Rock Creek: Hagemeyer Property

Initial Project Assessment

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1.0 Introduction

The Landowner Incentive Program/Yellowstone Cutthroat Trout project (LIP-YCT) assists private landowners seeking to improve habitat for Yellowstone cutthroat trout on their property. This report, or project assessment, documents preliminary evaluations for a potential project on Rock Creek, a small tributary of the Yellowstone River 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 landowners agree to proceed with conservation activities, Montana Fish, Wildlife & Parks' Yellowstone cutthroat trout restoration biologist will provide technical, financial, and planning assistance to implement restoration activities on these private lands.

2.0 Project Background

Rock Creek flows to the east from its headwaters in the Gallatin Range until its confluence with the Yellowstone River downstream of Yankee Jim Canyon (Figure 2-1). The lower end of property in question lies in T7S R7E Section 19, and encompasses most of the left bank of Rock Creek and both sides of Rock Creek. Duncan Hagemeyer, the owner of the property, is interested in conservation of native Yellowstone cutthroat trout in Rock Creek, and requested a site visit to evaluate opportunities to conserve this declining native species.

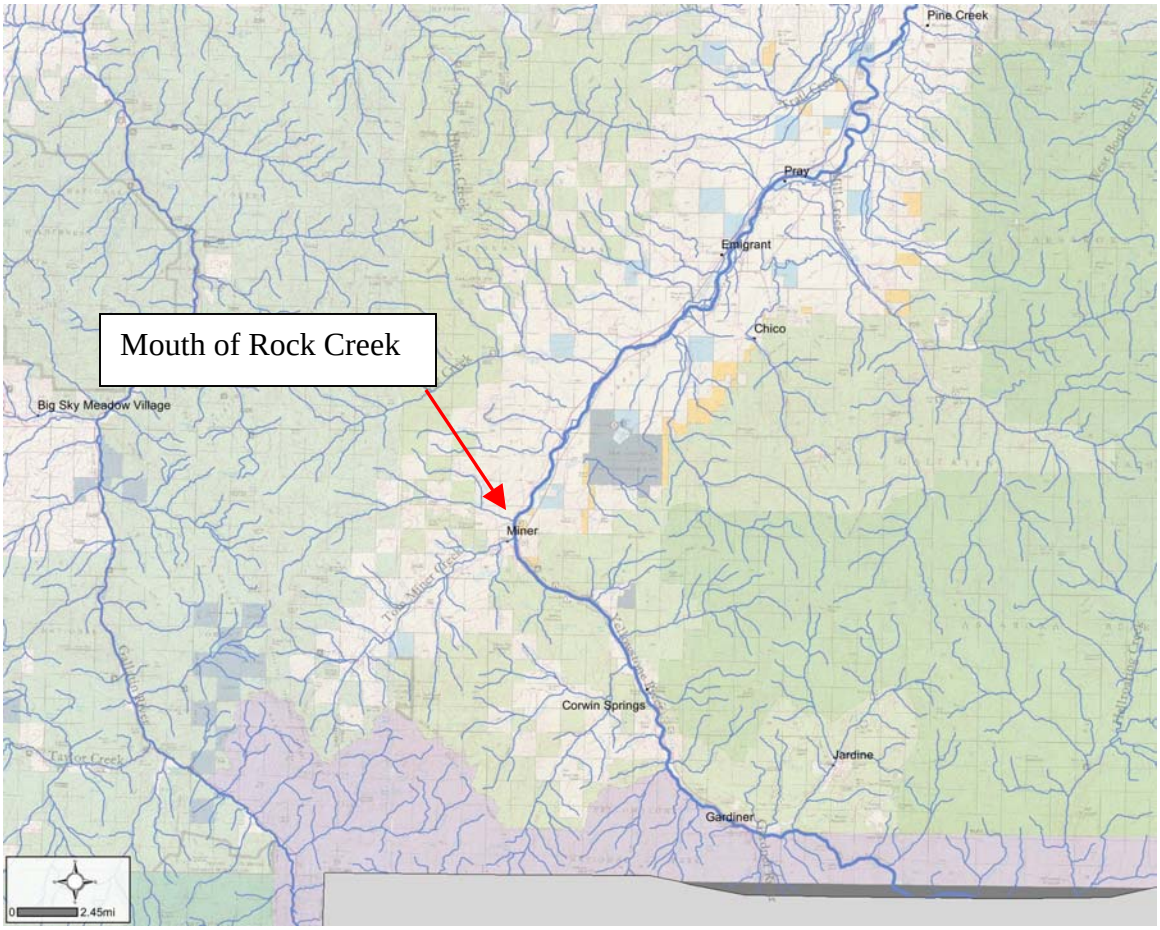

Figure 2-1: Map of Rock Creek watershed in the upper Yellowstone hydrologic unit.

