

Stream: GIBSON CREEK

Executive Summary

Water Division: 2

Water District: 13

CDOW#: 32538

Segment: HEADWATERS to VERDE CREEK

Upper Terminus: HEADWATERS

Latitude: 38° 07' 41"N Longitude: 105° 37' 47"W

Lower Terminus: VERDE CREEK

Latitude: 38° 08' 08"N Longitude: 105° 35' 29"W

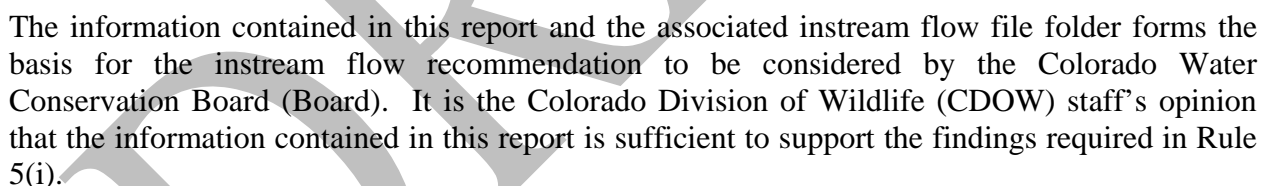
Counties: Custer County

Length: 2.5 miles

USGS Quad(s): Beckwith Mt.

ISF Appropriation: 1.90 cfs (May 1 – July 31)*
 0.80 cfs (August 1 - September 30) *
 0.50 cfs (October 1 – November 30)
 0.25 cfs (December 1 – April 30)





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.”

Gibson Creek is approximately 2.5 miles long. It begins on the northeast side of Spread Eagle Peak at an elevation of approximately 11,615 feet and terminates at the confluence with Verde Creek at an elevation of approximately 8,870 feet. Of the 2.5 mile segment addressed by this report, approximately 90% of the segment, or 2.2 miles, is located on public lands. Gibson Creek is located within Custer County. The total drainage area of Gibson Creek is approximately 1.5 square miles. Gibson Creek generally flows in an easterly direction.

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

Instream Flow Recommendation(s)

The CDOW is recommending up to 1.9¹ cfs, summer, and 0.5 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.

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

The modeling results from this survey effort are within the confidence interval produced by the R2CROSS model (see Table 1).

Land Status Review

Upper Terminus	Lower Terminus	Total Length (miles)	Land Ownership	
			% Private	% Public
HEADWATERS	VERDE CREEK	2.5	10	90

Biological and Field Survey Data

The CDOW, in 2006, collected stream cross-section information, natural environment data, and other data needed to quantify the instream flow needs for this reach of Gibson Creek. Gibson Creek is classified as a minor stream (between 4 to 9 feet wide) and surveys indicate the stream environment of Gibson Creek could support a population of brook trout (*Salvelinus fontinalis*).

¹ Additional data collection is required.

This species inhabits cold water streams and lakes with adequate stream spawning habitat present in the fall of the year.

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; Espregen 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	8/08/2006	0.2	0.5 – 0.1	1.9 ^{OR}	0.5

DOW = Division of Wildlife

Biologic Flow Recommendation

The summer flow recommendation, which met 3 of 3 criteria and was outside the accuracy range of the R2CROSS model is 1.9 cfs (See Table 1). The winter flow recommendation, which met 2 of 3 criteria and is within the accuracy range of the R2CROSS model range is 0.5 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 Middle Taylor Creek, near Westcliffe, CO (#07094900), which has a drainage area of 3.19 square miles (See Gage Summary in

Appendix C). The total drainage area upstream of this ISF segment of Gibson Creek is 1.5 square miles. The period of record for the Middle Taylor Creek gage was 1974 to 1985, the period of record used by staff in their analysis was 1974 to 1985, or 6 years of record. Table 2 below displays the estimated flow of Gibson 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 Gibson Creek

Exceedences	January	February	March	April	May	June	July	August	September	October	November	December
1%	0.42	0.42	0.38	2.01	12.36	17.96	15.40	3.87	1.80	3.47	1.32	0.66
5%	0.42	0.42	0.34	1.32	10.82	14.11	12.70	2.81	1.36	1.41	0.91	0.60
10%	0.42	0.42	0.33	1.08	8.93	12.23	7.76	2.42	1.18	1.29	0.71	0.56
20%	0.33	0.28	0.29	0.85	6.58	10.82	4.70	1.88	1.03	0.99	0.61	0.44
50%	0.26	0.24	0.24	0.42	3.62	6.58	2.61	1.13	0.80	0.61	0.47	0.38
80%	0.17	0.19	0.19	0.28	1.52	3.86	1.50	0.71	0.61	0.47	0.38	0.24
90%	0.14	0.14	0.19	0.21	0.71	2.02	1.18	0.66	0.52	0.47	0.33	0.19
95%	0.14	0.14	0.19	0.19	0.51	1.41	1.03	0.61	0.46	0.45	0.28	0.19
99%	0.14	0.14	0.14	0.19	0.35	1.21	0.94	0.43	0.41	0.44	0.26	0.18

Table 2 shows that the summer flow recommendation of 1.9 cfs is available at least 50% of the time from May through July. The winter flow recommendation of 0.5 cfs is available at least 50% of the time October through November. Based on this water availability analysis, the summer recommendation was further reduced to 0.8 cfs for the months of August and September and the winter recommendation was further reduced to 0.25 cfs for the time period of December through April. After incorporating the above water availability constraints, the original instream flow recommendation was modified to the following:

- 1.90 cubic feet per second is recommended from May 1 through July 31;
- 0.80 cubic feet per second is recommended from August 1 through September 30;
- 0.50 feet per second is recommended from October 1 through November 30;
- 0.25 cubic feet per second is recommended from December 1 through April 30.

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 4 local precipitation data sets located near the Gibson Creek Drainage: Westcliffe (8931), Wetmore 8 SW (8988), Crestone 1 SE (1964) and Froze Creek (3138) (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 no surface water rights within this reach of Gibson Creek.