Canyon Creek Executive Summary

CWCB STAFF INSTREAM FLOW RECOMMENDATION
January 27-28, 2025

UPPER TERMINUS:	headwaters in the vicinity of UTM North: 4271923.34 UTM East: 377118.23
LOWER TERMINUS:	confluence with Tomichi Creek at UTM North: 4264096.23 UTM East: 375818.37
WATER DIVISION/DISTRICT:	4/28
COUNTY:	Gunnison
WATERSHED:	Tomichi
CWCB ID:	25/4/A-002
RECOMMENDER:	High Country Conservation Advocates (HCCA)
LENGTH:	8.64 miles
FLOW RECOMMENDATION:	1.5 cfs (09/01 - 03/31) 4.5 cfs (04/01 - 08/31)

COLORADO
Colorado Water Conservation Board
Department of Natural Resources

BACKGROUND

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 (NLL) water rights. 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.

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 located at: https://cwcb.colorado.gov/2025-isf-recommendations.

RECOMMENDED ISF REACH

HCCA recommended that the CWCB appropriate an ISF water right on a reach of Canyon Creek at the ISF Workshop in February 2024. Canyon Creek is located within Gunnison County and is approximately 30 miles east of the City of Gunnison (See Vicinity Map). The stream originates near Granite Mountain and flows generally south until it reaches the confluence with Tomichi Creek. Canyon Creek is a tributary to Tomichi Creek which is a tributary to the Gunnison River.

The proposed ISF reach extends from the headwaters downstream to the confluence with Tomichi Creek for a total of 8.6 miles. Nearly the entire length of the reach, close to 98%, is on public land, only the lower 0.15 miles is on private land (See Land Ownership Map). HCCA is interested in protecting this stream with an ISF water right to continue their mission to protect the health and natural beauty of the land, rivers, and wildlife in and around Gunnison County.

OUTREACH

Stakeholder input is a valued part of the CWCB staff's analysis of ISF recommendations. Currently, more than 1,100 people subscribe to the ISF mailing list. Notice of the potential appropriation of an ISF water right on Canyon Creek was sent to the mailing list in March 2024 and November 2024. Staff sent letters to identified landowners adjacent to Canyon Creek based on information from the county assessor's website. A public notice about this recommendation was also published in the Crested Butte News on December 20, 2024.

Staff presented information about the ISF program and this recommendation to the Gunnison County Board of County Commissioners on October 8, 2024. Staff also spoke with Jack Brazinsky, District 28 Water Commissioner, on August 26, 2024, regarding water availability on Canyon Creek. Staff's understanding of the basin was confirmed and the reach has never required administrative action.

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 provides the Board with a basis for determining that a natural environment exists.

Canyon Creek is a headwater mountain stream driven by snowmelt. The headwaters originate above treeline between Little Baldy Peak, Monumental Peak, and Bald Mountain and flows at a steep gradient through an alpine valley densely forested with pine. Near the lower end of the reach, the channel transitions to a wetland, beaver dam complex before flowing into Tomichi Creek (see Figure 1). HCCA noted a large overflow channel and evidence of past high flows. CWCB staff observed evidence of widespread beaver activity including active and breached dams. The channel sequences between riffles, runs, pools, drop pools, and beaver dam complexes. The streambed has ample woody debris and detritus for aquatic species and the substrate consists of sand, coble, and gravel. The verdant riparian community is diverse and includes a mix of pine, wolf and plane leaf willow.

Figure 1. Image of beaver dam complex near confluence with Tomichi Creek

The lower portion of the Canyon Creek riparian corridor has been recognized by the Colorado Natural Heritage Program (CNHP) as possessing high biodiversity significance and as hosting a globally vulnerable thinleaf alder/mesic forb (Alnus incana ssp. tenuifolia/mosic forb) riparian shrubland. The CNHP has identified the Canyon Creek riparian area as a Level 4 Potential Conservation Area in recognition of the unique riparian vegetation. Notably, while this plant association was once common, it is now declining. The CNHP site analysis notes that these stands can be threatened by stream flow alterations; thus, this unique community is dependent on the hydrology of Canyon Creek.

In addition to supporting this unique riparian community, Canyon Creek also supports brook and brown trout populations (Table 1). CWCB staff observed caddisfly beetle larvae, and mayfly in the field.

Table 1. List of species identified in Canyon Creek.