3.0 Fisheries Data Review

The upper Yellowstone River watershed is a stronghold for Yellowstone cutthroat trout, which has experienced substantial declines in abundance and range. Recruitment is a limiting factor in the Yellowstone River, with many of the spawning tributaries dewatered during summer months (Byorth 1990, Hennessey 1998). Management priorities in this portion of the basin include increasing recruitment of Yellowstone cutthroat trout to the main stem through leasing water in key spawning tributaries, Big, Mol Heron, and Cedar creeks.

Rock Creek has also been the focus of efforts to increase recruitment of Yellowstone cutthroat trout to the Yellowstone River. In the late 1980s, a fish ladder was installed in a culvert under an abandoned railroad grade to provide fluvial spawners access to the stream. Shepard (1992) concluded this action was attributable to fry production with over 600 Yellowstone cutthroat trout fry captured in fry traps during five nights of trapping.

The functionality of this fish ladder did not persist into the 2000s. The previous LIP-YCT biologist noted it had swept away in recent years. The effect of the loss of this

ladder is unknown; however, the culvert is possibly not a full barrier with Yellowstone cutthroat trout observed upstream (Scott Opitz, MFWP, personal communication).

Fish survey data on Rock Creek are limited to a population estimates in 1986 (Clancy 1987) and evaluation of fluvial spawners in 1974 (Berg 1975). Yellowstone cutthroat trout were the most abundant trout captured in Rock Creek in 1986. Brown trout and mountain whitefish were also present. Genetic samples indicated no evidence of introgression with rainbow trout; however, a small sample size limited statistical certainty in these results (Leary 1987).

A water rights review conducted by MFWP's water rights specialist provides information on withdrawals from Rock Creek (Appendix A). Seven water rights with only two points of diversion are listed. The diversions lie in the lower mile of the stream. All these rights have priority dates older than MFWP's instream flow reservations. Diverted flows are used for stock water and irrigation of forage crops along the floodplain of the Yellowstone River. The influence of flow diversions on water quantity in Rock Creek is an unknown; however, Duncan Hagemeyer reports sufficient flows through the summer months.

In summary, Rock Creek is an important stream in conservation of both resident and fluvial forms of Yellowstone cutthroat trout. As a considerable portion of Rock Creek flows through private lands, identification of opportunities to implement conservation practices is within the scope of the LIP-YCT program's responsibilities.

4.0 Site Visit

I visited Rock Creek on April 9, 2007. Objectives of my site visit were to evaluate potential projects to benefit Yellowstone cutthroat trout in the upper Yellowstone River watershed. My efforts included evaluation of potential constraints to fish passage and identification of potential limiting factors associated with land use practices along this stream.

A notable feature at the mouth of Rock Creek is aggradation of bed load, which creates a short cascade (Figure 4-1). Although this may present a barrier to fish movement into Rock Creek at lower flows, timing of Yellowstone cutthroat trout movement into tributary streams coincides with higher flows in the main stem, which would facilitate passage. Therefore, this natural accumulation is not likely a factor limiting use of Rock Creek as a spawning tributary.

Figure 4-1: Accumulation of bed load at the mouth of Rock Creek.

The next feature was a concrete culvert under the abandoned railroad grade over Rock Creek. This is a relatively steep culvert and Rock Creek has scoured a trench in its floor, forming a chute at low flows, which is a potential barrier to fish movement (Figure 4-2). Remnants of the fish ladder were also observable, although it currently retains no functionality (Figure 4-3).

Figure 4-2: Concrete culvert under abandoned railroad grade over Rock Creek.

Figure 4-3: Remnant of fish ladder in culvert under the abandoned railroad grade.

Upstream of the railroad crossing is the Old Yellowstone Trail South road crossing. Instead of a culvert, a bridge spans the stream and presents no barrier to fish movement (Figure 4-4). Above the bridge, beavers have impounded a short reach of Rock Creek.

