

## 1. Warm Springs Creek (Anaconda) Watershed

### *Description and Land Use*

**Table xxx: Warm Springs Creek Watershed Overview**

<b>Watershed Size</b>	92,288 acres/144.2 sq miles/373.6 sq km
<b>Elevation Range</b>	5,781 feet [4,800- 10,581]
<b>Stream Miles</b>	215.2
<b>Land Ownership</b>	Private: 27% /State: 10%/Federal: 63%
<b>Road Miles</b>	Local Road/City Street = 128.7 Four Wheel Drive Trail = 16.3 Service Road/Driveway = 4.7 Frontage Road = 0.1 Highway = 19.1 Total = 168.9

Source: Montana GIS Portal Data Layers

Warm Springs Creek is a major tributary to the Clark Fork River and drains an area of about 144 square miles (Table xxx), including 24 named tributaries. Land ownership in the basin is split between Forest Service, state and private land. It supports grazing and pasture, irrigated agriculture, timber harvest, recreation and has historically been the site of significant mining activity (MFWP, 2008).

## 2. Impairments

**Table xxx: Listed and Suspected Impairments for Warm Springs Creek**

2010			
Impairment	Reach (River Mile)	Pollutant	Impaired Beneficial Use
Arsenic	0.0-16.6	Metals	Aquatic Life, Cold Water Fishery, Drinking Water
Cadmium	0.0-16.6	Metals	Aquatic Life, Cold Water Fishery
Copper	0.0-16.6	Metals	Aquatic Life, Cold Water Fishery
Lead	0.0-16.6	Metals	Aquatic Life, Cold Water Fishery
Iron	0.0-16.6	Metals	Aquatic Life, Cold Water Fishery
Zinc	0.0-16.6	Metals	Aquatic Life, Cold Water Fishery

2008							
Impairment	Reach (River Mile)		Pollutant		Impaired Beneficial Use		
Physical substrate habitat	16.6-32.5		Not a pollutant		Aquatic Life, Cold Water Fishery*		
Arsenic	0.0-16.6		Metals		Aquatic Life, Cold Water Fishery, Drinking Water		
Copper	0.0-16.6		Metals		Aquatic Life, Cold Water Fishery		
Lead	0.0-16.6		Metals		Aquatic Life, Cold Water Fishery,		
Low Flow Alterations	0.0-16.6		Not a pollutant		Aquatic Life, Cold Water Fishery, Primary Contact Recreation		
Alteration in streamside or littoral vegetative cover	0.0-16.6		Not a pollutant		Aquatic Life, Cold Water Fishery		
Physical substrate	0.0-16.6		Not a pollutant		Aquatic Life, Cold Water Fishery		
Temperature Measurements (Suspected Impairment)							
PIBO	Year	RM*	Start Date	End Date	Max T (°C)	Days>12°C	Days>18°C
	2009	24.9	7/15	8/31	13.5	16	0
Warm Springs Creek	2004	24.9	7/15	8/31	14.8	32	0
	2009	1.0	7/15	8/31	14.2	27	0
Foster Creek	2004	1.0	7/15	8/31	16.8	36	0
	2009	9.5	7/15	8/31	9.8	0	0
Twin Lakes Creek	2004	9.5	7/15	8/31	6.4	0	0
	MFWP	Year	RM*	Start Date	End Date	Max T (°C)	Days>15°C
Warm Springs Creek		1.0	7/6	10/17	21.2	58	8
	2007	13.2	7/6	10/17	16.6	11	0
		27.4	7/6	10/17	7.7	0	0
Barker Creek	2007	0.1	7/6	10/17	14.7	0	0
Foster Creek	2007	1.5	7/6	10/17	16.1	11	0
Twin	2007	0.2	7/6	7/12	15.3	Tampering caused only a	

<b>Lakes Creek</b>	week of results to be recorded. Results are insufficient.						
<b>Storm Lake Creek</b>	2007	1.4	7/6	10/17	15.1	1	0

