Elbow Creek

Initial Project Assessment

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Table of Contents

List of Figures

List of Tables

1.0 Introduction

The Yellowstone cutthroat trout (*Oncorhynchus clarki bouvieri*), a Montana native, has declined in abundance and distribution throughout its historic range. Seeking to reverse this trend on private lands, the Landowner Incentive Program/Yellowstone cutthroat trout project assists private landowners seeking to improve habitat for Yellowstone cutthroat trout on their property. This report, or project assessment, documents preliminary evaluations for potential projects on Elbow Creek in Paradise Valley. The objectives of the project assessment are to describe relevant literature and data, describe existing conditions and potential, and provide recommendations to landowners. If substantial benefits to Yellowstone cutthroat trout are possible, and if landowners agree to proceed with conservation activities, Montana Fish, Wildlife & Parks' (FWP's) Yellowstone cutthroat trout restoration biologist will provide technical, financial, and planning assistance to implement restoration activities on these private lands.

2.0 Project Background

Elbow Creek is a tributary of the Yellowstone River in Paradise Valley, Montana (Figure 2-1). Its headwaters originate in the Absaroka Mountain range, and it flows for 11 miles before its confluence with the Yellowstone River. Meredith Allen, initiated contact with FWP seeking assistance in addressing bank erosion on the property he ranches. High flows during spring of 2008 resulted in stream bank erosion and channel instability. Protecting property, reducing sediment loading to streams, and restoring the stream's ability to transport its sediment load were the primary concerns.

