## 1.Browns Gulch Watershed Summary

**Table xxx: Browns Gulch Watershed Overview**

| | |
|---|---|
| **Watershed Size** | 54,059 acres/85.0 sq miles/218.8 sq km |
| **Elevation Range** | 2,556 feet [5,302-7,858] |
| **Stream Miles** | 131.3 |
| **Land Ownership** | Private: 22%/State: 1%/Federal: 46%/ Local Government: 31% |
| **Road Miles** | Local Road/City Street = 86.7<br>Highway = 1.5<br>Four-wheel drive trail = 1.3<br>Driveway/Service Road = 5.9<br>Alley/Access Ramp = 1.0<br>Total = 86.7 |

Source: Montana GIS Portal Data Layers

*Description and Land Use*

Browns Gulch, a tributary to Silver Bow Creek (which is a tributary to the Clark Fork) originates in the Cottonwood Mountains near the Continental Divide and flows for about 18 miles. Browns Gulch drains an area of over 50,000 acres (Table xxx) and contains the tributaries of Alaska Gulch, American Gulch, Meadow Gulch, Telegraph Gulch and several others. Grazing and irrigated hay production, as well as past and present timber harvest are common land uses within the basin (KirK, 2006). Mines exist primarily near the lower reaches of Browns Gulch and its tributaries (MBMG, 2006)

## 2.Impairments

**Table xxx: Temperature Measurements for Browns Gulch**

| | RM* | Start Date | End Date | Max T (°C) | Days>12°C | Days>18°C |
|---|---|---|---|---|---|---|
| **PIBO 2008** | 14.0 | 7/15 | 8/31 | 14.0 | 23 | 0 |
| **PIBO 2003** | 14.0 | 7/15 | 8/31 | 19.2 | 42 | 4 |

*River Mile

Source: PIBO/USFS 2010

*TMDL Impairments*

According to the 2010 final TMDL document, Browns Gulch is not listed as a 303(d) stream and does not have TMDLs. However, Browns Gulch was assessed in 2005 by KirK Environmental Engineering and the findings are available in the *Browns Gulch Watershed Baseline Report* (2006). KirK cited inconclusive data on sediment/siltation, nutrient levels, and elevated arsenic and copper levels as impairments to Browns Gulch. They suggested more research into impairment causes and pollutant levels (2006).

*Temperature*

Water temperature has been monitored twice in the last ten years at one site on Browns Gulch (Table xxx). The results show a sizable drop in maximum temperature as well as the number of days where the temperature rose above 12 °C. While the literature gives no proven cause for the change in temperature, KirK (2006) speculates that the lower temperature could be the result of increased stream flow. Additionally, given the riparian status of the lower reaches of the creek (riparian assessments, KirK, 2006), it is likely that temperatures are considerably higher due to sparse woody vegetation and increased dewatering.

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 Fishery

**Table xxx: Fish Distribution in the Browns Gulch Watershed**

| Waterbody | Begin RM* | End RM* | Species |
|---|---|---|---|
| Browns Gulch | 0.0 | 17.1 | Westslope Cutthroat Trout |
| Browns Gulch | 0.0 | 7.6 | Brook Trout |
| Browns Gulch | 7.6 | 18.1 | Brook Trout |
| Alaska Gulch | 0.0 | 4.7 | Westslope Cutthroat Trout |
| Alaska Gulch | 0.0 | 2.1 | Brook Trout |

| | | | |
|---|---|---|---|
| American Gulch | 0.0 | 3.0 | Westslope Cutthroat Trout |
| American Gulch | 0.0 | 2.0 | Brook Trout |
| Butcher Gulch | 0.0 | 1.8 | Westslope Cutthroat Trout |
| Cooney Gulch | 0.0 | 1.3 | Surveyed; no fish captured |
| Deep Canyon | 0.0 | 1.3 | Westslope Cutthroat Trout |
| Flume Gulch | 0.0 | 3.9 | Westslope Cutthroat Trout |
| Flume Gulch | 0.0 | 2.4 | Brook Trout |
| Hail Columbia Gulch | 0.0 | 7.4 | Westslope Cutthroat Trout |
| Hail Columbia Gulch | 4.6 | 5.7 | Slimy Sculpin |
| Hail Columbia Gulch | 0.0 | 7.0 | Brook Trout |
| Rocky Canyon | 0.0 | 2.6 | Westslope Cutthroat Trout |
| Rocky Canyon | 0.4 | 2.6 | Brook Trout |
| Sheep Gulch | 0.0 | 4.5 | Westslope Cutthroat Trout |
| Telegraph Gulch | 0.0 | 3.7 | Westslope Cutthroat Trout |
| Telegraph Gulch | 0.0 | 2.5 | Brook Trout |

Source: MFWP, 2010

*Current Condition*

Browns Gulch and its tributaries have been sampled by the Montana FWP between 2005 and 2009 (Table xxx). Several reaches provide habitat for native westslope cutthroat trout and also contain brook trout--which compete with westslope cutthroat trout for habitat, food and mates (KirK, 2006). However, the basin contains areas of high stream temperatures as well as degraded fish habitat and riparian areas.

*Fishery Potential*

Given the existence of trout in the majority of Brown Gulch's tributaries and in Brown Gulch itself, both a viable sport fishery and population of native trout appear

possible. As mentioned in the previous section, degraded fish and riparian habitat is a problem throughout Browns Gulch and needs to be addressed the fishery reaches its potential. KirK (2006) cites gaps in existing data and recommends further monitoring and research in order to create solutions for the identified habitat issues.

## 4.Assessments

Browns Gulch and some of its tributaries have been assessed several times in the last ten years (Table xxx) but not as often as other impaired creeks in the same general area. Assessments have included noxious weeds, temperature, stream flow, geomorphology, riparian habitat and fish habitat. Generalized assessments for pollutants (chemicals, nutrients, metals, sediment) have been conducted to a lesser degree and further study may be required for accurate results.

**Table xxx: Browns Gulch Assessments**

| Type | Agency | Year | Area |
|---|---|---|---|
| Riparian/Geomorphology/Flow Assessments | WRC | 2010/2011 | Throughout Browns Gulch |
| Tributary Prioritization/Rating Summary | MFWP | 2010 | Not listed |
| Browns Gulch Watershed Baseline Report | KirK | 2006 | Browns Gulch and Tributaries |
| PIBO Temperature | USFS | 2010 | River Mile 14, 16.3 |

## 5.Restoration

*Needs*

- Continued, in-depth monitoring for temperature, TMDL impairments and fishery conditions
- Limit livestock access to riparian areas and streams
- Encourage woody vegetation growth
- Address road and bank erosion to prevent sedimentation/siltation issues
- Work with landowners to address dewatering/flow issues

*Activities: Projects being undertaken by the WRC*

## 6.Watershed Map

## 7.Bibliography

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