Ways Gulch Executive Summary

CWCB STAFF INSTREAM FLOW RECOMMENDATION
January 29-30, 2024

UPPER TERMINUS:	headwaters in the vicinity of UTM North: 4522331.91 UTM East: 337512.44
LOWER TERMINUS:	BLM land boundary at UTM North: 4519370.29 UTM East: 338159.82
WATER DIVISION/DISTRICT:	6/58
COUNTY:	Routt
WATERSHED:	Upper Yampa
CWCB ID:	23/6/A-002
RECOMMENDER:	Bureau of Land Management (BLM)
LENGTH:	2.25 miles
FLOW RECOMMENDATION:	0.2 cfs (10/01 - 04/30) 1.3 cfs (05/01 - 07/31) 0.5 cfs (08/01 - 09/30)

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 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.

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/2024-isf-recommendations.

RECOMMENDED ISF REACH

BLM recommended that the CWCB appropriate an ISF water right on a reach of Ways Gulch at the February 2022 ISF Workshop. Ways Gulch is located within Routt County (See Vicinity Map) and is approximately two miles northeast from Steamboat Lake. The stream originates near the south flank of Hahns Peak and flows generally south until it reaches the confluence with Willow Creek downstream from Steamboat Lake. Willow Creek is a tributary to the Elk River which is a tributary to the Yampa River.

The proposed ISF reach extends from the headwaters downstream to a BLM land boundary for a total of 2.25 miles. Nineteen percent of the land on the proposed reach is managed by BLM, 67% is managed by the United States Forest Service, and 14% is under private ownership (See Land Ownership Map). BLM is interested in protecting this stream to preserve the natural environment. BLM's management goals include maintaining and enhancing habitat that supports fish species and functional riparian and wetland systems. Establishing an ISF water right will assist in meeting these BLM objectives.

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 Ways Gulch was sent to the mailing list in March 2022, March 2023, and November 2023. Staff sent letters to identified landowners adjacent to Ways Gulch based on information from the county assessor's website. A public notice about this recommendation was also published in the Steamboat Pilot & Today on December 11, 2023.

Staff presented information about the ISF program and this recommendation to the Routt County Board of County Commissioners on January 8, 2024. In addition, staff spoke with Luke Fitzgerald, District 58 Water Commissioner, on September 18, 2023 regarding water availability on Ways Gulch.

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.

Ways Gulch is a cold-water, high-gradient stream. It begins in a narrow, densely forested valley, and then emerges into a wide meadow area that surrounds Steamboat Lake. Substrate generally ranges from gravels to 1-foot boulders. Ways Gulch supports a healthy riparian community comprised of spruce, willow, and alder. Bank stability appears to be good, except in areas of high livestock usage.

Beaver activity is extensive on the upper portions of the stream, resulting in many ponds that are able to support fish populations during low flow periods. A low quantity of riffle habitat is a limiting factor for the fish population. Water quality is excellent for supporting cold-water species. Fish surveys have documented a self-sustaining population of native mountain suckers (Table 1). Spot surveys have revealed abundant populations of macroinvertebrates including stonefly, caddisfly, and mayfly.

Table 1. List of species identified in Ways Gulch.

Species Name	Scientific Name	Status
mountain sucker	*Catostomus platyrhynchus*	State - Species of Greatest Conservation Need State - Species of Special Concern
tiger salamander (waterdogs or mudpupies)	*Ambystoma tigrinum*	None

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

BLM 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 (Espegren, 1996; CWCB, 2022). 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 macro-invertebrates (Nehring, 1979). BLM 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

BLM collected R2Cross data at two transects for this proposed ISF reach (Table 2). Results obtained at more than one transect are averaged to determine the R2Cross flow rate for the stream reach. The R2Cross model results in a winter flow of 0.78 cfs and a summer flow of 1.28 cfs. 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 Ways Gulch.

Date, XS #	Top Width (feet)	Streamflow (cfs)	Winter Rate (cfs)	Summer Rate (cfs)
05/14/2021, 1	7.60	2.50	0.90	1.32
05/14/2021, 2	9.00	2.27	0.66	1.23
			0.78	1.28

ISF Recommendation

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

1.30 cubic feet per second is recommended from May 1 through July 31 during the snowmelt runoff period and early summer. This recommendation is driven by the average depth criteria. This flow rate will ensure that the riffle habitat can be fully utilized during the spring and summer period, when fish are spawning and moving actively between pools.

0.50 cubic feet per second is recommended from August 1 through September 30 during late summer. This flow rate is reduced due to water availability limitations but does meet the mean velocity criteria. This flow rate should maintain full and sufficiently cool pools during late summer when stream temperatures can still be high and provide sufficient water for passage between pools.

