses added (12/9/2015)



Habitat Unit #14 – Slash Piles and Willow Mattresses February 2018