Species Name	Scientific Name	Status
brook trout	Salvelinus fontinalis	
brown trout	Salmo trutta	

ISF QUANTIFICATION

CWCB staff relies on 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 method to develop the initial ISF recommendation. The R2Cross method is based on a hydraulic model and uses field data collected in a stream riffle (CWCB, 2022; CWCB, 2024). Riffles are the stream habitat type that are most vulnerable to dry if streamflow ceases. The data collected consists of a streamflow measurement, a survey of channel geometry and features at a cross-section, and a survey of the longitudinal slope of the water surface.

The R2Cross model uses Ferguson's Variable-Power Equation (VPE) to estimate roughness and hydraulic conditions at different water stages at the measured cross-section (Ferguson, 2007; Ferguson, 2021). This approach is based on calibrating the model as described in Ferguson (2021). The model is used to evaluate three hydraulic criteria: 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 macroinvertebrates (Nehring, 1979). HCCA staff use the model results to develop an initial recommendation for summer and winter flows. The summer flow recommendation is based on the flow that meets all three hydraulic criteria. The winter flow recommendation is based on the flow that meets two of the three hydraulic criteria.

The R2Cross method estimates 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 Collection and Analysis

HCCA collected R2Cross data at three transects for this proposed ISF reach (Table 2). Results obtained at more than one cross-section are averaged to determine the R2Cross flow rate for the stream reach. The R2Cross model results in a winter flow of 1.5 cfs and a summer flow of 4.5 cfs. R2Cross field data and model results can be found in the appendix to this report.

Table 2. Summary of R2Cross cross-section measurements and results for Canyon Creek.

Date, XS #	Top Width (feet)	Streamflow (cfs)	Winter Rate (cfs)	Summer Rate (cfs)
06/22/2023, 1	17.0	29.20	1.44	4.47
09/14/2023, 1	13.3	3.39	0.59	4.88
09/14/2023, 2	16.4	3.26	2.39	4.18
			1.47	4.54

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

1.5 cfs is recommended from September 1 to March 31. This rate meets two of three hydraulic criteria and will support baseflows during overwintering period.

4.5 cfs is recommended from April 1 to August 31. This rate meets three of three hydraulic criteria and provides protection for high flows during the snowmelt runoff period thought the falling limb in summer.

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

Water Availability 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.). 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) are used to evaluate streamflow. Other streamflow information such as short-term gages, temporary gages, spot streamflow measurements, diversion records, and regression-based models are used when long-term gage data is not available. CSUFlow18 is a multiple regression model developed by Colorado State University researchers using streamflow gage data collected between 2001 and 2018 (Eurich et al., 2021). This model estimates mean-monthly streamflow based on drainage basin area, basin terrain variables, and average basin precipitation and snow persistence. Diversion records are 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 from gage records; 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 contributing basin of the proposed ISF on Canyon Creek is 12 square miles, with an average elevation of 10,718 feet and average annual precipitation of 26.1 inches. Canyon Creek is a high elevation, steep gradient snowmelt driven hydrologic system that supports ample fish habitat. The reach experiences variable timing and magnitude of snowmelt, often peaking in mid-summer and supports baseflows throughout the late season.

Water Rights Assessment

There are no water rights within or above the reach recommended for an ISF.

Data Collection and Analysis

Representative Gage Analysis

There are no current or historic gages on Canyon Creek. Staff investigated nearby gages for similarities in basin characteristics and hydrology and found no gages were sufficiently similar to be used to estimate streamflow on Cabin Creek.

Multiple Regression Model

The CSUFlow18 regression model predicts mean-monthly flow in Canyon Creek and provides the best estimate for streamflow conditions.

Site Visit Data

CWCB staff made one streamflow measurement on the proposed reach of Canyon Creek as summarized in Table 3.

Table 3. Summary of streamflow measurements for Canyon Creek.

Visit Date	Flow (cfs)	Collector
08/28/2024	2.9	CWCB

Water Availability Summary

The hydrograph shows CSUFlow18 results for mean-monthly streamflow and includes the proposed ISF rate (See Complete Hydrograph). The proposed ISF flow rate is below the mean-monthly streamflow. Staff concludes that water is available for appropriation on Canyon Creek.

