

1. Gold Creek Watershed Summary

Description and Land Use

Table xxx: Gold Creek Watershed Overview

Watershed Size	42,613 acres / 66.5 sq miles / 172.4 sq km
Elevation Range	5,082 Feet [4,170-9,252]
Stream Miles	81.3
Land Ownership	Private: 40% / State: 2% / Federal: 58%
Road Miles	Local Road/City Street = 51.7 Four Wheel Drive Trail = 34.2 Service Road/Driveway = 3.1 Trail/Walkway = 2.2 Total = 91.2

Source: Montana GIS Portal Data Layers

Gold Creek originates in the Flint Creek mountain range and flows for about 15 miles until it reaches its confluence with the Clark Fork. The Gold Creek watershed contains the tributaries of Blum Creek, Pikes Peak Creek, Crevice Creek, and North and South Fork Gold Creek, as well as several smaller streams. Gold Creek is the site of the first gold discovery in Montana, and thus has a long mining history (MDEQ, 2010). The watershed also supports agriculture, grazing and timber harvest (MFWP, 2009). The basin is comprised mainly of private and Forest Service land, with a small percentage of state-owned property (MFWP, 2010).

2. Impairments

Table xxx: Listed and Suspected Impairments for Gold Creek

Impairment	Reach (River Mile)	Pollutant	Affected Beneficial Use
Iron & Lead	0-10.2		Metals Aquatic Life, Cold Water Fishery
Nitrogen (Total)	0-10.2		Nutrients Aquatic Life, Cold Water Fishery
Low Flow Alterations	0-10.2	<i>Not a Pollutant</i>	Aquatic Life, Cold Water Fishery, Primary Contact Recreation
Temperature Measurements			

PIBO 2007 Gold Ck (N.F.)	RM*	Start Date	End Date	Max T (°C)	Days>12°C	Days>1
	1.0	7/15	8/31	18.1	37	0
FWP 2007 Gold Creek	RM*	Start Date	End Date	Max T (°C)	Days>15°C	Days>2
	0.1	7/1	10/16	21.2	65	8
	5.7	7/1	10/16	16.1	10	0
FWP 2008 Gold Creek	RM*	Start Date	End Date	Max T (°C)	Days>15°C	Days>2
	0.1	7/4	10/13	16.9	37	0
	5.7	7/4	10/13	14.1	0	0

Source: MDEQ, 2010; PIBO/USFS, 2010; MFWP, 2009

Metals

The Gold Creek basin contains over 80 abandoned mines (MBMG, 2002), many of which have been associated with adit discharge and/or waste rock dumps (MDEQ, 2010). Sampling for metals exceedences were taken in 2007 and 2008 on the upper segment of Gold Creek, and elevated levels of lead were identified during the process. While no samples exceeded water quality targets, soil samples taken near some of the tributaries were found to have higher lead levels (MDEQ, 2010). Lower Gold Creek (River Mile 10.2-0.0) was also sampled, but that section of the creek did not contain sufficient amounts to warrant placement on the 2008 303 (d) list (MDEQ, 2010). However, the sample values for lead and iron on some of Gold Creek's tributaries are documented in the 2010 document because they exceed water quality target levels (MDEQ, 2010).

Nutrients

Gold Creek exceeds Montana DEQ TMDL standards for total nitrogen throughout the lower part of the drainage (Table xxx). Excess nitrogen comes mainly from agricultural and urban runoff, and from in-stream livestock access. According to KirK (2008), excessive nutrient levels can lead to undesirable algae growth which in turn can cause:

- Unpleasant tastes and odors in drinking water
- Corrosion and blockages of irrigation equipment
- Reduced dissolved oxygen
- Altered ecological communities, especially macroinvertebrates
- Degradation of aesthetic value

Irrigation and Dewatering

Chronic dewatering results from agricultural irrigation within the basin and has many implications for both water quantity and quality. Over 250 diversions exist in the Gold Creek basin (MDNRC, 2011) and lower sections of Gold Creek have been completely dewatered in the past (MFWP, 2009). Low flows result in unsuitable habitat for fish and macroinvertebrates due to increased temperatures and algal growth (Table xxx). In addition, irrigation structures can create barriers which impede fish passage and migration (MFWP, 2010).

