

## 1. Brock Creek Watershed Summary

### *Description and Land Use*

Brock Creek, a tributary to the Clark Fork River, originates in the Garnet Range and flows for about 12 miles before joining the Clark Fork between the towns of Garrison and Gold Creek. Brock Creek drains an area of nearly 25 square miles and is shared primarily by private entities and the Bureau of Land Management (Table xxx). The drainage currently supports timber harvest, recreation and livestock grazing, and contains some abandoned mines and other evidence of historic mining (FWP, 2009).

**Table xxx: Brock Creek Watershed Overview**

<b>Watershed Size</b>	15,847 acres/24.8 sq miles/64.1 sq km
<b>Elevation Range</b>	3,114 feet (4,229-7,343)
<b>Stream Miles</b>	27.2
<b>Land Ownership</b>	Private: 69% /State: 8%/ Federal: 23%
<b>Road Miles</b>	Local Road/City Street = 4.5 Four Wheel Drive Trail = 21.1 Total = 25.6

Source: Montana GIS Portal Data Layers

## 2. Impairments

### *Temperature*

Thermal impairments are often attributed to agricultural dewatering and lack of stream cover, and have been documented at one site on Brock Creek (Table xxx).

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.

**Table xxx: Temperature Measurements for Brock Creek**

<b>FWP 2008</b>	<b>RM*</b>	<b>Start Date</b>	<b>End Date</b>	<b>Max T (°C)</b>	<b>Days&gt;15°C</b>	<b>Days&gt;20°C</b>
	0.2	7/11	10/13	19.9	47	0

\*River Mile

Source: MFWP 2009

### *Sediment/Siltation*

Impairments from sediment and siltation most likely occur from over-grazing in riparian areas and from timber harvest near Brock Creek. Sedimentation beyond that which is naturally occurring, damages fish and macroinvertebrate habitat by filling in redds, reducing available habitat (such as riffles and pools), and by altering stream channels (Kusnierz and Welch, 2011). Sediment levels in Brock Creek exceed those defined by Montana DEQ TMDL standards.

**Table xxx: TMDL Impairments for Brock Creek**

2010			
Impairment	Reach (River Mile)	Pollutant	Impaired Beneficial Use
Sedimentation/ Siltation	0.0-12.0	Sediment	Primary Contact Recreation*
2008			
Impairment	Reach (River Mile)	Pollutant	Impaired Beneficial Use
Sedimentation/ Siltation	0.0-12.0	Sediment	Primary Contact Recreation*

Source: MDEQ, 2010

### 3.Sport/Native Fishery

#### *Current Condition*

Brock Creek and East Fork Brock Creek were sampled in 2005, 2008 and 2009 by Montana FWP. During the 2008 sampling, westslope cutthroat were the only trout species they encountered, but brown trout have been found in the past (Table xxx). While in-stream obstacles in Brock Creek are few, a large culvert between the creek and the Clark Fork River poses a potential problem. Montana FWP was unable to determine if fish from the Clark Fork can actually access Brock Creek (FWP, 2009).

A riparian survey was conducted at each fish sample site (RM 4.4 and 7.8) as well. River Mile 4.4 exhibited signs of livestock pressure in the form of hoofshear erosion and riparian browsing. Sediment levels appeared high and channelization (and a large pile of tailings) from past mining was evident (FWP, 2009). Montana FWP scored the site as “good” and cited lack of cover as a reason for the reduced score (FWP, 2009).

River Mile 7.8 showed a more stable channel with little erosion. A road runs close to the creek in this area and timber harvest is evident, but riparian vegetation is still adequate. This section scored well for riparian condition and “good” for fish habitat (FWP, 2009).

**Table xxx: Fish Distribution in the Brock Creek Watershed**

Waterbody	Begin RM*	End RM*	Species	Updated
Brock Creek	0.0	12.0	Westslope Cutthroat Trout	1/5/2005
Brock Creek	0.0	12.0	Slimy Sculpin	2/23/2009
Brock Creek	0.0	5.2	Longnose Sucker	2/23/2009
Brock Creek	0.0	1.1	Brown Trout	2/20/2009
East Fork Brock Creek	0.0	5.3	Westslope Cutthroat Trout	1/5/2005

Source: FWP, 2010

*Fishery Potential*

While Brock Creek experiences some impairments, protection and enhancement possibilities for a viable trout fishery exist (Table xxx). Montana FWP has shown an interest in managing (in collaboration with state agencies and other organizations) Brock Creek as a recreational fishery (FWP, 2010). Improved management practices can increase the fishery viability by addressing documented impairments (Table xxx) with appropriate restoration projects.

**Table xxx: Tributary Rating Summary for Brock Creek (Unranked)**

Stream	Reach(RM)	Trout Species	Impairments
Brock Creek	All: 0.0-12.0	Westslope Cutthroat	Timber harvest; roads; development; livestock grazing and traffic; mining; sediment/siltation; channelization; culverts
Current Recruitment/Restoration Fishery Value			Protection/Enhancement Value
<b>Low</b>			<b>Medium</b>
Current Tributary/Replacement Fishery Value			Protection/Enhancement Value
<b>Low</b>			<b>Medium</b>
Current Native Fishery Value (westslope cutthroat)			Protection/Enhancement Value
<b>High</b>			<b>High</b>

Source: MFWP, 2010

**4. Assessments**

Brock Creek and its riparian areas have been monitored by several different agencies in recent years (Table xxx). Assessments have included fish habitat and fishery potential, stream flow, noxious weeds, and stream channel and riparian habitat status.

**Table xxx: Brock Creek Assessments**

Type	Agency	Year	Area
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Tributary Prioritization /Rating Summary	MFWP	2010	River Mile 0.0-12.0
Fish Population/Riparian Habitat	MFWP	2009	River Mile 4.4, and 7.8
Upper Clark Fork Tributaries TMDL	MDEQ	2010	River Mile 0.0-12.0

## 5. Restoration

### Needs

- Address erosion issues by limiting livestock access to the creek and riparian areas
- Address mining degradation with the proper remediation processes
- Assess fish passage and recruitment from the Clark Fork River by monitoring the area near the culvert
- Monitor and treat for noxious weeds
- Continue to monitor temperature

*Activities: Projects undertaken by the WRC*

## 6. Watershed Map

### 7. Bibliography

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