



COLORADO

Colorado Water Conservation Board

Department of Natural Resources
1313 Sherman Street, Room 718
Denver, CO 80203

Spring Creek (Upper) EXECUTIVE SUMMARY



CWCB STAFF INSTREAM FLOW RECOMMENDATION JANUARY 2020

UPPER TERMINUS: confluence with Rocky Brook Creek
UTM North: 4301609.78 UTM East: 351947.60

LOWER TERMINUS: confluence with Bear Creek
UTM North: 4298075.72 UTM East: 349182.58

WATER DIVISION: 4

WATER DISTRICT: 59

COUNTY: Gunnison

WATERSHED: East-Taylor

EXISTING ISF: 84CW0368, 7.5 cfs (01/01 - 12/31)

CWCB ID: 20/4/A-003

RECOMMENDER: High Country Conservation Advocates (HCCA)

LENGTH: 3.18 miles

FLOW RECOMMENDATION: 6.5 cfs (04/01 - 09/30)



Spring Creek (Upper)

Introduction

Colorado's General Assembly created the Instream Flow and Natural Lake Level Program in 1973, recognizing "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 Colorado Water Conservation Board (CWCB or Board) with the exclusive authority to appropriate and acquire instream flow (ISF) and natural lake level water rights (NLL). Before initiating a water right filing, the Board must determine that: 1) there is a natural environment that can be preserved to a reasonable degree with the Board's water right if granted, 2) the natural environment will be preserved to a reasonable degree by the water available for the appropriation to be made, and 3) such environment can exist without material injury to water rights.

HCCA recommended that the CWCB appropriate an increase to the existing ISF water right on a reach of Spring Creek. Spring Creek is located within Gunnison County (See Vicinity Map), and originates at an elevation of approximately 11,950 feet in the Gunnison National Forest. The creek flows south 17 miles to the confluence with the Taylor River at an elevation of 8,350 feet. The proposed reach extends from confluence with Rocky Brook Creek downstream to the confluence with Bear Creek. The U.S. Forest Service manages 95 percent of the land on the 3.18 mile proposed reach and the remaining 5 percent is privately owned. (See Land Ownership Map).

The information contained in this Executive Summary and the associated supporting data and analyses form the basis for staff's ISF recommendation to be considered by the Board. This Executive Summary provides sufficient information to support the CWCB findings required by ISF Rule 5i on natural environment, water availability, and material injury. Additional supporting information is available at <http://cwcb.state.co.us/environment/instream-flow-program/Pages/2020ProposedISFRecommendations.aspx>.

Natural Environment

CWCB staff relies on the recommending entity to provide information about the natural environment. In addition, staff reviews information and conducts site visits for each recommended ISF appropriation. This information is used to provide the Board with a basis for determining that a natural environment exists.

This segment of Spring Creek flows through a broad valley with open meadows consisting of sagebrush and potentilla. The riparian plant community is primarily willows with abundant grasses and forbs. The stream has good floodplain connectivity and stable banks throughout, which support good water quality and cold water for trout species. The upper segment is primarily cobble and gravel substrate with riffle-run type habitat. Large pools are scattered throughout the upper reach, providing habitat complexity for fish species. Downstream from Bear Creek at the start of the lower segment, Spring Creek transitions to a steep canyon channel type surrounded by mature coniferous forests.

Fish sampling conducted by Colorado Parks and Wildlife (CPW) has recorded populations of brown and rainbow trout. When conducting field work, the team observed robust macroinvertebrate and fish communities.

Table 1. List of species identified in Spring Creek.

Species Name	Scientific Name	Status
brown trout	<i>Salmo trutta</i>	None
rainbow trout	<i>Oncorhynchus mykiss</i>	None
Snake River cutthroat trout	<i>Oncorhynchus clarkii behnkei</i>	None

ISF Quantification

CWCB staff relies upon the biological expertise of the recommending entity to quantify the amount of water required to preserve the natural environment to a reasonable degree. CWCB staff performs a thorough review of the quantification analyses completed by the recommending entity to ensure consistency with accepted standards.

