1.Dunkleberg Creek Watershed Summary

Description and Land Use

Dunkleberg Creek has its headwaters in the Flint Creek Range and flows for 8.3 miles before its confluence with the Clark Fork River. The creek drains an area of approximately 15 square miles and is mainly divided between private and federal interests (Table xxx). The Dunkleberg Creek basin supports cattle grazing as the primary land use.

Table xxx: Dunkleberg Creek Watershed Overview

Watershed Size	9,779 acres/15.2 sq miles/39.6 sq km
Elevation Range	2,877 ft [4,078-6,955]
Stream Miles	27.8
Land Ownership	Private: 60% /State: 5%/Federal: 35%
Road Miles	Driveway/Service Road: 1.9 Local Road/City Street = 14.9 Four Wheel Drive Trail = 3.6 Total = 20.4

Source: Montana GIS Portal Data Layers

2.Impairments

Metals

The Dunkleberg Creek watershed contains the only two abandoned mines in the Upper Clark Fork TMDL Planning Area that are listed as DEQ priority abandoned mines: Forest Rose Mine and Jackson Park Mine (MDEQ, 2010). These mines contribute to metals contamination (Table xxx) through tailing impoundments, seeps, waste rock and adit discharge. The contamination spreads via water transportation and is also dispersed through human-caused and natural soil erosion. High levels of metals, along with acidic conditions created by leaching, pose health issues for humans, wildlife, fish and vegetative communities in the area. (MDEQ, 2010).

Nutrients

Lower Dunkleberg Creek exceeded Montana DEQ TMDL standards for nitrogen (nitrites/nitrates) in 2008 (Table xxx). Nitrites and nitrates mainly come 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

Sediment/Siltation

Impairments from sediment and streamside vegetative alteration most likely occur from over-grazing in the riparian areas near Dunkleberg Creek and somewhat from the effects of historic mining. Because livestock frequently have access to natural water sources in this area, riparian vegetation is sparse. This combined with livestock traffic, leads to accelerated bank erosion (MFWP, 2009). 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.). In the case of Dunkleberg Creek, soil erosion also transports metals pollution from mining refuse (MDEQ, 2010).

Table xxx: TMDL Impairments for Dunkleberg Creek

2010			
Reach	**Impairment**	**Pollutant**	**Impaired Beneficial Use**
River Mile 4.4-8.3	Arsenic	Metals	Aquatic Life, Cold Water Fishery, Drinking Water
	Cadmium	Metals	Aquatic Life, Cold Water Fishery
	Copper	Metals	Aquatic Life, Cold Water Fishery
	Lead	Metals	Aquatic Life, Cold Water Fishery
	Iron	Metals	Aquatic Life, Cold Water Fishery
	Zinc	Metals	Aquatic Life, Cold Water Fishery
River Mile 0.0-4.4	Arsenic	Metals	Aquatic Life, Cold Water Fishery, Drinking Water
	Cadmium	Metals	Aquatic Life, Cold Water Fishery
	Copper	Metals	Aquatic Life, Cold Water Fishery

	Lead	Metals	Aquatic Life, Cold Water Fishery
	Iron	Metals	Aquatic Life, Cold Water Fishery
	Zinc	Metals	Aquatic Life, Cold Water Fishery
2008			
Reach	**Impairment**	**Pollutant**	**Impaired Beneficial Use**
River Mile 4.4-8.3	Cadmium	Metals	Aquatic Life, Cold Water Fishery
	Lead	Metals	Aquatic Life, Cold Water Fishery, Drinking Water
	Zinc	Metals	Aquatic Life, Cold Water Fishery
	Alteration in side or littoral vegetative cover	*Not a Pollutant*	Aquatic Life, Cold Water Fishery, Primary Contact Recreation
River Mile 0.0-4.4	Lead	Metals	Aquatic Life, Cold Water Fishery
	Nitrogen (Total)	Nutrients	Aquatic Life, Cold Water Fishery
	Alteration in side or littoral vegetative cover	*Not a Pollutant*	Aquatic Life, Cold Water Fishery

Source: MDEQ, 2010

3.Sport/Native Fishery

Current Condition

Montana FWP electrofished and conducted riparian assessments at RM 2.8 and 6.2 in 2008. The survey found mainly native westslope cutthroat trout along with one brown trout (FWP, 2009). The riparian survey found both sites to be degraded from heavy grazing and some timber harvest, but RM 2.8 was significantly more damaged, with less plant diversity and an abundance of noxious weeds (FWP, 2009). The fish habitat at both sites was classified as "good" but lacked sufficient amounts of large woody debris (FWP, 2009).

Table xxx: Fish Distribution in Dunkleberg Creek

Waterbody	Begin RM*	End RM*	Species	Updated
Dunkleberg Creek	2.0	3.0	Brown Trout	9/2/2009
Dunkleberg Creek	0.0	8.3	Westslope Cutthroat Trout	9/4/2009

Source: MFWP, 2010

Fishery Potential

While Dunkleberg Creek experiences impairments, protection and enhancement possibilities for a viable trout fishery exist on several levels (Table xxx). Montana FWP has shown an interest in managing the creek (in collaboration with state agencies and other organizations) as a recreational fishery 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.

Table xxx: Tributary Rating Summary for Dunkleberg Creek (Unranked)

Stream	Reach(RM)	Trout Species	Impairments
Dunkleberg Creek	All: 0.0-8.3	Westslope Cutthroat and Brown	Soil erosion; heavy grazing; mining waste and contamination; lack of riparian vegetation; timber harvest
Current Recruitment/Restoration Fishery Value			Protection/Enhancement Value
Medium			**Medium**
Current Tributary/Replacement Fishery Value			Protection/Enhancement Value
Low			**Low**
Current Native Fishery Value (westslope cutthroat)			Protection/Enhancement Value
High			**High**

Source: MFWP, 2010

4.Assessments

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

Table xxx: Dunkleberg Creek Assessments

Type	Agency	Year	Area
Tributary Prioritization /Rating Summary	MFWP	2010	River Mile 0.0-8.3
Fish Population/Riparian Habitat	MFWP	2009	River Mile 2.8 and 6.2
Upper Clark Fork Tributaries TMDL	MDEQ	2010	River Mile 0.0-8.3

5.Restoration

Needs

- Address mining contamination with appropriate remediation efforts and soil erosion prevention measures

- Limit livestock access to riparian areas and the creek
- Improve riparian vegetation with restoration plantings
- Consider monitoring temperature throughout the creek

Activities: Projects undertaken by the WRC

6.Watershed Map

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