

Stream: Bonnett Creek

Executive Summary

Water Division: 2
Water District: 16
CDOW#: 29202

Segment: Headwaters to USFS Boundary

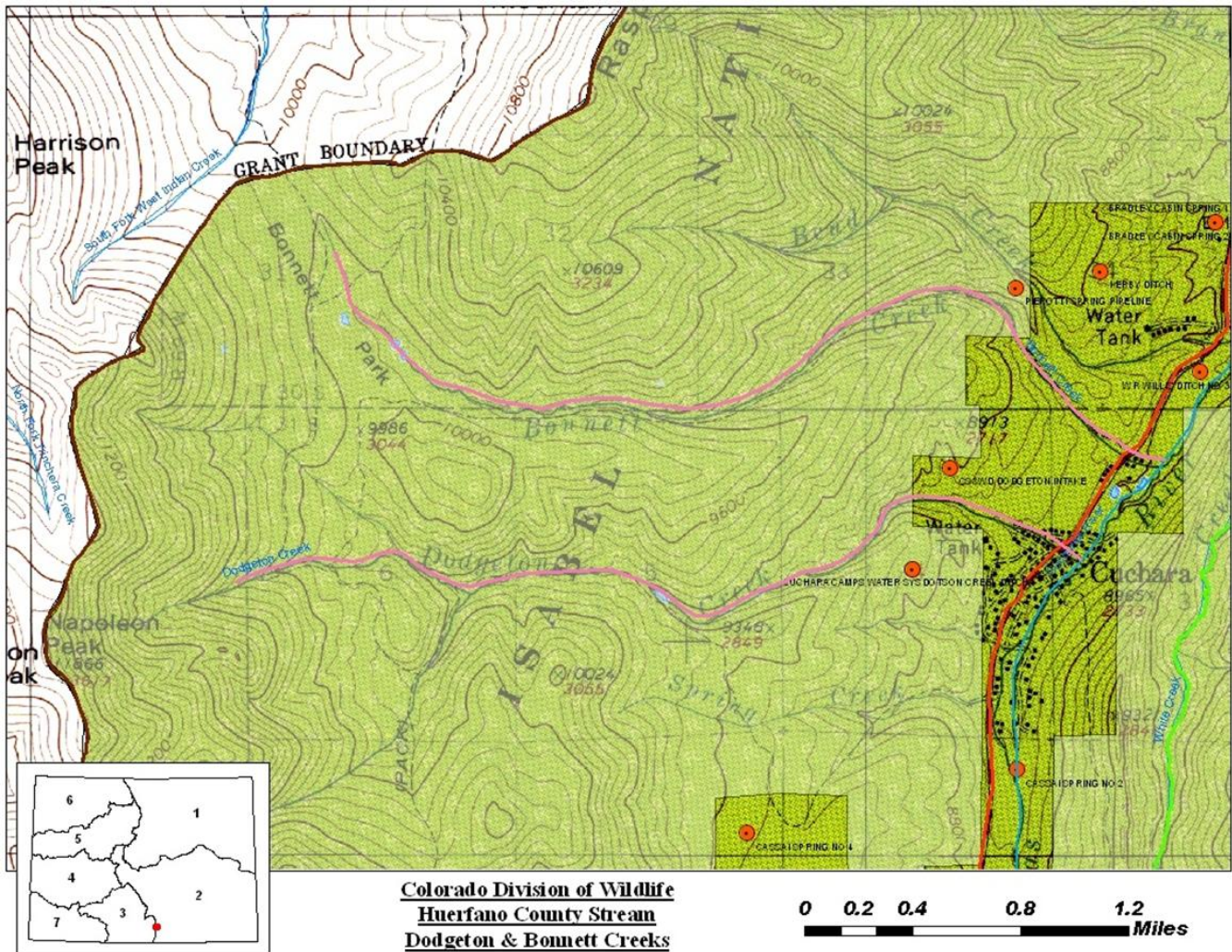
Upper Terminus: Headwaters

Latitude: 37° 23' 45.4"N Longitude: 105° 08' 58.0"W

Lower Terminus: USFS Boundary

Latitude: 37° 23' 28.3"N Longitude: 105° 06' 12.5"W

ISF Appropriation: 0.8 cfs (05/01 – 07/31)
 0.5 cfs (08/01 – 08/31)
 0.3 cfs (09/01 – 04/30)



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 for the Board's staff to begin the investigations required to support the findings required in Rule 5(i) of the Instream Flow Rules.

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 is recommending this segment of Bonnett Creek to the Board for inclusion into the ISFP. Bonnett Creek should be 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 stream 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."