Quantification Methodology

HCCA staff used the R2Cross methodology to develop the initial ISF recommendation. The R2Cross method is based on a hydraulic model and uses field data collected in a stream riffle (Espegren, 1996). Riffles are most easily visualized as the stream habitat types that would dry up first should streamflow cease. The data collected consists of a streamflow measurement, survey of channel geometry and features at a single transect, and survey of the longitudinal slope of the water surface.

The field data is used to model three hydraulic parameters: average depth, average velocity, and percent wetted perimeter. Maintaining these hydraulic parameters at adequate levels across riffle habitat types also will maintain aquatic habitat in pools and runs for most life stages of fish and aquatic macro-invertebrates (Nehring, 1979). HCCA staff interprets the model results to develop an initial recommendation for summer and winter flows. The summer flow recommendation is based on meeting 3 of 3 hydraulic criteria. The winter flow recommendation is based on meeting 2 of 3 hydraulic criteria. The model’s suggested accuracy range is 40% to 250% of the streamflow measured in the field. Recommendations that fall outside of the accuracy range may not give an accurate estimate of the hydraulic parameters necessary to determine an ISF rate.

The R2Cross methodology provides the biological amount of water needed for summer and winter periods. The recommending entity uses the R2Cross results and its biological expertise to develop an initial ISF recommendation. CWCB staff then evaluates water availability for the reach typically based on median hydrology (see the Water Availability section below for more details). The water availability analysis may indicate less water is available than the initial recommendation. In that case, the recommending entity either modifies the magnitude and/or duration of the recommended ISF rates if the available flows will preserve the natural environment to a reasonable degree, or withdraws the recommendation.

Data Analysis

R2Cross data was collected at one transect for this proposed ISF reach by HCCA (Table 2). The R2Cross model results in a summer flow of 13.54 cfs, which meets 3 of 3 criteria and is within the accuracy range of the R2Cross model. R2Cross field data and model results can be found in the appendix to this report.

Table 2. Summary of R2Cross transect measurements and results for Spring Creek.

Date, Xsec #	Top Width (feet)	Streamflow (cfs)	Accuracy Range (cfs)	Winter Rate (cfs)	Summer Rate (cfs)
09/28/2018, 1	26.00	6.30	2.52 - 15.75	Out of range	13.54
	Mean				13.54

ISF Recommendation

HCCA recommends the following flows based on R2Cross modeling analyses, biological expertise, and staff's water availability analysis.

Based on analysis of R2Cross results, an increase of 6.5 cfs to the existing ISF of 7.5 cfs is recommended during the snowmelt runoff period and summer, from April 1 to September 30. The combined total of the two ISF water rights would be 14.0 cfs, which satisfies all three of the required hydrologic criteria. This recommendation is driven by the velocity criteria.

The proposed increase to the existing instream flow will improve the quality of the aquatic habitat during the summer, a critical time for fish growth, survival, and reproduction. On this segment of Spring Creek, the proposed increase will increase the average water depth by approximately 0.21 feet to an average depth of 0.7 feet. The percent wetted perimeter will also increase. Together, these conditions will increase habitat connectivity including access to pools and other areas that provide critical refuge to fish during the summer months.

Water Availability

CWCB staff conducts hydrologic analyses for each recommended ISF appropriation to provide the Board with a basis for making the determination that water is available.

Methodology

Each recommended ISF reach has a unique flow regime that depends on variables such as the timing, magnitude, and location of water inputs (such as rain, snow, and snowmelt) and water losses (such as diversions, reservoirs, evaporation and transpiration, groundwater recharge, etc). Although extensive and time-consuming investigations of all variables may be possible, staff takes a pragmatic and cost-effective approach to analyzing water availability. This approach focuses on streamflow and the influence of flow alterations, such as diversions, to understand how much water is physically available in the recommended reach.