\*River Mile

Source: MDEQ, 2010; PIBO/USFS 2010; MFWP 2008

*Metals*

The Warm Springs Creek basin lies within the Anaconda Smelter Superfund Site and, in addition to the effects of mine wastes and placer mining, exhibits impairments from atmospheric pollutant deposition from the smelter (MDEQ, 2010). Warm Springs Creek is listed for arsenic, copper, lead, cadmium, and zinc (Table xxx). High concentrations of metals can have harmful effects on vegetation, macroinvertebrates, fish and human health. Lack of riparian vegetation leads to bank erosion, which contributes to further contamination (MDEQ, 2010). Remediation efforts to address the extensive metals contamination and to prevent further pollution from erosion and leaching have been ongoing since the 1990s (MDEQ, 2010).

*Irrigation and Dewatering*

Almost 1,000 diversions exist within the Warm Springs Creek watershed. Chronic dewatering results from the variety of land uses within the basin and has many implications for both water quantity and quality. Low flows increase water temperatures and result in unsuitable habitat for fish and macroinvertebrates as well as in excess algal growth (Table xxx). In addition to reduced stream flow, irrigation structures create physical barriers and impediments to fish passage. Meyers Dam presents a major obstacle at River Mile 16.6, and several unscreened diversions have been noted at sites throughout the creek (MFWP, 2008).

*Sediment/Siltation*

Impairments from sediment and siltation often occur from lack of woody vegetation in the riparian areas near Warm Springs Creek and its tributaries. Sulfur dioxide, a byproduct of the Anaconda Smelter, has damaged bank-stabilizing riparian vegetative

communities (MDEQ, 2010). Timber harvest and roads also disturb plant communities and add sediment to streams. Additionally, livestock often have access to natural water sources in this area, which further harms vegetation and causes bank erosion (MFWP, 2008).

Sedimentation beyond that which is naturally occurring degrades 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 contaminated creeks such as Warm Springs, metals and other pollutants are attached to soil particles and spread with eroding soil. Sediment levels in Warm Springs Creek exceed those defined by Montana DEQ TMDL standards (MDEQ, 2010).

### *Temperature*

Thermal impairments are often attributed to agricultural dewatering, and have been documented on Warm Springs Creek and its tributaries (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**

**Table xxx: Fish Distribution in the Warm Springs Watershed**

<b>Waterbody</b>	<b>Begin RM*</b>	<b>End RM*</b>	<b>Species</b>	<b>Updated</b>
Warm Springs Creek	15.3	24.5	Westslope Cutthroat Trout	1/5/2005
Warm Springs Creek	9.4	10.7	Westslope Cutthroat Trout	1/5/2005
Warm Springs Creek	10.7	15.3	Westslope Cutthroat Trout	1/5/2005
Warm Springs Creek	24.5	32.5	Westslope Cutthroat Trout	1/5/2005
Warm Springs Creek	0.0	4.0	Westslope Cutthroat Trout	11/18/2009
Warm Springs Creek	13.1	24.1	Westslope X Rainbow	2/23/2009
Warm Springs Creek	0.0	26.1	Slimy Sculpin	2/23/2009
Warm Springs Creek	0.0	11.6	Rainbow Trout	3/25/2009
Warm Springs Creek	11.6	25.0	Rainbow Trout	8/28/2009