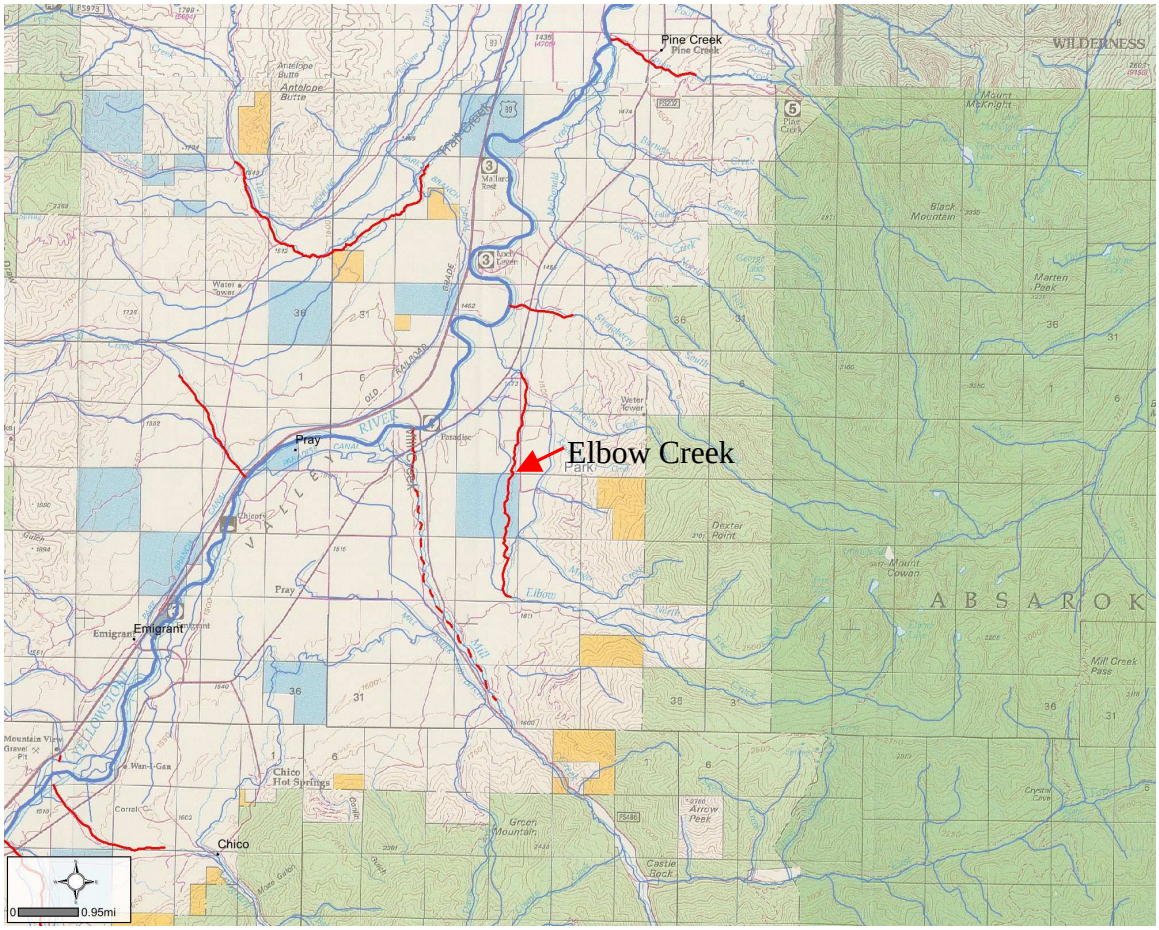

Figure 2-1: Overview map showing location of Elbow Creek. Streams denoted by solid red lines are considered to be chronically dewatered during the irrigation season.

3.0 Fisheries Data Review

Fisheries information for Elbow Creek is limited. No recent fish data exist for Elbow Creek, although a fish survey in 1984 found brown trout (*Salmo trutta*), rainbow trout (*Oncorhynchus mykiss*), and mountain whitefish (*Prosopium williamsoni*) (Table 3-1). The location of this sampling effort is unknown. Resident Yellowstone cutthroat trout may be present; however, occurrence of nonnatives is a constraint to persistence of Yellowstone cutthroat trout. Fish surveys to update information on species composition and distribution are warranted.

Although Elbow Creek is listed as a chronically dewatered stream, pure Yellowstone cutthroat trout have been documented ascending this stream during the spawning period (DeRito 2004). Nonetheless, fry survival is likely negligible given lack of water during summer months. A review of water rights found diversion rates for Elbow creek totaled 70.19 cfs, which is likely more than Elbow Creek flows, except at very high flows (Andy Brummond, FWP water rights specialist, personal communication). This level of water demand means flows are inadequate during the summer months to support incubation or drift of fluvial Yellowstone cutthroat trout fry, or a resident fishery.

Table 3-1: Fish distribution in Elbow Creek (from MFISH database).

Begin Mile	End Mile	Species	Abundance	Use Type	Life History	Genetic Status	Data Rating
1.01	11.1	Brown Trout	Rare	Year-round resident	N/A	N/A	Extrapolated based on surveys
1.01	11.1	Mountain Whitefish	Unknown	Year-round resident	N/A	N/A	Extrapolated based on surveys
1.01	11.1	Rainbow Trout	Rare	Year-round resident	N/A	N/A	Extrapolated based on surveys
0	5.84	Yellowstone Cutthroat Trout	Unknown	Unknown	Resident	Potentially hybridized with records of contaminating species	No Survey, Professional judgment

4.0 Site Visit

On March 13, 2009, Carol Endicott, FWP's Landowner Incentive Program biologist visited Elbow Creek. Landowners Meredith Allen and Dan Hull were present, and provided history and associated information on status and trends of the stream. The primary area of interest was the reach upstream of an internal ranch bridge and below the East River Road crossing (Figure 4-1).

A striking feature of Elbow Creek on March 13, 2009 was a total lack of water (Figure 4-2). The glacial history of the east side of the Paradise Valley has resulted in a highly permeable landscape, and many streams lose water when they encounter the valley. A lack of water before onset of the irrigation season suggests water supply is naturally limited, which affects Elbow Creek's potential to support a resident fishery.

One of Mr. Allen's concerns was an area of aggradation upstream of the bridge crossing Elbow Creek (Figure 4-3). The upper Yellowstone River watershed had a greater than average snowpack in 2008, and many tributaries reached and remained flows at flood stage for an extended period. On Elbow Creek, the bridge trapped debris, which impounded flow. Bed load, mostly cobble size particles, fell out of transport, and accumulated upstream of the bridge (Figure 4-4). The resulting rise in the streambed elevation diverted flows out of the channel and across the floodplain, as evidenced by debris caught on a barbwire fence (Figure 4-5).