Staff's hydrologic analysis is data-driven, meaning that staff gathers and evaluates the best available data and uses the best available analysis method for that data. Whenever possible, long-term stream gage data (period of record 20 or more years) will be used to evaluate streamflow. Other streamflow information such as short-term gages, temporary gages, spot streamflow measurements, diversion records, and StreamStats will be used when long-term

gage data is not available. StreamStats, a statistical hydrologic program, uses regression equations developed by the USGS (Capesius and Stephens, 2009) to estimate mean flows for each month based on drainage basin area and average drainage basin precipitation. Diversion records will also be used to evaluate the effect of surface water diversions when necessary. Interviews with water commissioners, landowners, and ditch or reservoir operators can provide additional information. A range of analytical techniques may be employed to extend gage records, estimate streamflow in ungaged locations, and estimate the effects of diversions. The goal is to obtain the most detailed and reliable estimate of hydrology using the most efficient analysis technique.

The final product of the hydrologic analysis used to determine water availability is a hydrograph, which shows streamflow and the proposed ISF rate over the course of one year. The hydrograph will show median daily values when daily data is available; otherwise, it will present mean-monthly streamflow values. Staff will calculate 95% confidence intervals for the median streamflow if there is sufficient data. Statistically, there is 95% confidence that the true value of the median streamflow is located within the confidence interval.

Basin Characteristics

The drainage basin of the proposed ISF on Spring Creek is 44.10 square miles, with an average elevation of 10,899 feet and average annual precipitation of 25.64 inches (See the Hydrologic Features Map). Spring Creek Reservoir is located 0.75 miles upstream from the upper terminus, but there are no surface water diversions in this reach. The reservoir has a 2 cfs evaporation diversion right. There are no other surface water diversions in the basin tributary to this proposed reach on Spring Creek. Due to the small number and volume of diversions, streamflow represents natural conditions.

Available Data

There are no current or historic streamgages in the vicinity of the proposed ISF reach or nearby drainages that would be representative of streamflow in this reach. In some cases, diversion records or reservoir release records can be used to provide an indication of water availability in the stream reach; however, no diversion or release records are maintained in the basin.

CWCB staff made two streamflow measurements on the proposed reach of Spring Creek as summarized in Table 3.

Table 3. Summary of streamflow measurement for Spring Creek.

Visit Date	Flow (cfs)	Collector
08/02/2019	49.14	CWCB
10/17/2019	22.83	CWCB

Data Analysis

CWCB staff spoke with the Division 4 Engineer, Bob Hurford, who confirmed that Spring Creek Reservoir is used for recreation and fishing, and kept full at all times of the year. Therefore, Spring Creek Reservoir likely releases flow equal in amount and timing to the reservoir inflow. All other diversions in the basin are small springs or wells. StreamStats provides the best available estimate of streamflow on Spring Creek.

Water Availability Summary

The hydrograph (see Complete Hydrograph) shows StreamStats results for mean-monthly streamflow. Staff has concluded that water is available for an increase.

Material Injury

Because the proposed ISF on Spring Creek is a new junior water right, the ISF can exist without material injury to other water rights. Under the provisions of section 37-92-102(3)(b), C.R.S. (2019), the CWCB will recognize any uses or exchanges of water in existence on the date this ISF water right is appropriated.

Citations

Capesius, J.P. and V.C. Stephens, 2009, Regional regression equations for estimation of natural streamflow statistics in Colorado, Scientific Investigations Report 2009-5136.

Espgren, G.D., 1996, Development of Instream Flow Recommendations in Colorado Using R2CROSS, Colorado Water Conservation Board.

