# Stream: MOELLER CREEK

## Executive Summary

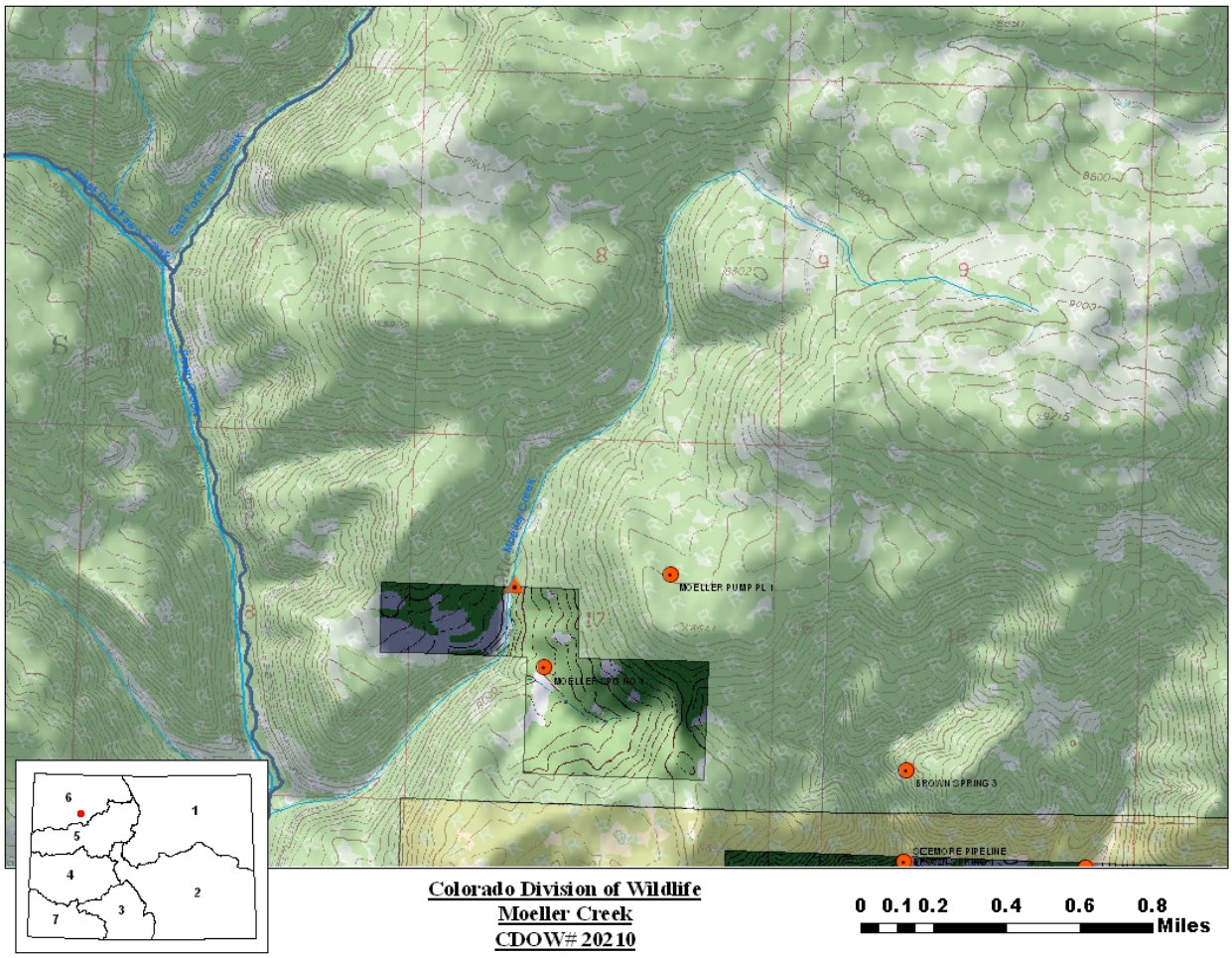
Water Division: 6
Water District: 43
CDOW#: 20210

## Segment: HEADWATERS to FAWN CREEK

**Upper Terminus: HEADWATERS**
Latitude: 40º 04’ 00”N Longitude: 107º 29’ 27"W

**Lower Terminus: FAWN CREEK**
Latitude: 40º 02’ 50”N Longitude: 107º 31’ 45"W

Counties: Rio Blanco County
Length: 3.5 miles
USGS Quad(s):
ISF Appropriation: 2.50 cfs (April 1 – April 30)*
3.25 cfs (May 1 – June 30) *
0.60 cfs (July 1 – July 31) *
0.35 cfs (August 1 – March 31) *




The information contained in this report and the associated instream flow file folder forms the basis for the instream flow recommendation to be considered by the Colorado Water Conservation Board (Board). It is the Colorado Division of Wildlife (CDOW) staff's opinion that the information contained in this report is sufficient to support the findings required in Rule 5(i).