MATERIAL INJURY

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

ADDITIONAL INFORMATION

Common Acronyms and Abbreviations

Term	Definition
af	acre feet
BLM	Bureau of Land Management
cfs	cubic feet per second
CWCB	Colorado Water Conservation Board
CPW	Colorado Parks and Wildlife
DWR	Division of Water Resources
HCCA	High Country Conservation Advocates
ISF	Instream Flow
NLL	Natural Lake Level
USGS	United States Geological Survey
USFS	United States Forest Service
XS	Cross section

Citations

Colorado Water Conservation Board, 2022, R2Cross model- User's manual and technical guide. Retrieve from URL: https://r2cross.erams.com/

Colorado Water Conservation Board, 2024, R2Cross field manual. Retrieve from URL: https://dnrweblink.state.co.us/cwcbsearch/0/edoc/224685/R2Cross%20Field%20Manual%202024.pdf

Eurich, A., Kampf, S.K., Hammond, J.C., Ross, M., Willi, K., Vorster, A.G. and Pulver, B., 2021, Predicting mean annual and mean monthly streamflow in Colorado ungauged basins, River Research and Applications, 37(4), 569-578.

Ferguson, R.I., 2007. Flow resistance equations for gravel- and boulder-bed streams. Water Resources Research 43. https://doi.org/10.1029/2006WR005422

Ferguson, R.I., 2021. Roughness calibration to improve flow predictions in coarse-bed streams. Water Res 57. https://doi.org/10.1029/2021WR029979

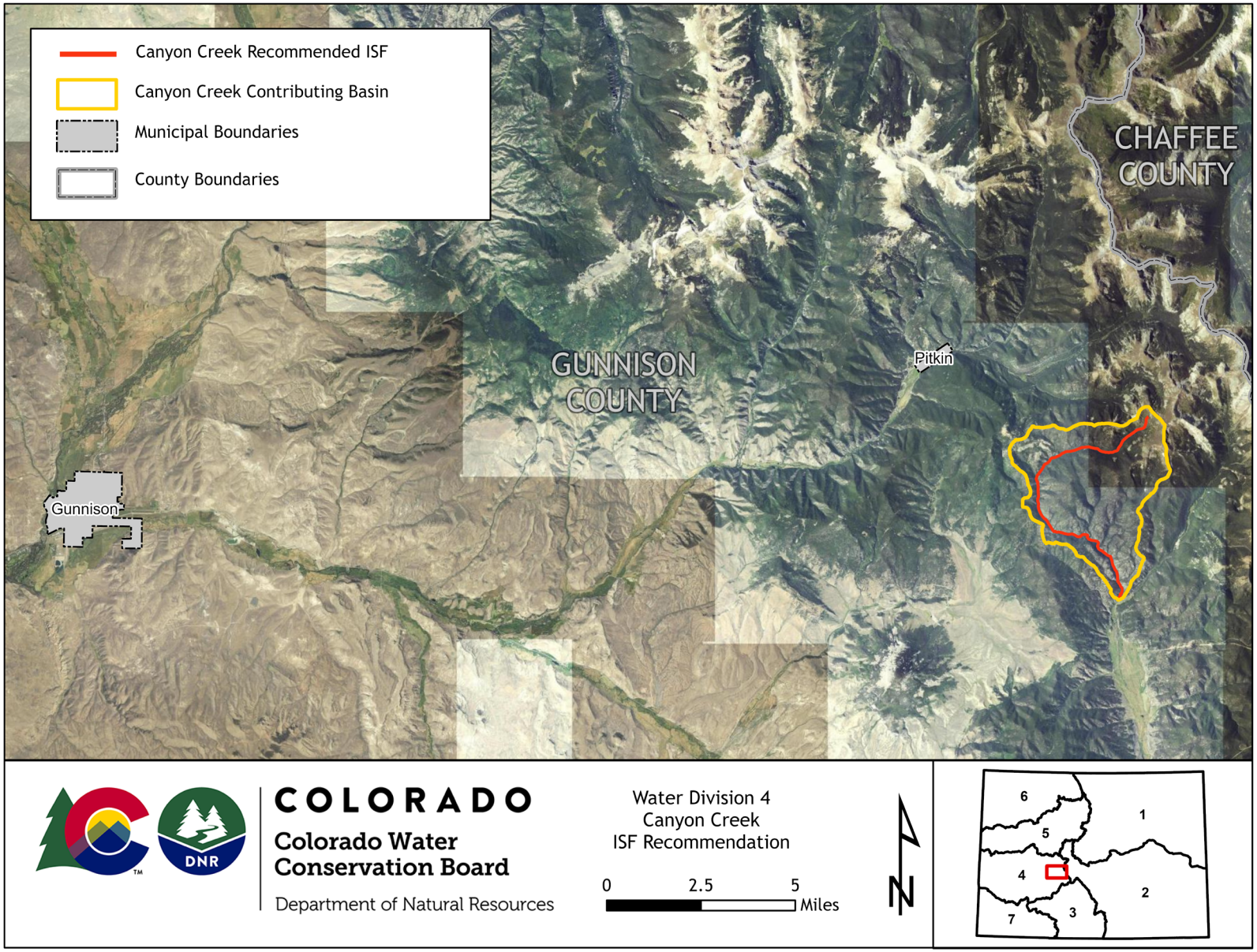
Nehring, B.R., 1979, Evaluation of instream flow methods and determination of water quantity needs for streams in the state of Colorado, Colorado Division of Wildlife.