Warm Springs Creek	0.0	12.9	Mountain Whitefish	2/20/2009
Warm Springs Creek	0.0	22.3	Longnose Sucker	1/5/2005
Warm Springs Creek	24.4	24.4	Bull Trout	1/5/2005
Warm Springs Creek	12.3	24.4	Bull Trout	1/5/2005
Warm Springs Creek	24.4	32.6	Bull Trout	1/5/2005
Warm Springs Creek	18.2	24.4	Brown Trout	9/14/2009
Warm Springs Creek	0.0	18.2	Brown Trout	9/14/2009
Warm Springs Creek	14.0	28.4	Brook X Bull Trout hybrid	2/20/2009
Warm Springs Creek	13.1	29.4	Brook Trout	3/25/2009
East Fork Warm Springs Creek	0.0	1.9	Westslope Cutthroat Trout	1/5/2005
Middle Fork Warm Springs Creek	0.0	2.1	Westslope Cutthroat Trout	1/5/2005
West Fork Warm Springs Creek	0.0	2.1	Westslope Cutthroat Trout	1/5/2005
West Fork Warm Springs Creek	0.0	2.0	Bull Trout	2/20/2009
Twin Lakes Creek	1.0	10.0	Westslope Cutthroat Trout	9/16/2009
Twin Lakes Creek	0.0	7.3	Slimy Sculpin	9/16/2009
Twin Lakes Creek	0.0	9.0	Bull Trout	1/5/2005
Twin Lakes Creek	0.0	9.0	Brook X Bull Trout hybrid	1/5/2005
Twin Lakes Creek	0.0	9.0	Brook Trout	1/5/2005
East Fork Twin Lakes Creek	0.0	2.0	Westslope Cutthroat Trout	8/7/2007
Storm Lake Creek	0.0	12.3	Westslope Cutthroat Trout	7/25/2008
Storm Lake Creek	1.5	3.5	Bull Trout	7/24/2009
Storm Lake Creek	0.0	1.5	Bull Trout	7/24/2009
Storm Lake Creek	0.0	3.5	Brook Trout	3/25/2009
Foster Creek	0.0	9.8	Westslope Cutthroat Trout	1/5/2005
Foster Creek	0.0	1.3	Slimy Sculpin	2/23/2009
Foster Creek	0.0	9.9	Bull Trout	1/5/2005
Foster Creek	0.0	2.4	Brook X Bull Trout hybrid	2/20/2009
Foster Creek	4.8	9.4	Brook Trout	2/20/2009
Foster Creek	0.0	4.8	Brook Trout	2/20/2009

Cable Creek	0.0	3.2	Westslope Cutthroat Trout	1/5/2005
Cable Creek	0.0	0.6	Rainbow Trout	7/13/2009
Cable Creek	0.0	3.2	Brook Trout	2/20/2009
Barker Creek	0.0	4.1	Westslope Cutthroat Trout	6/4/2009
Barker Creek	0.0	5.0	Bull Trout	7/24/2009
Barker Creek	0.0	0.7	Brook Trout	2/20/2009

Source: MFWP, 2010

### *Current Condition*

Montana FWP conducted fish sampling on Warm Springs Creek in 2007 at River Mile 1.8, 7.4, 8.4, 16.4, 18.6, 23.3, 27.4, and 29.1. Trout populations changed composition throughout the creek with brown trout comprising the majority in the lower reaches, brown trout, some brook trout and westslope cutthroat (including rainbows and hybrids) making up the lower to middle reaches, westslope cutthroat inhabiting the middle to upper reaches, and a majority of bull trout in the upper reaches (MFWP, 2008). Fish habitat ranged mainly from “good” to “excellent” with most sites being declared “near” or “at potential”. River Mile 18.6 and 23.3 scored only “fair” on the assessment and lacked deep pools and sufficient large woody debris (MFWP, 2008).

### *Tributary Fishery Conditions*

- **West For Warm Springs Creek:** The sample at RM 1.0 showed 58% bull trout and 48% westslope cutthroat trout. Fish habitat assessments received a perfect score. Montana FWP declared fish habitat “good” and at its potential (2008).
- **Middle Fork Warm Springs Creek:** The sample at RM 0.4 found only westslope cutthroat trout. Fish habitat was scored as “good” but lacked sufficient large woody debris (MFWP, 2008).
- **East Fork Warm Springs Creek:** The sample at RM 0.5 contained no fish and MFWP did not conduct a scored riparian assessment (MFWP, 2008).
- **Barker Creek:** Montana FWP sampled the creek at RM 0.5, 1.6 and 2.9. Bull trout were the dominant species at each site, with westslope cutthroat and brook trout comprising the remainder. Some cutthroat -rainbow hybrids as well as bull-brook

hybrids were present. Fish habitat at 0.5 was “excellent” but only “good” at the other two sites (MFWP, 2008).