0.20 cubic feet per second is recommended from October 1 through April 30 during the cold weather period. This recommendation is driven by naturally limited water availability. This flow rate should prevent pools from completely icing during winter, allowing the fish population to successfully overwinter.

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 drainage basin of the proposed ISF on Ways Gulch is 1.24 square miles, with an average elevation of 8,855 feet and average annual precipitation of 30.02 inches (See the Hydrologic Features Map). There are three small, decreed springs with a total of 0.0595 cfs in absolute water rights. Hydrology is snowmelt driven and essentially natural in the proposed reach.

Data Collection and Analysis

Representative Gage Analysis

There are no historic or current streamflow gages on Ways Gulch and no nearby representative gages were identified.

Multiple Regression Model
CSUFlow18 provides the best available estimate of streamflow on Ways Gulch and no adjustments were made for the small springs.

Flow Measurements
CWCB staff made two streamflow measurements on the proposed reach of Ways Gulch as summarized in Table 3.

Table 3. Summary of streamflow measurements for Ways Gulch.

Visit Date	Flow (cfs)	Collector
07/20/2023	0.21	CWCB
07/20/2023	0.17	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 has concluded that water is available for appropriation on Ways Gulch.

MATERIAL INJURY
Because the proposed ISF on Ways Gulch 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., the CWCB will recognize any uses or exchanges of water in existence on the date this ISF water right is appropriated.

ADDITIONAL INFORMATION

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

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.

Espegren, G.D., 1996, Development of instream flow recommendations in Colorado using R2CROSS, Colorado Water Conservation Board.

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

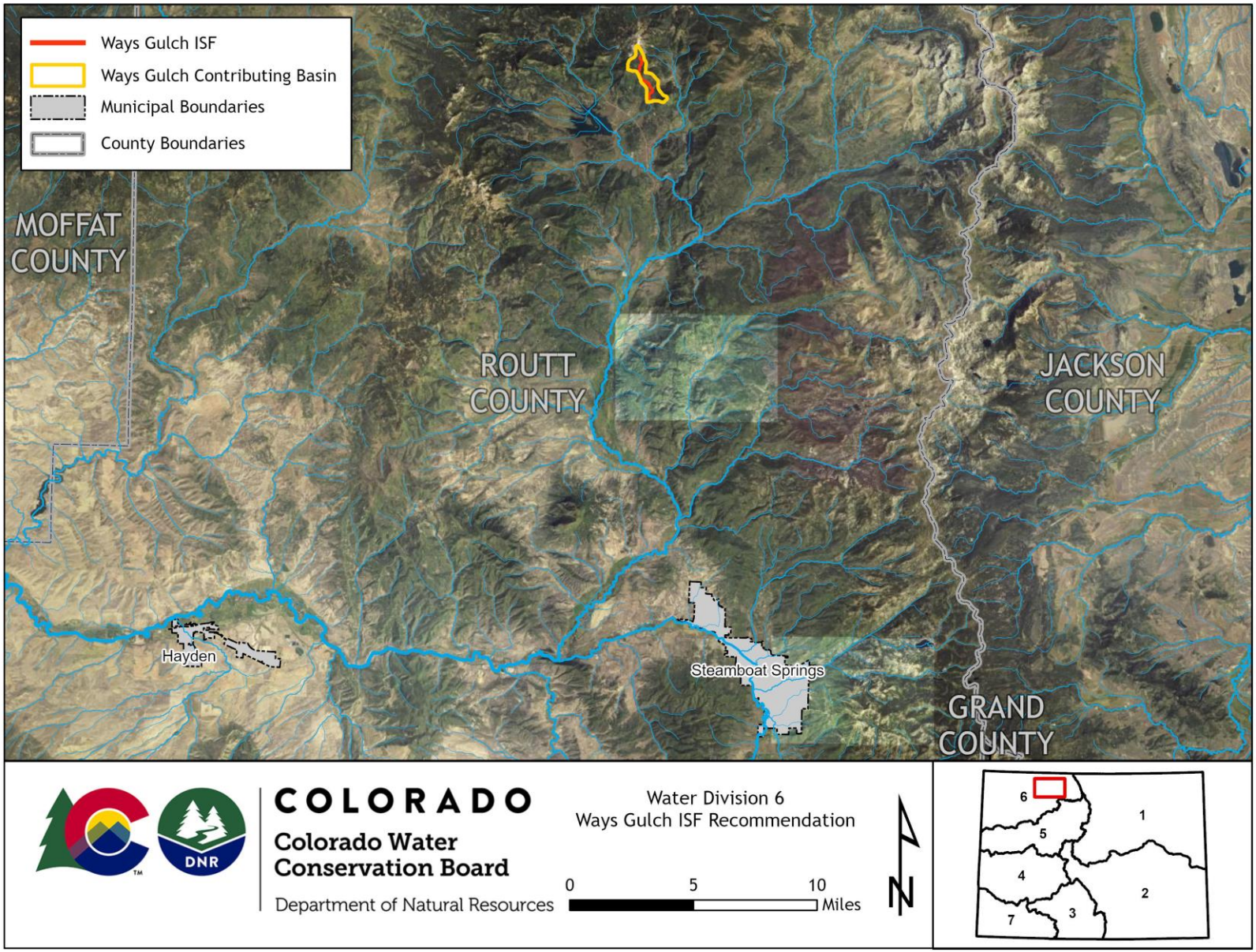
Ferguson, R.I., 2021. Roughness calibration to improve flow predictions in coarse-bed streams. Water Res 57. https://doi.org/10.1029/2021WR029979