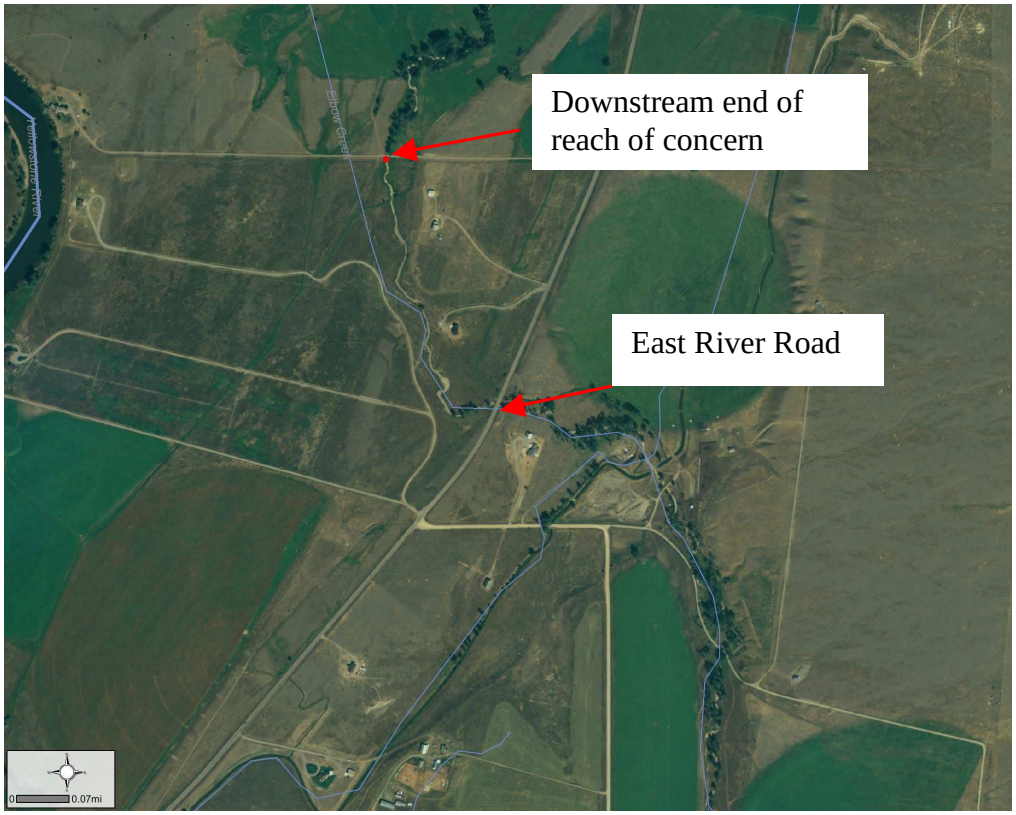

Figure 4-1: Aerial photo of lower Elbow Creek

Figure 4-2: Cottonwood gallery downstream of ranch road crossing on Elbow Creek.

Figure 4-3: Ranch bridge which impounded flows during spring runoff of 2008.

Figure 4-4: Area of aggradation upstream of the ranch bridge where bed load deposited when high flows became impounded by the bridge in spring of 2008.

Figure 4-5: Debris caught on fence where Elbow Creek's flows were diverted across the floodplain because of a rise in bed elevation.

A scarcity of woody riparian species is another dominant feature in the reach of concern, and the lack of mature cottonwoods or riparian shrubs is apparent in the aerial photo (Figure 4-1). Mr. Hull indicated cottonwoods had been removed years ago when an irrigation system was installed. He has planted several cottonwoods in order to reestablish a riparian stand. In addition to historic removal, livestock are probably limiting recruitment of woody vegetation along the stream margin.

In addition to changes in bed elevation, flooding in 2008 resulted in localized areas of bank erosion, which was another of Mr. Allen's concerns (Figure 4-6). Shallow rooted grasses were the dominant vegetation type on these eroding banks. These closely cropped grasses do little to protect banks during high flows.

A final feature of concern on Elbow Creek was a large scour just downstream of the East River Road crossing. This is a source of cobble and gravel sized particles, and likely contributes to an over supply of bed load in Elbow Creek. In addition, this erosion may put the bridge abutment at risk. The Park Conservation District recently approved application of bank armor to reduce sourcing of sediment, and protect the bridge structure.

Figure 4-6: Sloughing of stream banks associated with flooding in 2008.

Figure 4-7: Bank scour immediately downstream of the East River Road crossing.

5.0 Conclusions and Recommendations

This reach of Elbow Creek has numerous constraints that negatively influence fluvial processes and its ability to support fish. Water supply is considerably less than water demands in most years, so insufficient water is available to transport bed load and provide suitable habitat for fish. An undersized bridge traps debris, which further adds to reduced sediment transport capabilities. Dominance of shallow rooted grasses, to the near exclusion of riparian woody vegetation, has made banks susceptible to erosion during high flows.