Metadata Descriptions

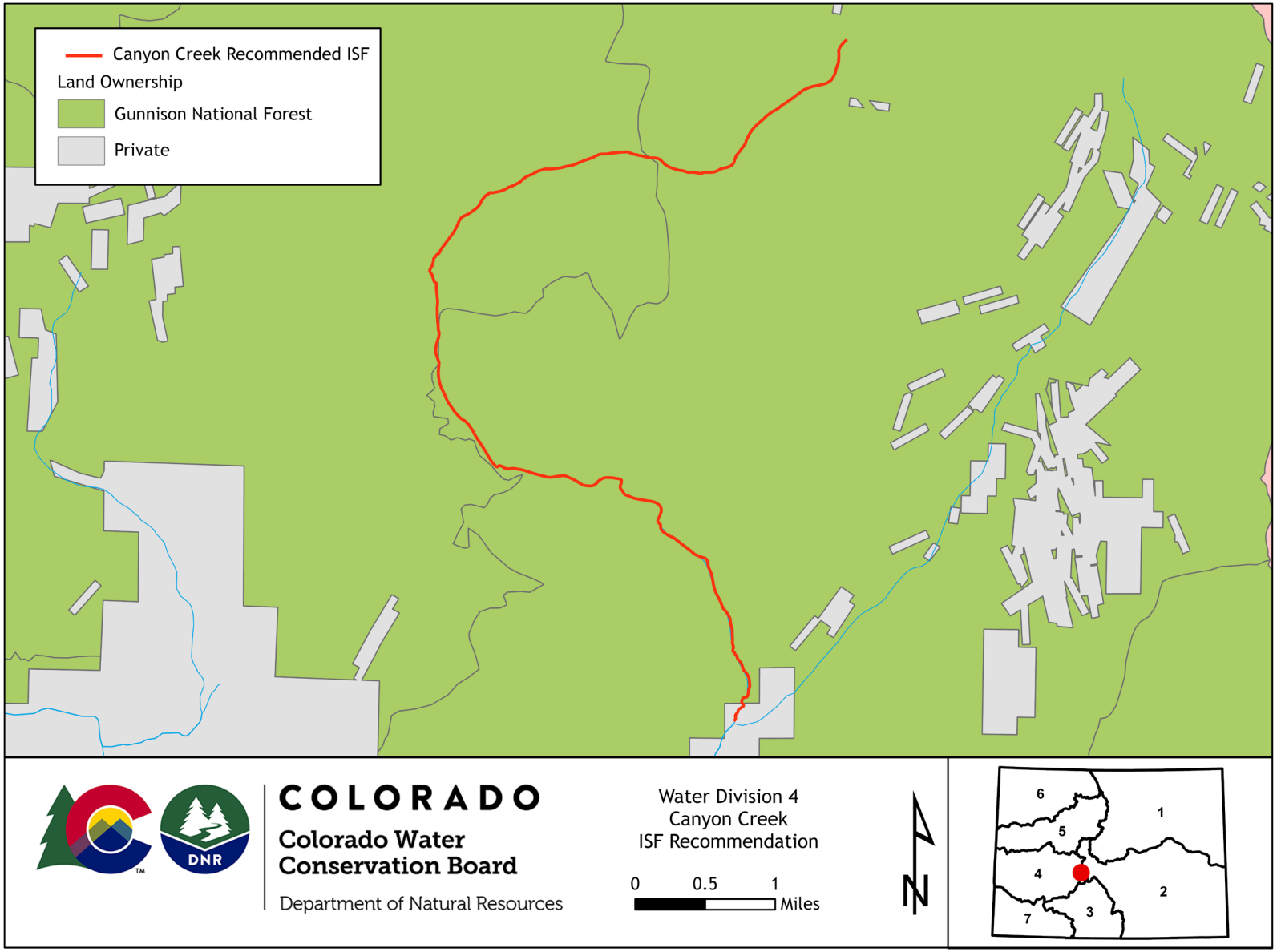
The UTM locations for the upstream and downstream termini were derived from CWCB GIS using the National Hydrography Dataset (NHD).