Temperature

Thermal impairments are attributed to agricultural dewatering, and have been documented on Gold Creek and North Fork Gold Creek. While temperatures on some reaches of the creek have regularly climbed above 15 °C, the 2007 and 2008 monitoring seasons showed a marked drop in water temperature. This drop was possibly caused by increased stream flows in the reach due to some irrigation improvements (MFWP, 2009).

Concerning fishery health and fish survival, temperatures below 16°C are optimum for westslope cutthroat trout growth, while temperatures below 20 °C are critical for their survival (Kirk, 2010). High temperatures also encourage algae growth and reduce dissolved oxygen content, which can be detrimental to fish health.

3. Native/Sport Fisheries

Table xxx: Fish Distribution in Gold Creek

Water Body	Begin*	End*	Species	Updated
Gold Creek	0.0	12.1	Brown Trout	11/18/2009
Gold Creek	0.0	2.8	Mountain Whitefish	2/20/2009
Gold Creek	0.0	4.6	Slimy Sculpin	9/14/2009
Gold Creek	0.0	14.4	Westslope Cutthroat Trout	7/27/2009
North Gold Creek	0.0	1.1	Westslope Cutthroat Trout	7/24/2009
North Gold Creek	1.1	4.4	Westslope Cutthroat Trout	1/5/2005
South Gold Creek	0.0	3.0	Westslope Cutthroat Trout	1/5/2005

Pikes Peak Creek	0.0	12.8	Westslope Cutthroat Trout	1/5/2005
Crevice Creek	0.0	4.5	Westslope Cutthroat Trout	9/17/2009
Blum Creek	0.0	5.5	Westslope Cutthroat Trout	1/5/2005

*River Mile

Source: MFWP, 2010

Current Condition

Gold Creek is one of the largest tributaries to the Clark Fork between Flint Creek and the Little Blackfoot River, and provides habitat for native westslope cutthroat trout. Fish samples taken in 2007 (RM 0.3, 4.4, 11.1, 13.8) show large numbers of juvenile fish from both trout species, which suggests that the creek is important for spawning and fry development (MFWP, 2010). Despite supporting populations of westslope cutthroat trout, Gold Creek still loses water to irrigated hay production which contributes to low flows during drier years. Additionally, cattle are allowed access to the creek and continue to graze riparian areas. Grazing and pasturing have diminished woody vegetation in the area as well as contributed sediment and nutrients to the stream (MFWP, 2010).

Fishery Conditions in Gold Creek Tributaries

- **Pikes Peak Creek:** primarily supports populations of westslope cutthroat trout (MFWP, 2009). However, Montana FWP (2009) rates the creek's fish habitat only as "fair" due to heavy grazing in the riparian area which has depleted woody vegetation and damaged stream banks. In addition to grazing, the Pikes Peak Creek drainage is affected by timber harvest and has historically been mined (MFWP, 2009).
- **Crevice Creek:** also contains westslope cutthroat trout, and sample taken in 2007 by Montana FWP returned no other trout species (MFWP, 2009). Montana FWP rated fish habitat at RM 1.8 as "good", but not at its potential. While there is a good amount of woody vegetation, much of it showed the results of heavy browsing. Stream bank erosion was also present due to hoofshear, and noxious weeds were evident near the sample site (MFWP, 2009). Habitat at RM 4.4 was rated only "fair" and not at its potential because of heavy grazing, hoofshear, lack of deep pools and fine sediment accumulation (MFWP, 2009).
- **North Fork Gold Creek:** was found to support populations of westslope cutthroat trout at RM 1.6 and none at a sample site on RM 3.7., despite a riparian habitat score of 100%. Fish habitat at the first site was rated good, but could benefit from more woody vegetation and deeper pools. An irrigation diversion also exists near the site (MFWP, 2009).