The State of Colorado's Instream Flow Program (ISFP) was created in 1973 when the Colorado State Legislature recognized "the need to correlate the activities of mankind with some reasonable preservation of the natural environment" (See §37-92-102 (3) C.R.S.). The statute vests the Board with the exclusive authority to appropriate and acquire instream flow and natural lake level water rights. In order to encourage other entities to participate in Colorado's ISFP, the statute directs the Board to request instream flow recommendations from other state and federal agencies. The CDOW recommended this segment of Moeller Creek to the Board for inclusion into the ISFP. Moeller Creek is being considered for inclusion into the ISFP because it has a natural environment that can be preserved to a reasonable degree with an instream flow water right.

The CDOW is forwarding this instream flow recommendation to the Board to meet Colorado's policy "… that the wildlife and their environment are to be protected, preserved, enhanced, and

managed for the use, benefit, and enjoyment of the people of this state and its visitors … and that, to carry out such program and policy, there shall be a continuous operation of planning, acquisition, and development of wildlife habitats and facilities for wildlife-related opportunities" (See §33-1-101 (1) C.R.S.). The CDOW Strategic Plan states "[h]ealthy aquatic environments are essential to maintain healthy and viable fisheries, and critical for self-sustaining populations. The [CDOW] desires to protect and enhance the quality and quantity of aquatic habitats."

Moeller Creek is approximately 3.5 miles long. It begins on the south side of Sleepy Cat Peak at an elevation of approximately 9,050 feet and terminates at the confluence with Fawn Creek at an elevation of approximately 7,475 feet. Of the 3.5 mile segment addressed by this report, approximately 95% of the segment, or 3.3 miles, is located on public lands. Moeller Creek is located within Rio Blanco County. The total drainage area of Moeller Creek is approximately 2.9 square miles. Moeller Creek generally flows in a westerly direction.

The subject of this report is a segment of the Moeller Creek beginning at its headwaters and extending downstream to the confluence with Fawn Creek. The proposed segment is located near the Town of Buford. The recommendation for this segment is discussed below.

## Instream Flow Recommendation(s)

The CDOW is recommending[1] 3.25 cfs, summer, and 0.6 cfs, winter, based on their data collection efforts. This recommendation is based on the physical and biological data collected to date and does not incorporate any water availability constraints.

- 3.25 cubic feet per second is recommended is required to maintain the three principal hydraulic criteria of average depth, average velocity and percent wetted perimeter;
- 0.6 cubic feet per second is required to maintain two of the three principal hydraulic criteria.

The modeling results from this survey effort were outside the confidence interval produced by the R2CROSS model and additional data will be collected to more accurately predict the necessary flows for protection of the natural environment (see Table 1).

## Land Status Review

| Upper Terminus | Lower Terminus | Total Length (miles) | Land Ownership | |
|---|---|---|---|---|
| | | | % Private | % Public |
| HEADWATERS | FAWN CREEK | 3.5 | 5 | 95 |

## Biological and Field Survey Data

The CDOW, in 2007, collected stream cross-section information, natural environment data, and other data needed to quantify the instream flow needs for this reach of Moeller Creek. Moeller Creek is classified as a minor stream (between 4 to 9 feet wide) and fishery surveys indicate the

[1] Additional data collection is required for both the summer and winter flow recommendations.

stream environment of Moeller Creek could support: Colorado River cutthroat trout (*Oncorhynchus clarkii pleuriticus*).

Colorado River cutthroat trout sucker have been identified by the DOW and several other state and federal agencies as "species of greatest conservation need". DOW is involved in developing Conservation and Management Plans for these species. The intention of these plans is to increase populations and distributions of identified species, thereby assisting in the long-term persistence of each species. The success of such plans could potentially curtail the need for federal listing of these species under the Endangered Species Act (ESA). This species is not currently federally listed" (See CDOW Fish Survey in Appendix B).

## Field Survey Data

CDOW staff used the R2CROSS methodology to quantify the amount of water required to preserve the natural environment to a reasonable degree. The R2CROSS method requires that stream discharge and channel profile data be collected in a riffle stream habitat type. Riffles are most easily visualized, as the stream habitat types that would dry up first should streamflow cease. This type of hydraulic data collection consists of setting up a transect, surveying the stream channel geometry, and measuring the stream discharge. Appendix B contains copies of field data collected for this proposed segment.

## Biological Flow Recommendation

The Board staff relied upon the biological expertise of the cooperating agencies to interpret output from the R2CROSS data collected to develop the initial, biologic instream flow recommendation. This initial recommendation is designed to address the unique biologic requirements of each stream without regard to water availability. Three instream flow hydraulic parameters, average depth, percent wetted perimeter, and average velocity are used to develop biologic instream flow recommendations. The CDOW has determined that maintaining these three hydraulic parameters at adequate levels across riffle habitat types, aquatic habitat in pools and runs will also be maintained for most life stages of fish and aquatic invertebrates (Nehring 1979; Espegren 1996).