- **Foster Creek:** Sample sites included RM 1.1, 2.3 and 3.9 and mainly contained westslope cutthroat and brook trout. One bull-brook hybrid was noted. All three sites’ fish habitat received a score of “good” (MFWP, 2008).
- **Twin Lakes Creek:** Sample sites at RM 1.4, 2.8, 4.7, and 7.2 showed populations of bull, westslope cutthroat and brook trout. Bull trout also occur in Upper and Lower Twin Lakes (which drain into Twin Lakes Creek. Fish habitat ranged from “fair” at RM 1.4 to “good” at the rest of the sites (MFWP, 2008).
- **Cable Creek:** Fish samples were conducted at RM 0.8 and 2.2. Westslope cutthroat comprised the majority of the trout population at the lower site, while brook trout were the main species at the upper. Fish habitat scored better at RM 2.2 than 0.8 with 2.2 being rated “good” and 0.8 rated “fair” (MFWP, 2008).
- **Storm Lakes Creek:** Fish samples and riparian assessment occurred at RM 0.6, 1.4, 3.0, 4.2, and 6.3. Westslope cutthroat and brook trout were most common at the sample sites, with bull trout and bull trout hybrids appearing in the upper reaches. Fish habitat ranged from “poor” at RM 0.6 to “good and even “excellent” at the other sites (MFWP, 2008).

*Fishery Potential*

**Table xxx: Tributary Rating Summary for Lower Warm Springs Creek (Priority 1)**

Stream	Reach(RM)	Trout Species	Impairments
Warm Springs Creek	Lower: 0.0-16.6	Bull, Brook, Brown, Westslope Cutthroat and Rainbow	Low summer flows due to irrigation, diversions, unscreened diversions; erosion; mining; livestock grazing in riparian areas; timber harvest; high temperatures; development; competition to bull and westslope cutthroat trout from brook/brown/rainbow trout
Current Recruitment/Restoration Fishery Value			Protection/Enhancement Value
<b>Very High</b>			<b>Very High</b>
Current Tributary/Replacement Fishery Value			Protection/Enhancement Value
<b>High</b>			<b>High</b>
Current Native Fishery Value (westslope cutthroat)			Protection/Enhancement Value
<b>Medium</b>			<b>Medium</b>

Source: MFWP, 2010

**Table xxx: Tributary Rating Summary for Upper Warm Springs Creek (Priority 2)**

Stream	Reach(RM)	Trout Species	Impairments
--------	-----------	---------------	-------------

Warm Springs Creek	Upper:16.6-32.5	Bull, Brook, Brown, Westslope Cutthroat and Rainbow	Low summer flows due to irrigation, diversions, unscreened diversions; erosion; mining; livestock grazing in riparian areas; timber harvest; high temperatures; development; competition to bull and westslope cutthroat trout from brook/brown/rainbow trout
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 (bull; westslope cutthroat)			Protection/Enhancement Value
<b>High</b>			<b>High</b>

Source: MFWP, 2010

**Table xxx: Tributary Rating Summary for West Fork Warm Springs Creek (Priority 4)**

Stream	Reach(RM)	Trout Species	Impairments
West Fork Warm Springs Creek	All: 0.0-2.0	Bull and Westslope Cutthroat	Low summer flows due to irrigation, diversions, unscreened diversions; erosion; mining; timber harvest; competition to bull and westslope cutthroat trout from brook/brown/rainbow trout
Current Recruitment/Restoration Fishery Value			Protection/Enhancement Value
<b>Low</b>			<b>Low</b>
Current Tributary/Replacement Fishery Value			Protection/Enhancement Value
<b>Low</b>			<b>Low</b>
Current Native Fishery Value (bull; westslope cutthroat)			Protection/Enhancement Value
<b>Very High</b>			<b>Very High</b>

Source: MFWP, 2010

While Warm Springs Creek and its tributaries experience several impairments, protection and enhancement possibilities for a viable trout fishery exist on several levels (Table xxx, xxx and xxx). Montana FWP has shown an interest in managing (in collaboration with state agencies and other organizations) Warm Springs Creek and West Fork Warm Springs Creek as recreational fisheries, declaring lower Warm Springs Creek a “Priority 1” stream reach, upper Warm Springs Creek a “Priority 2” stream reach and West Fork Warm Springs Creek a “Priority 4” 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, xxx and xxx) with appropriate restoration projects.