- **South Fork Gold Creek:** A 2007 Montana FWP sample at RM 0.8 was comprised entirely of westslope cutthroat trout. The creek received a score of 100%, was rated as “good” and thought to be near its potential as a fishery (MFWP, 2009). Woody vegetation was varied and abundant, although pools were not deep and fine sediment accumulation was noted (MFWP, 2009).

Fishery Potential

Table xxx: Tributary Rating Summary for Gold Creek (Priority 2)

Stream	Reach(RM)	Trout Species	Impairments
Gold Creek	Lower: 0.0-10.2	Brown and Westslope Cutthroat	Low summer flows due to irrigation with complete dewatering at certain reaches; livestock grazing in riparian areas; high temperatures; competition to westslope cutthroat from brown trout; residential development
Current Recruitment/Restoration Fishery Value			Protection/Enhancement Value
High			High
Current Tributary/Replacement Fishery Value			Protection/Enhancement Value
High			High
Current Native Fishery Value (westslope cutthroat)			Protection/Enhancement Value
Medium			Medium

Source: MFWP, 2010

Table xxx: Tributary Rating Summary for Pikes Peak Creek (Unrated)

Stream	Reach(RM)	Trout Species	Impairments
Pikes Peak Creek	0.0-12.7	Westslope Cutthroat	Low summer flows due to irrigation with complete dewatering at certain reaches, livestock grazing in riparian areas; high temperatures; historic mining and timber harvest impacts
Current Recruitment/Restoration Fishery Value			Protection/Enhancement Value
Low			Low
Current Tributary/Replacement Fishery Value			Protection/Enhancement Value
Medium			Medium
Current Native Fishery Value (westslope cutthroat)			Protection/Enhancement Value
High			High

Source: MFWP, 2010

While Gold Creek experiences several impairments, protection and enhancement possibilities for a viable trout fishery exist on several levels (Table xxx). Montana FWP has shown an interest in managing (in collaboration with state agencies and other organizations) Gold Creek as a recreational fishery, declaring lower Gold Creek a “Priority 2” stream reach in the agency’s Final Tributary Rating Summary (2010). Improved management practices can increase the fishery viability by addressing documented impairments (Table xxx) with appropriate restoration projects.

4. Monitoring/Assessments

Gold Creek’s habitat and water quality status have been assessed several times in the last 10 years (Table xxx). Assessments have included fish habitat and fishery potential, temperature, noxious weeds, stream flow, and stream channel and riparian habitat status.

Table xxx: Gold Creek Assessments

Type	Agency	Year	Area
Upper Clark Fork Tributaries TMDL	MDEQ	2010	River Mile 0.0-10.2
PIBO Stream s and Riparian Areas	USFS	2009	River Mile 1.0
Tributary Prioritization /Rating Summary	MFWP	2010	River Mile 0-10.2
Fish Population/Riparian Habitat	MFWP	2009	Gold Creek/tributaries
Riparian/ Geomorphology/ Flow Assessment	MWRC	2010/2011	River Mile 0.0-5.7
Irrigation Structure Inventory	WRC/TU/MFWP	2010	Throughout Gold Creek

WRC Riparian Assessment

The WRC (2011) conducted NRCS riparian assessments on 5.2 miles of Gold Creek in 2010. Of the 14 assessed reaches, the WRC classified one as “not sustainable”, six as “at-risk” and seven as “sustainable.

5. Restoration

Needs

- Address high stream temperatures in Gold Creek and monitor those of the tributaries
- Monitor abandoned mine areas for metals discharge and leaching
- Address dewatering issues caused by over-irrigation and over-allocation of water

rights

- Facilitate fish passage in areas with barriers such as diversions and culverts
- Promote methods of keeping livestock out of creeks and away from sensitive riparian areas to help with nutrient loading, metals contamination, sedimentation, and destruction of fish and riparian habitat
- Riparian plantings for improved woody vegetation communities and stream cover
- Monitor and address noxious weed issues

Activities: Projects being undertaken by the WRC

6.Map

7.Bibliography

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