

## 1. Dempsey Creek Watershed Summary

### *Description and Land Use*

**Table xxx: Dempsey Creek Watershed Overview**

<b>Watershed Size</b>	18,158 acres/36.4 sq miles/94.2 sq km
<b>Elevation Range</b>	5,364 Feet [4,672-10,036]
<b>Stream Miles</b>	45.1
<b>Land Ownership</b>	Private: 38% /State: 7%/ Federal: 55%
<b>Road Miles</b>	Highway = 0.5 Local Road/City Street = 25.3 Four Wheel Drive Trail = 8.6 Service Road/Driveway = 2.1 Total = 36.5

Source: Montana GIS Portal Data Layers

Dempsey Creek originates in the Flint Creek mountain range and drains an area encompassing about 36 square miles east of the town of Deer Lodge. The creek flows for 16.5 miles until it reaches the Clark Fork River, two and a half miles north of the community of Dempsey.

The land in Dempsey Creek is mainly shared by U.S. Forest Service and private landowners (Table xxx), and is used for National Forest recreation, grazing and irrigated agriculture (MFWP, 2009). The large amount of private land has impeded comprehensive environmental assessments of the watershed in the past (MDEQ, 2010).

## 2. Impairments

**Table xxx: Listed and Suspected Impairments for Dempsey Creek**

<b>Impairment</b>	<b>Reach (River Mile)</b>	<b>Pollutant</b>	<b>Affected Beneficial Use</b>
<b>Nitrate/Nitrite (Nitrite + Nitrate as N)</b>	RM 0.0.-10.2	Nutrients	Aquatic Life, Cold Water Fishery
<b>Sedimentation/ Siltation</b>	RM 0.0.-10.2	Sediment	Aquatic Life, Cold Water Fishery

<b>Low flow alterations</b>	RM 0.0.-10.2	<i>Not a Pollutant</i>	Aquatic Life, Cold Water Fishery, Primary Contact
<b>Alteration in stream-side or littoral vegetative cover</b>	RM 0.0.-10.2	<i>Not a Pollutant</i>	Aquatic Life, Cold Water Fishery
<b>Temperature Measurements (Suspected Impairment)</b>			

<b>PIBO 2008</b>	RM*	Start Date	End Date	Max T (°C)	Days>12°C	Days>18°C
	11.8	7/15	8/31	14.0	30	0
<b>FWP 2008</b>	RM*	Start Date	End Date	Max T (°C)	Days>15°C	Days>20°C
	0.6	7/12	10/13	17.1	4	0
	5.1	7/12	10/13	22.3	47	8

\*River Mile

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

#### *Nutrients*

Dempsey Creek exceeds Montana DEQ TMDL standards for nitrogen (nitrites/nitrates) throughout most of the drainage (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

#### *Irrigation and Dewatering*

Chronic dewatering results from agricultural irrigation within the basin and has many implications for both water quantity and quality. Over 200 water rights exist on Dempsey Creek and North Fork Dempsey Creek (MDNRC, 2011), and several lakes near its headwaters are regulated for summer water use (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).

*Sediment/Siltation*

Impairments from sediment and siltation often occur from over-grazing in the riparian areas near Dempsey Creek. 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 (MDEQ, 2011). Sediment levels in Dempsey Creek exceed those defined by Montana DEQ TMDL standards.

*Temperature*

Thermal impairments are attributed to agricultural dewatering, and have been documented throughout the basin (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.

**3. Native/Sport Fishery Status**

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

<b>Waterbody</b>	<b>Reach (RiverMiles)</b>		<b>Species</b>	<b>Updated</b>
Dempsey Creek	0.0	6.8	Slimy Sculpin	2/23/2009
Dempsey Creek	0.0	8.1	Brown Trout	1/5/2005
Dempsey Creek	5.2	13.1	Brook Trout	2/20/2009
Dempsey Creek	0.0	5.2	Brook Trout	2/20/2009
Dempsey Creek	8.1	16.8	Westslope Cutthroat Trout	1/5/2005
North Fork Dempsey Creek	0.0	4.4	Westslope Cutthroat Trout	7/9/2009

Source: MFWP, 2010

*Current Condition*

The Dempsey Creek fishery is severely affected by agricultural irrigation practices. Over-allocation of water has led to extreme low flows on the lower reaches of the creek, with complete dewatering in certain reaches. While upper reaches support populations of westslope cutthroat trout, the lower reaches (confluence with the North Fork to the mouth) contain none. Trout populations in this section are composed mainly of brook and brown trout (MFWP, 2010). As mentioned in earlier sections, low water flows also result in high temperatures and algal growth, which can also compromise westslope cutthroat trout survival, as well as that of other fish species.

*Fishery Potential*

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

Stream	Reach(RM)	Trout Species	Impairments
Dempsey Creek	Lower: 0.0-8.1	Brook and Brown	Low summer flows due to irrigation with complete dewatering at certain reaches, livestock grazing in riparian areas; high temperatures; competition to westslope cutthroat from brook/brown trout; residential development
Current Recruitment/Restoration Fishery Value			Protection/Enhancement Value
<b>Medium</b>			<b>High</b>
Current Tributary/Replacement Fishery Value			Protection/Enhancement Value
<b>Medium</b>			<b>High</b>
Current Native Fishery Value (westslope cutthroat)			Protection/Enhancement Value
<b>Very Low</b>			<b>Low</b>

Source: MFWP, 2010

While Dempsey 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) Dempsey Creek as a recreational fishery, declaring lower Dempsey 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

Dempsey 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, temperature, stream flow, noxious weeds, and stream channel and riparian habitat status.