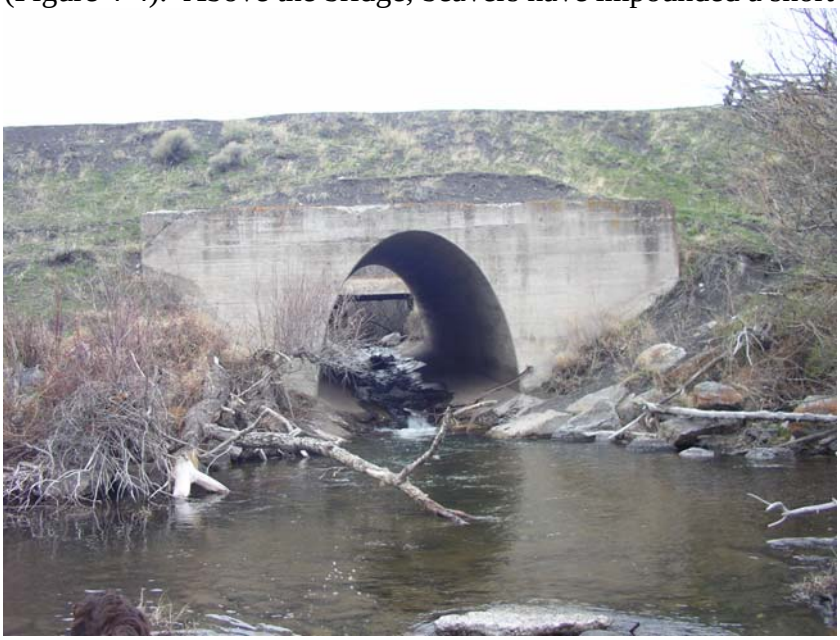

Figure 4-4: Old Yellowstone Trail South Bridge crossing visible through the railroad culvert.

The remaining, observable portion of Rock Creek is a relatively high gradient, Rosgen B channel (Rosgen 1996, Figure 4-5). Defining characteristics of B channels include a limited floodplain and low to moderate sinuosity. Rock Creek is a relatively high gradient stream, and consists primarily of riffles and runs, with pool habitat being limited. Cobble and boulders are the dominant substrate size fraction. Gravel deposits suitable for spawning were not readily observable.

Figure 4-5: Typical view of Rock Creek showing moderately entrenched channel and large cobble to boulder substrate.

Stream morphology and substrate composition in Rock Creek is atypical of streams deemed good spawning streams. General characteristics of high quality spawning habitat include substantial length of gradual pool tail outs dominated by clean gravels (Kondolf 2000). In general, sinuous Rosgen C and E channels are move likely to possess these features than B channels as meanders promote formation of lateral scour pools.

Although not typical of "good" spawning streams, Rock Creek is similar to other important spawning streams in the upper Yellowstone River watershed. Big Creek, Mol Heron, and Cedar creeks are Rosgen B channels and laterally confined by the local, mountainous topography. Likewise, all have relatively coarse bed material that lies outside particle sizes that are movable by a spawning fish. Despite these apparent constraints to suitability for spawning, these streams are important natal streams for Yellowstone cutthroat trout (Clancy 1986, Berg 1975, Byorth 1990, Hennessey 1998), which suggests local adaptation of Yellowstone cutthroat trout to sub-optimal spawning habitats.

Frequently, initial project assessments identify the need for implementation of grazing best management practices to protect streamside vegetation and banks. Such conditions were not observed on Rock Creek. Livestock use of the stream is apparently limited to the lower two miles, and includes the use of fencing and water gaps, which has protected riparian vegetation and banks. Moreover, B channels are generally resilient to livestock pressures owing to their coarse bed and bank material.

Water rights investigations identified two points of diversion, which were easily located in the field. One withdraws water by a pump, and apparently delivers water to the top of the bench. The other diversion feeds the Stewart Ditch. This diversion had an expanded metal grate screen, which would block entrainment of adults; however, fry could easily

pass through the mesh (Figure 4-6). This screen likely requires constant cleaning when the ditch is in use, and may not be in place throughout the irrigation season.

Figure 4-6: Irrigation diversion on Rock Creek

5.0 Conclusions and Recommendations

Rock Creek is among the known spawning tributaries in the upper Yellowstone River watershed, and promoting access and adequate stream flows are valid conservation concerns for this stream. A barrier to fish passage through the railroad culvert, entrainment of fish into the Stewart Ditch, and dewatering present potential constraints on production of Yellowstone cutthroat trout in this stream. In contrast, stream adjacent land uses are compatible with riparian health and function, and channel and bank stability are intact.