A primary focus of the Landowner Incentive Program/Yellowstone cutthroat trout restoration project is finding opportunities to work with water rights holders on voluntary measures to improve water use efficiency and maintain in stream flows. Because of the large number of water rights holders, and the extent to which water rights exceed supply, Elbow Creek does not present a suitable candidate for these activities. As promoting in stream flows is likely infeasible, spending public funds intended to promote healthy fisheries is not justifiable for this stream.

Decreasing sediment loading from eroding banks does provide public benefit, and financial and technical assistance may be available from the Natural Resources Conservation Service (NRCS). The Environmental Quality Incentives Program (EQIP) is a voluntary conservation program for farmers and ranchers that promotes agricultural production and environmental quality as compatible, national goals. EQIP sign up information is available on-line[1]. Alternatively, contact the local NRCS office at (406) 222-2899, extension 3.

Recommended approaches to remedying eroding banks involve several actions aimed at reducing erosion and restoring riparian function, and preventing future damage by controlling livestock adjacent to the stream. Montana stream permitting guidelines (DNRC 2001) emphasize the use of soft, bioengineered approaches that replicate natural channel stability. Restoring banks through bioengineered approaches typically involves re-sloping the eroding banks, applying erosion control fabric, and revegetating the bank with plantings and seeding (see Figure 5-1 for a conceptual approach).

[1] http://www.nrcs.usda.gov/PROGRAMS/EQIP/

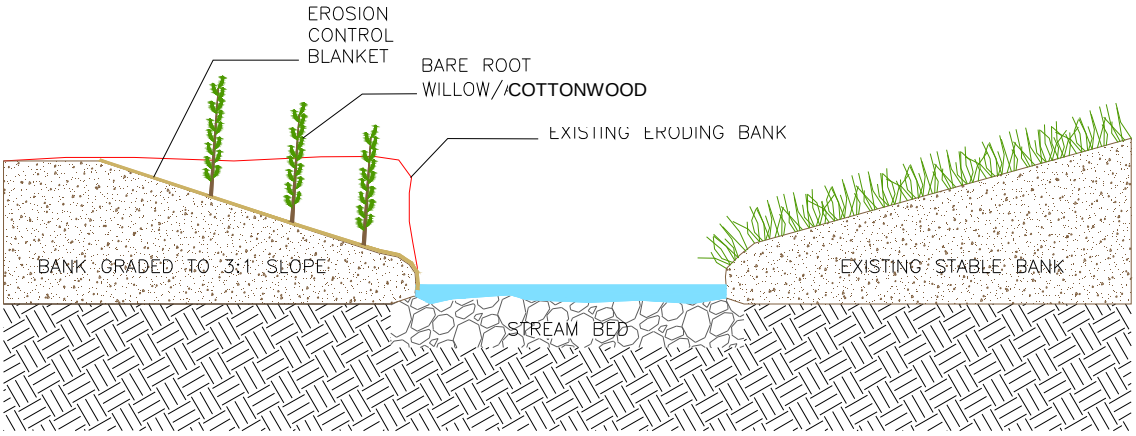

Figure 5-1: Conceptual approach to bioengineered bank stabilization.

Managing livestock adjacent to the stream is another component of reducing sediment loading, and will protect restored banks from future erosion. The NRCS works with private landowners on voluntary grazing management practices that reduce impacts to streams and riparian areas, while promoting agricultural production. Grazing management plans are site specific, but typically include components such as temporary or permanent fencing, and off-channel water sources.

In summary, low flows, an associated over supply of bed load, and riparian degradation are significant constraints on Elbow Creek. The extent to which water rights and water demand exceed water supply suggests efforts to increase water use efficiency would be insufficient to maintain adequate stream flow to support Yellowstone cutthroat trout. Therefore, involvement of the Landowner Incentive Program/Yellowstone cutthroat trout project biologist is not justifiable. Nonetheless, financial and technical assistance may be available through the NRCS's EQIP funds. EQIP regularly funds projects relating to managing livestock adjacent to streams, and implementing bank restoration measures.

6.0 Literature Cited

DeRito, J. N. 2004. Assessment of reproductive isolation between Yellowstone cutthroat trout and rainbow trout in the Yellowstone River, Montana. Masters Thesis, Montana State University, Bozeman, Montana.

DNRC. 2001. Montana stream permitting. A guide for conservation district supervisors and others. Conservation Districts Bureau. Helena, MT