Projected Coordinate System: NAD 1983 UTM Zone 13N.

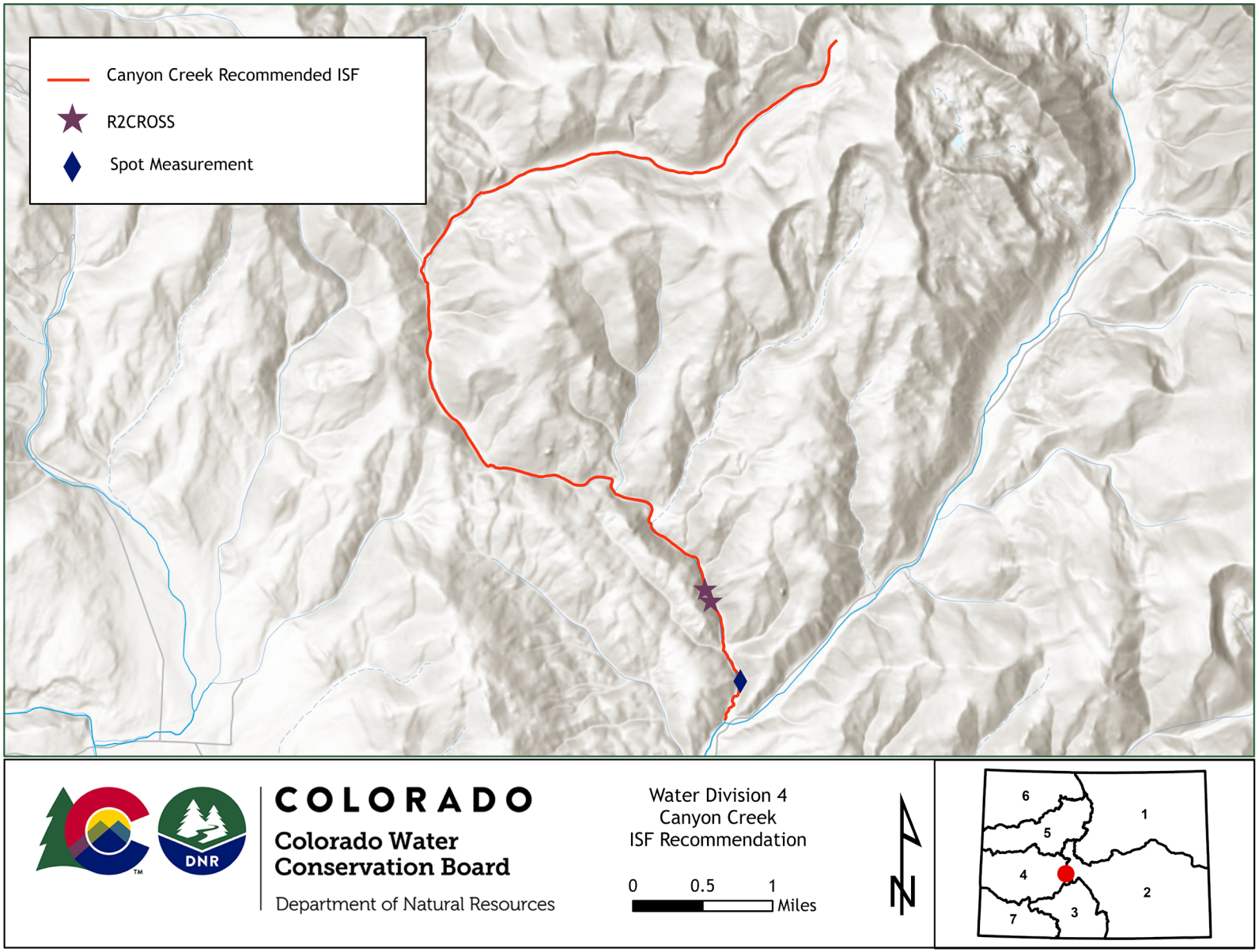
VICINITY MAP



LAND OWNERSHIP MAP



SITE MAP


Canyon Creek Recommended ISF
R2CROSS
Spot Measurement
COLORADO
Colorado Water Conservation Board
Department of Natural Resources
Water Division 4
Canyon Creek
ISF Recommendation
0 0.5 1
Miles
N
6
1
5
4
2
7
3

COMPLETE HYDROGRAPH