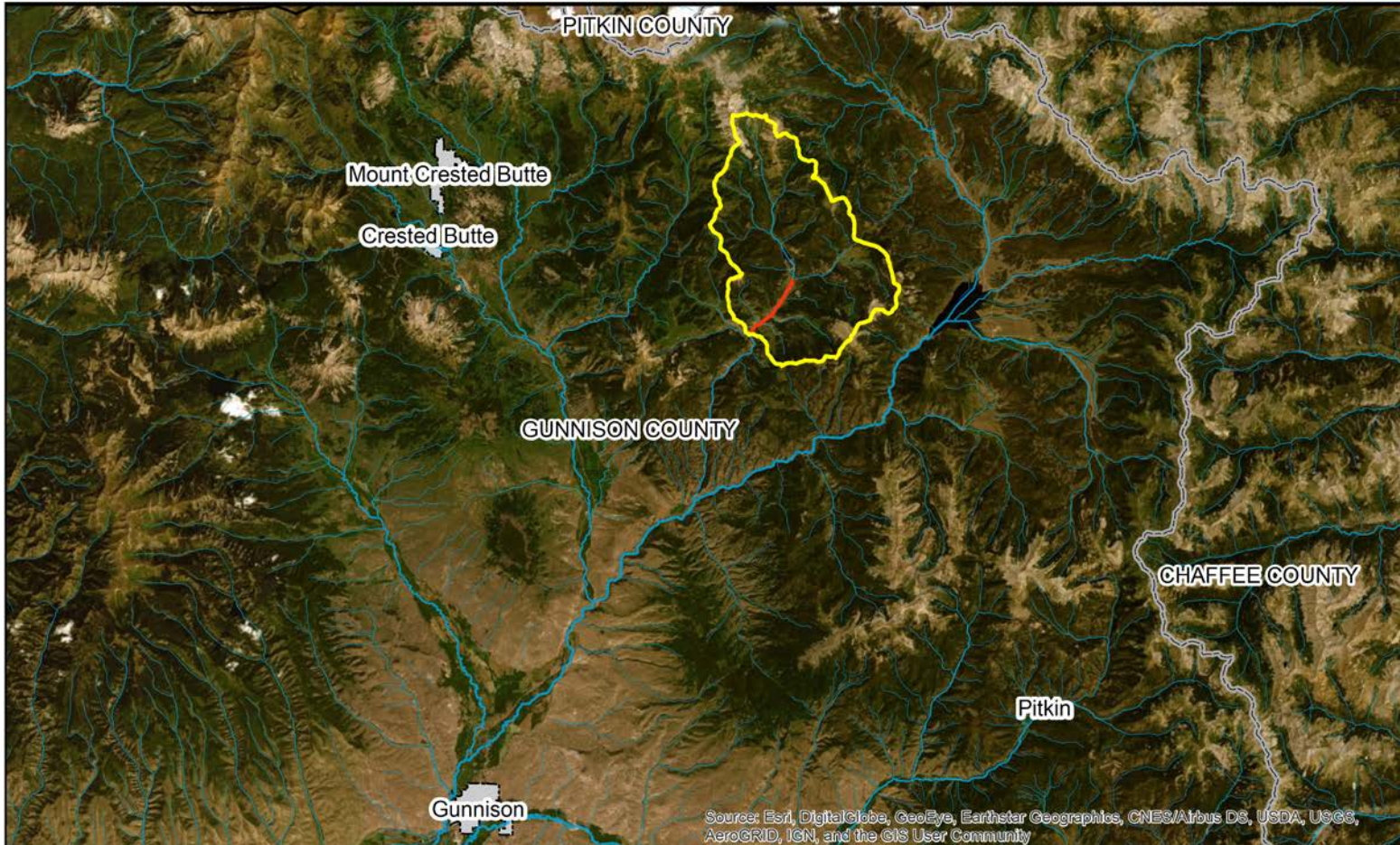
Nehring, B.R., 1979, Evaluation of Instream Flow Methods and Determination of Water Quantity Needs for Streams in the State of Colorado, Colorado Division of Wildlife.

Metadata Descriptions

The UTM locations for the upstream and downstream termini were derived from CWCB GIS using the National Hydrography Dataset (NHD).

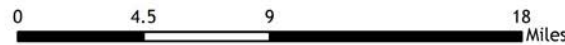
Projected Coordinate System: NAD 1983 UTM Zone 13N.