A lack of recent data presents a constraint in evaluating the extent to which the potentially limiting factors are influencing Yellowstone cutthroat trout production in Rock Creek. The fish ladder installed in the 1980s has failed; however, Berg (1975) observed fluvial spawners in Rock Creek without benefit of a ladder. Landowner observations indicate irrigation withdrawals do not substantially reduce stream flow during the summer months. Still, the adequacy of the flow to cue upstream migrations and transport fry downstream is unknown.

The initial recommendation is to collect information to guide development of conservation activities as need for Rock Creek. The following monitoring activities are advisable for spring and summer of 2007:

- Evaluate fish passage and spawning use of Rock Creek during the Yellowstone cutthroat trout spawning period through visual observations and redd counts;
- Evaluate stream flow throughout the irrigation season;

- Evaluate the ability of the railroad culvert to pass fish using Fish Xing (Love and Firor 2001), a standard method of evaluating fish passage at road crossings;
- Monitor out-migrant fry during August to evaluate current production; and
- Evaluate entrainment of Yellowstone cutthroat trout adults and fry into the Steward Ditch.

In conclusion, Rock Creek presents an exciting opportunity to promote production of Yellowstone cutthroat trout in the upper Yellowstone River basin. Additional data are needed to guide development of specific activities. Ultimately, these may include removal or alteration of the railroad culvert, constructing a self-cleaning screened intake for the irrigation diversion, and developing a water conservation plan that meets irrigator's production needs, while promoting sufficient stream flows.

6.0 Literature Cited

Byorth, P.A. 1990. An evaluation of Yellowstone cutthroat trout production in three tributaries of the Yellowstone River, Montana. Master's Thesis. Montana State University, Bozeman.

Clancy, C. 1987. Ic, Inventory and survey of waters of the project area, period covered July 1, 1986 through June 30, 1987/report period July 1, 1986 through June 30, 1987; February 1987,southwest Montana Fisheries Investigations. MFWP.

Hennessey, L.E. 1998. An evaluation of Yellowstone cutthroat trout fry recruitment related to water leases on four tributary streams of the Yellowstone River. Master's Thesis. Montana State University, Bozeman.

Rosgen, D.1996. Applied River Morphology. Wildland Hydrology, Pagosa Springs, Colorado.

Berg, R. 1975. Fish and game planning, upper Yellowstone and Shields River drainages. Montana Department of Fish and Game. Environment and Information Division. Federal Aid to Fish and Wildlife Restoration Project.

Love, M.A. and S. Firor. 2001. FishXing V2.2.0. Watershed Interactions Team of the Six Rivers National Forest.

Shepard, Bradley B. 1992. If, fisheries of the upper Yellowstone river including tributary recruitment: report for years 1989, 1990 and 1991, survey and inventory of cold water streams: southwest Montana major river fisheries investigation - Yellowstone river and its tributaries, July 1, 1991 through June 30, 1992; November 1992, statewide fisheries Investigations

Leary, R. 1987. Genetic divergence among Yellowstone cutthroat trout populations in the Yellowstone River drainage. University of Montana, Missoula.

Appendix A

To: Carol Endicott
From: Andy Brummond

Date: March 28, 2007

Subject: Water Rights – Rock Creek tributary to Yellowstone River approx. 1 mile downstream of Tom Miner Creek