#### 4. Assessments

Warm Spring 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: Warm Springs Creek Assessments**

Type	Agency	Year	Area
Tributary Prioritization /Rating Summary	MFWP	2010	Warm Springs Creek and West Fork Warm Springs Creek
Fish Population/Riparian Habitat	MFWP	2008	Warm Springs Creek and tributaries
PIBO Temperature	USFS	2010	Warm Springs Creek and tributaries
Upper Clark Fork Tributaries TMDL	MDEQ	2010	River Mile 0.0-32.5
Irrigation Structure Inventory	WRC	2010	Throughout Dempsey Creek

#### *FWP Riparian Assessment*

Montana FWP conducted riparian assessments at all fish survey reaches on Warm Springs Creek and its tributaries during 2008 (Section 3 contains specific river mile references).

- **Warm Springs Creek:** The riparian condition at most sites scored well, with the presence of noxious weeds being the main detractor (MFWP, 2008). The site at RM 29.1 scored the lowest due to recent timber harvest near the stream and a lack of woody vegetation and stream cover (MFWP, 2008).
- **West Fork Warm Springs Creek:** Riparian assessment results at RM 1.0 received a perfect score.
- **Middle Fork Warm Springs Creek:** River Mile scored high on the riparian assessment, with fish habitat being the reducing factor (MFWP, 2008).
- **East Fork Warm Springs Creek:** The sample at RM 0.5 contained no fish and MFWP did not conduct a scored riparian assessment (MFWP, 2008).

- **Barker Creek:** Montana FWP assessed the creek at RM 0.5, 1.6 and 2.9. Riparian habitat at 0.5 was “excellent” but only “good” at the other two sites. Recent logging was apparent throughout the sampled reaches. Noxious weeds, decreased woody vegetation and some soil erosion appeared to be effects of the timber harvest (MFWP, 2008).
- **Foster Creek:** Assessment sites included RM 1.1, 2.3 and 3.9. The lower sites contained good levels of riparian woody vegetation but were limited by low flows. Flow at site 3.9 was good but riparian vegetation (and therefore large woody debris) was sparse.
- **Twin Lakes Creek:** Assessment sites at RM 1.4, 2.8, 4.7, and 7.2 showed the effects of timber harvest (past and recent) were present throughout the drainage. Woody vegetation and large woody debris were below optimum levels (MFWP, 2008).
- **Cable Creek:** Riparian assessments were conducted at RM 0.8 and 2.2. Habitat scored better at RM 2.2 than 0.8 with 2.2 being rated “good” and 0.8 rated “fair”. Noxious weeds, sedimentation and lack of large woody debris reduced the scores (MFWP, 2008).
- **Storm Lakes Creek:** Riparian assessment occurred at RM 0.6, 1.4, 3.0, 4.2, and 6.3. Timber harvest effects were apparent throughout the drainage and sedimentation was noted at RM 4.2 and 1.4 (MFWP, 2008).

## 5. Restoration

### *Needs*

- Continued monitoring and remediation for metals contamination
- Address bank erosion and sedimentation causes such as livestock access, timber harvest, roads
- Continued temperature monitoring
- Address fish passage issues by screening diversions and altering instream barriers
- Work with water users to address low streamflow

*Activities: Projects being undertaken by the WRC*

## 6. Watershed Map

## 7. Bibliography

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

Fischer, Jessie. Warm Springs Creek Watershed map. 1:200,000 [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

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 I)*. 2008.

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 (PIBO) 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.