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.

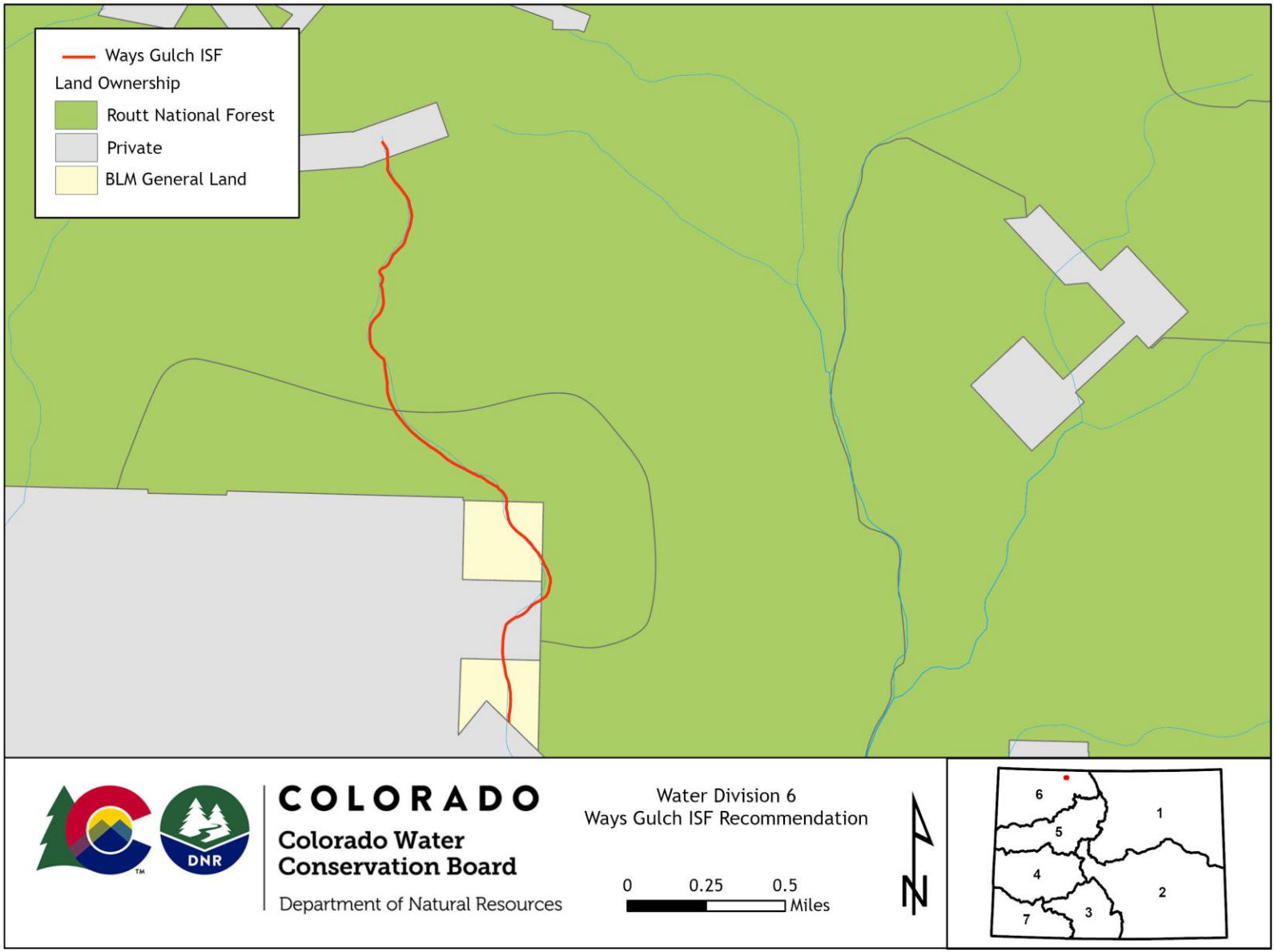
Metadata Descriptions
The UTM locations for the upstream and downstream termini were derived from CWCB GIS using the National Hydrography Dataset (NHD).