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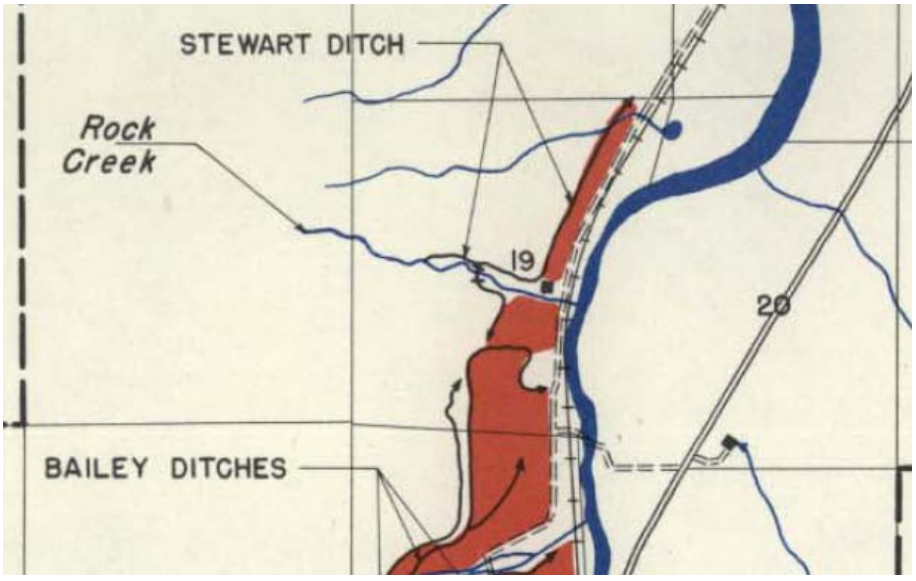
I have reviewed the water rights for Rock Creek and Slaughter Creek, a tributary to Rock Creek. I found no water rights for Slaughter Creek. The following table shows the water rights for Rock Creek, excluding FWP's instream flow reservation for Rock Creek that ranges from low of 4.09 cfs in February to a high of 109 cfs in June.

wrnumber	wrtype	prioritydate	meanofdiv	srcname	tr	secno	qsection	govtlot	reservoir	maxflwrt	flwrtunt	maxvol	maxacres
43B 194222 00	STATEMENT OF CLAIM	19041026	HEADGATE	ROCK CREEK	7S7E	19	SESWNW		N	148	GPM	79.95	8.7
43B 194343 00	STATEMENT OF CLAIM	19020529	HEADGATE	ROCK CREEK	7S7E	19	SESWNW		N	1.5	CFS		39.5
43B 194822 00	STATEMENT OF CLAIM	19090505	HEADGATE	ROCK CREEK	7S7E	19	SESWNW		N	0.99	CFS	221	26
43B 194823 00	STATEMENT OF CLAIM	19060424	HEADGATE	ROCK CREEK	7S7E	19	SESWNW		N	0.99	CFS	221	26
43B 194824 00	STATEMENT OF CLAIM	19041026	HEADGATE	ROCK CREEK	7S7E	19	SESWNW		N	0.99	CFS	221	26
43B 195143 00	STATEMENT OF CLAIM	19200102	HEADGATE	ROCK CREEK	7S7E	19	NENESW		N	1.67	CFS		44
43B 16777 00	STATEMENT OF CLAIM	19200102	HEADGATE	ROCK CREEK	7S7E	19	SESWNW		N	0.38	CFS	30	10
43B 95418 00	PROVISIONAL PERMIT	1.995E+11	PUMP	ROCK CREEK	7S7E	19	NWSW		Y	30	GPM	2.4	
43B 59909 00	STATEMENT OF CLAIM	19060307	LIVESTOCK D	ROCK CREEK	7S6E	14	SESESE		N				

There are 7 irrigation rights, 1 provisional permit and one instream stockwater right. All of the diversions appear to be located in section 19, T7N, R7E on the lower 1 mile of Rock Creek.

Two legal descriptions are given for the irrigation diversions. 6 of the water rights list SE SW NW as the point of diversion. I suspect this is one single diversion serving multiple water rights. It is most likely the diversion shown on the excerpt from the Water Resources Survey below. The Water Resources Survey shows only this one diversion on the left bank supplying lands north of Rock Creek via the "Stewart Ditch" and a flume taking the water south across Rock Creek to additional lands. I suspect that the flume is no longer functional and second diversion has been added in the NE NE SW serving one water right.



1951 Park County Water Resources Survey – T7S, R7E

2005 Aerial Photo

The 2005 aerial photo above shows irrigation taking place on the lands supplied by Rock Creek. It is possible that Tom Miner Creek and not Rock Creek supplies the area south of Rock Creek. However, this scenario would seem unlikely for those acres lying north of Rock Creek. Reviewing water rights for this irrigated parcel north of Rock Creek indicates it is only supplied by Rock Creek water.

The third diversion from Rock Creek is for a pump in the NW SW that apparently supplies an off-stream reservoir. From the aerial photo I am unable to identify the location of the pond.

Based on the information I have found, it seems unlikely no water is being diverted from Rock Creek. However, this may provide the potential for a flow restoration project.