The subject of this report is a segment of the Bonnett Creek beginning at its headwaters and extending downstream to the USFS Boundary. The proposed segment is located southwest of the Town of Cuchara. The recommendation for this segment is discussed below.

Instream Flow Recommendation(s)

The CDOW is recommending 0.8 cfs, summer, and 0.5 cfs, winter, based on USFS data collection efforts. This recommendation is based on the physical and biological data collected to date and does not incorporate any water availability constraints.

- 0.80 cubic feet per second is required to maintain the three principal hydraulic criteria of average depth, average velocity and percent wetted perimeter;
- 0.50 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	USFS Boundary	3.1	0%	100%

100% of the public lands are managed by the USFS.

Biological and Field Survey Data

The USFS, in July of 1992, collected stream cross section information, natural environment data, and other data needed to quantify the instream flow needs for this reach of the Bonnett Creek. Bonnett Creek is classified as a minor stream (between 4 to 10 feet wide) and fishery surveys indicate the stream environment of the Bonnett Creek supports brook trout (*Salvelinus fontinalis*) (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 relies 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; Espgren 1996).

For this segment of stream, three data sets were 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)
USFS	7/15/92	0.4	1.1 – 0.2	0.8*	0.5

DOW = Division of Wildlife

* = Estimated Flow

R = Outside of R2X Accuracy Range

Biologic Flow Recommendation

The estimated summer flow recommendation which should meet 3 of 3 criteria is 0.8 cfs. 0.8 cfs is based on data collection efforts on similar stream adjacent to Bonnett Creek (see results for Baker, Dodgton and Chaparral Creeks). The winter flow recommendation which met 2 of 3 criteria is 0.5 cfs. 0.5 cfs is within the accuracy range of the R2CROSS model (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 Cucharas River at Boyd Ranch, near La Veta, CO (#07114000), which has a drainage area of 56 square miles (See Gage Summary in Appendix C). The total drainage area upstream of this ISF segment of Bonnett Creek is 4.5 square miles. The period of record for the Cucharas River gage was 1934 to 1981, the period of record used by staff in their analysis was 1934 to 1981, or 47 years of record. Table 2 below displays the estimated flow of Cucharas River at the lower terminus of the instream flow reach in terms of a percentage of exceedence.

Table 2: Estimated Stream Flow for Bonnett Creek

Bonnett Creek Exceedences	January	February	March	April	May	June	July	August	September	October	November	December
1%	0.6	0.7	1.0	5.4	12.5	11.8	5.0	2.1	1.2	1.0	0.9	0.7
5%	0.5	0.5	0.7	3.0	9.2	8.3	2.9	1.5	0.9	0.8	0.7	0.5
10%	0.4	0.4	0.6	2.0	7.6	6.6	2.4	1.3	0.7	0.6	0.5	0.5
20%	0.4	0.4	0.5	1.3	5.0	4.8	1.8	1.0	0.6	0.5	0.4	0.4
50%	0.3	0.3	0.4	0.7	2.1	2.5	1.0	0.6	0.4	0.4	0.4	0.3
80%	0.2	0.2	0.3	0.4	0.9	1.0	0.6	0.4	0.3	0.3	0.3	0.3
90%	0.2	0.2	0.3	0.3	0.5	0.8	0.4	0.3	0.2	0.2	0.3	0.2
95%	0.2	0.2	0.2	0.3	0.4	0.6	0.3	0.2	0.2	0.2	0.2	0.2
99%	0.1	0.2	0.2	0.2	0.3	0.3	0.1	0.2	0.1	0.2	0.2	0.1

Table 2 shows that the summer flow recommendation of 0.8 cfs is available at least 50% of the time for the months of May, June and July. The winter flow recommendation of 0.5 cfs is not available at least 50% of the time from November through April. Based on this water availability analysis, the summer flow recommendation was further reduced to 0.5 cfs for the time period of August 1 through August 31 and the winter flow recommendation was reduced to 0.3 cfs September 1 through April 30. After incorporating the above water availability constraints, the original instream flow recommendation was modified to the following:

- 0.80 cubic feet per second is recommended from May 1 through July 31;
- 0.50 cubic feet per second is recommended from August 1 through August 31;
- 0.30 cubic feet per second is recommended from September 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 Cucharas River Drainage: La Veta, La Veta Pass, North Lake and Aguilar 18 WSW (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 diversions located within this reach of Bonnett Creek. In addition, there are several existing water rights downstream of the proposed instream flow reach (see below).