Projected Coordinate System: NAD 1983 UTM Zone 13N.

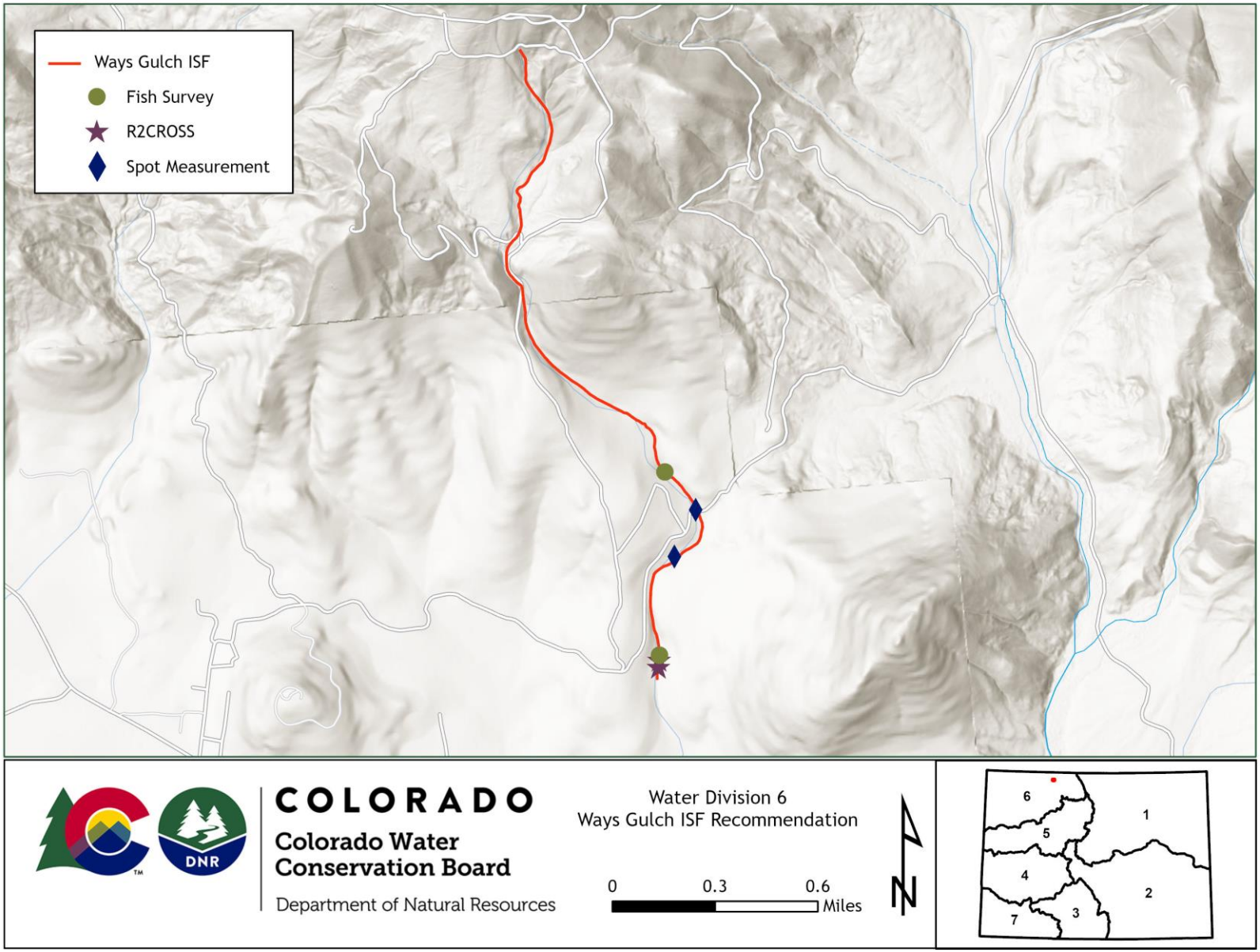
VICINITY MAP



LAND OWNERSHIP MAP



HYDROLOGIC FEATURES MAP



COMPLETE HYDROGRAPH