For this segment of stream, one data set was collected with the results shown in Table 1 below. Table 1 shows who collected the data (Party), the date the data was collected, the measured discharge at the time of the survey (Q), the accuracy range of the predicted flows based on Manning's Equation (240% and 40% of Q), the summer flow recommendation based on meeting 3 of 3 hydraulic criteria and the winter flow recommendation based upon 2 of 3 hydraulic criteria.

Table 1: Data

| Party | Date | Q | 250%-40% | Summer (3/3) | Winter (2/3) |
|---|---|---|---|---|---|
| DOW | 7/11/2007 | 0.21 | 0.5 – 0.1 | $3.25^{OR}$ | $0.65^{OR}$ |

DOW = Division of Wildlife

Biologic Flow Recommendation

The summer flow recommendation, which met 3 of 3 criteria and was outside of the accuracy range of the R2CROSS model is 3.25 cfs (See Table 1). The winter flow recommendation,

which met 2 of 3 criteria and was outside the accuracy range of the R2CROSS model range is 0.6 cfs (See Table 1).

## Hydrologic Data

The CDOW staff conducted a preliminary evaluation of the stream hydrology to determine if water was physically available for an instream flow appropriation. The hydrograph below was derived from data collected by the USGS stream gage for Lost Creek, near Buford, CO (#09302450), which has a drainage area of 21.5 square miles (See Gage Summary in Appendix C). The total drainage area upstream of this ISF segment of Moeller Creek is 2.9 square miles. The period of record for the Lost Creek gage was 1964 to 1989, the period of record used by staff in their analysis was 1964 to 1989, or 25 years of record. Table 2 below displays the estimated flow of Moeller Creek in cfs at the lower terminus of the instream flow reach in terms of a percentage of exceedence.

Table 2: Estimated Stream Flow for Moeller Creek

| Exceedences | January | February | March | April | May | June | July | August | September | October | November | December |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1% | 0.87 | 0.97 | 5.77 | 29.40 | 64.95 | 33.59 | 4.45 | 0.90 | 1.16 | 1.25 | 0.84 | 0.83 |
| 5% | 0.71 | 0.70 | 1.11 | 18.61 | 51.43 | 23.13 | 2.56 | 0.67 | 0.70 | 0.97 | 0.72 | 0.70 |
| 10% | 0.59 | 0.62 | 0.88 | 13.35 | 42.89 | 16.86 | 1.75 | 0.55 | 0.58 | 0.88 | 0.66 | 0.65 |
| 20% | 0.46 | 0.51 | 0.74 | 8.50 | 31.70 | 11.60 | 1.11 | 0.47 | 0.45 | 0.65 | 0.58 | 0.51 |
| 50% | 0.34 | 0.35 | 0.46 | 2.56 | 17.40 | 5.13 | 0.57 | 0.31 | 0.28 | 0.36 | 0.35 | 0.35 |
| 80% | 0.26 | 0.27 | 0.31 | 0.80 | 7.42 | 1.75 | 0.32 | 0.22 | 0.19 | 0.26 | 0.27 | 0.27 |
| 90% | 0.24 | 0.26 | 0.28 | 0.54 | 4.32 | 0.92 | 0.21 | 0.16 | 0.15 | 0.22 | 0.24 | 0.24 |
| 95% | 0.21 | 0.24 | 0.27 | 0.43 | 3.20 | 0.57 | 0.17 | 0.12 | 0.13 | 0.20 | 0.22 | 0.22 |
| 99% | 0.12 | 0.22 | 0.22 | 0.35 | 1.75 | 0.20 | 0.11 | 0.08 | 0.11 | 0.16 | 0.16 | 0.16 |

Table 2 shows that the estimated summer flow recommendation of 3.25 cfs is available at least 50% of the time from May 1 through June 30. The winter flow recommendation of 0.6 cfs is available at least 50% of the time during the month of July. Based on this water availability analysis, the summer recommendation was further reduced to 2.5 cfs for the month of April and the winter recommendation was further reduced to 0.35 cfs for the time period of August 1 through March 31. After incorporating the above water availability constraints, the original instream flow recommendation was modified to the following:

- 2.50 cubic feet per second is recommended from April 1 through April 30;
- 3.25 cubic feet per second is recommended from May 1 through June 30;
- 0.60 feet per second is recommended from July 1 through July 31;
- 0.35 cubic feet per second is recommended from August 1 through March 31.

However, if additional water is determined to be available in further investigations, the CDOW would recommend appropriating the additional water up to the recommended flow amounts to preserve the natural environment to a reasonable degree.

Precipitation Data

CDOW staff identified 2 local precipitation data sets located near the Moeller Creek Drainage: Marvine (5408) and Marvine Ranch (5414) (see Precipitation Data in Appendix C).

## Existing Water Right Information

CDOW staff has analyzed the water rights tabulation and will consult with the Division Engineer's Office (DEO) to identify any potential water availability problems due to existing diversions. Records indicate that there are 3 water rights within this reach of Moeller Creek.