VICINITY MAP

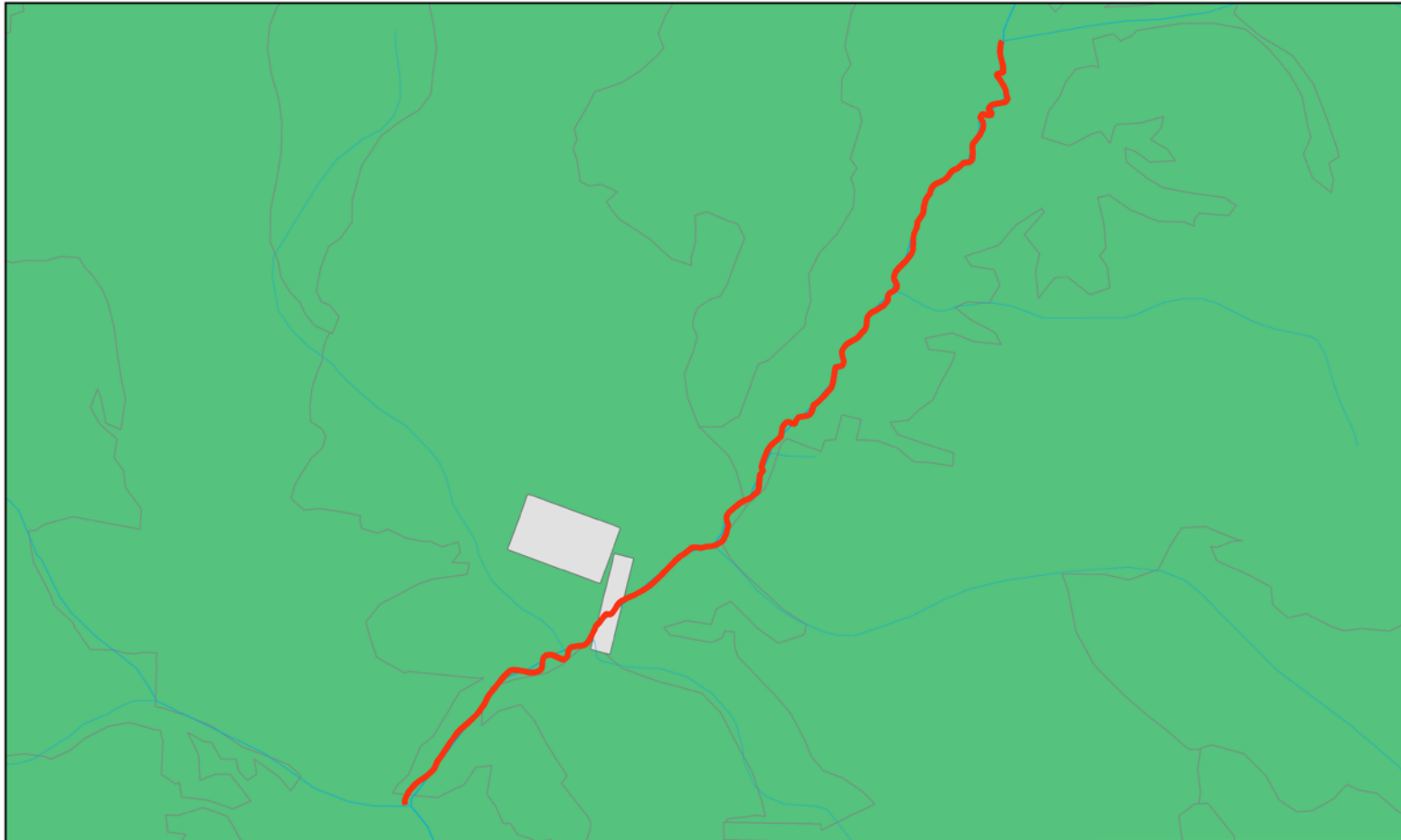


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- Spring Creek Drainage Basin
- ISF Recommended Reach
- County Boundaries

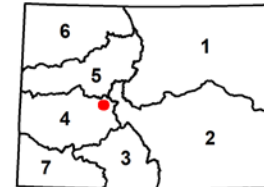
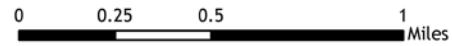
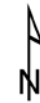


LAND OWNERSHIP MAP



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- ISF Recommended Reach
- Private
- Gunnison National Forest

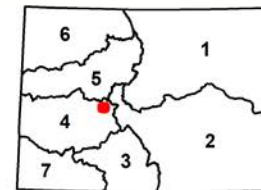
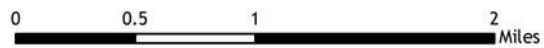


HYDROLOGIC FEATURES MAP



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- ISF Recommended Reach
- ▲ CWCB Spot Discharge Measurement
- R2Cross Location



COMPLETE HYDROGRAPH