**Table xxx: Dempsey Creek Assessments**

Type	Agency	Year	Area
Tributary Prioritization /Rating Summary	MFWP	2010	River Mile 0.0-8.1
Fish Population/Riparian Habitat	MFWP	2009	River Mile 4.4, 5.0, and 10.7
PIBO Streams and Riparian Areas	USFS	2010	River Mile 11.8
Upper Clark Fork Tributaries TMDL	MDEQ	2010	River Mile 0.0-10.2
Riparian/Geomorphology/Flow Assessment	WRC	2010/2011	River Mile 0.6-6.0
Irrigation Structure Inventory	WRC	2010	Throughout Dempsey Creek

#### *WRC and FWP Riparian Assessments*

The WRC conducted NRCS riparian assessments on 6.1 miles of Dempsey Creek. Of the 15 assessed reaches, the WRC rated seven as “not sustainable”, seven as “at-risk” and one as sustainable (WRC, 2011). Montana FWP (2010) also assessed portions of Dempsey Creek and rated the riparian habitat of lower Dempsey Creek as “fair to poor” due to its lack of woody vegetation and channel alteration from livestock access.

#### 5. Restoration

##### *Needs*

- Address irrigation and dewatering issues within the affected stream reaches
- Address issues of livestock access to Dempsey Creek and its riparian areas
- Continue to monitor temperature and stream flow
- Improve habitat for trout, especially native westslope cutthroat populations
- Stabilize riparian areas and provide stream cover by restoring riparian vegetation communities
- Monitor and control invasive weeds
- Improve community outreach methods in order to overcome limits to monitoring on private land within the watershed

*Activities: Projects being undertaken by the WRC*

## 6.Map

## 7.Bibliography

Bureau of Land Management, Montana State Office. Montana Surface Management Ownership (poly)[vector digital data]. 2007.

Fischer, Jessie. Dempsey Creek Watershed map. 1:100,000. [Printed/Computer Maps]. Fischer Geospatial Enterprises, LLC. Missoula, Montana. 2011.

Kirk Environmental and Natural Resources, Inc. *Cottonwood Creek Flow Monitoring and Fish Barrier Study, Flow Monitoring and Water Rights Report*. Watershed Restoration Coalition. Deer Lodge, Montana. March 5, 2010.

Kirk Engineering and Natural Resources, Inc. *East Deer Lodge Valley Landscape Assessment*. April 24, 2008.

Kusnierz, Paul and Welch, Andy. *The Montana Department of Environmental Quality Sediment Assessment Method: Considerations, Physical and Biological Parameters, and Decision Making*. Montana Department of Environmental Quality. June, 2011

Montana Bureau of Mines and Geology (MBMG). Montana Abandoned and Inactive Mines Database [vector digital data]. Montana State Library. Helena, Montana. January 9, 2006

Montana Department of Environmental Quality. *Upper Clark Fork River Tributaries Sediment, Metals, and Temperature TMDLs and Framework for Water Quality Restoration*. March 4, 2010

Montana Department of Natural Resources and Conservation Water Resources Division. Montana Water Rights [vector digital data]. Montana State Library. Helena, Montana. July 11, 2011

Montana Fish, Wildlife & Parks. Montana Fish Distribution – Streams[vector digital data]. Montana Fish, Wildlife & Parks. Helena, Montana. May 17, 2010.

Montana Fish Wildlife and Parks. *Rating Summaries for the Prioritization of Tributaries of the Upper Clark Fork River Basin for Fishery Enhancement Draft Final*. May, 2010.

Montana Fish Wildlife and Parks. *An Assessment of Fish Populations and Riparian Habitat in Tributaries of the Upper Clark Fork River Basin (Phase II)*. March, 2009

Montana Fish, Wildlife & Parks. River Mile Locations (Tenth Mile Intervals) [vector digital data]. January 30, 2008.

Montana Natural Resources Conservation Service State Office. (6th-code) Hydrologic Units Montana Subwatershed [vector digital data]. Montana Natural Resources Conservation Service. Bozeman, Montana. 2007

Montana Trout Unlimited, Watershed Restoration Coalition and Montana Fish Wildlife and Parks. Summary of Irrigation Structure Inventory. 2010

U.S. Forest Service. PACFISH/INFISH Biological Opinion temperature and invasive weed datasets. U.S. Department of Agriculture. 2010

U.S. Census Bureau Geography Division. Montana Roads from TIGER/Line Files (Redistricting Census 2000)[vector digital data. Montana State Library. Helena, Montana. 2001.

U.S. Department of Commerce U.S. Census Bureau, Geography Division. Montana TIGER/Line Files, UA Census 2000 [vector digital data]. Montana State Library. Helena, Montana. 2002.

U.S. Geological Survey. National Elevation Dataset for Montana [raster digital data]. Montana State Library. Helena, MT. April 1, 2002.

Watershed Restoration Coalition. Upper Clark Fork Tributaries assessment data [Unpublished data for flow, geomorphology and riparian assessments]. Watershed Restoration Coalition. Deer Lodge, Montana. 2010-2011.