

West Hubbard Creek Executive Summary



CWCB STAFF INSTREAM FLOW RECOMMENDATION January 27-28, 2025

UPPER TERMINUS: headwaters in the vicinity of
UTM North: 4322507.68 UTM East: 270549.71

LOWER TERMINUS: Overland Ditch at
UTM North: 4323616.26 UTM East: 273785.08

WATER DIVISION/DISTRICT: 4/40

COUNTY: Delta

WATERSHED: North Fork Gunnison

CWCB ID: 21/4/A-012

RECOMMENDER: Colorado Parks and Wildlife (CPW)

LENGTH: 2.32 miles

FLOW RECOMMENDATION: 0.4 cfs (10/01 - 04/30)
4.0 cfs (05/01 - 05/14)
6.5 cfs (05/15 - 07/15)
3.2 cfs (07/16 - 07/31)
1.3 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 (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

CPW recommended that the CWCB appropriate an ISF water right on a reach of West Hubbard Creek at the ISF Workshop in January 2020. West Hubbard Creek is located within Delta County and is approximately 10.5 miles north of the Town of Paonia (See Vicinity Map). The stream originates near the base of Mount Derline and flows west and northwest until it reaches the confluence with Hubbard Creek. West Hubbard Creek is a tributary to Hubbard Creek, which is a tributary to the North Fork of the Gunnison River, which is a tributary to the Gunnison River.

The proposed ISF reach extends from the headwaters downstream to the Overland Ditch for a total of 2.32 miles. The proposed reach is entirely on public lands managed under the Grand Mesa National Forest. CPW is interested in protecting this stream to preserve the natural environment which includes native Colorado River cutthroat trout.

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 West Hubbard Creek was sent to the mailing list in November 2024, March 2024, March 2023, March 2022, March 2021, and March 2020. A public notice about this recommendation was also published in the Delta County Independent on December 12, 2024.

Staff presented information about the ISF program and this recommendation to the Delta County Board of County Commissioners on October 1, 2024. CWCB and CPW staff met with members of the North Fork Gunnison Water Users Association and Raquel Flinker from the Colorado River District on November 28, 2023 about the Middle Hubbard Creek, Main Hubbard Creek, and West Hubbard Creek ISF recommendations. CWCB and CPW staff also met with members of the Ragged Mountain Water Users Association and Raquel Flinker to discuss the recommendations on April 13, 2024. In addition, staff met with Luke Reschke, District 40 Lead Water Commissioner, and Doug Christner, District 40 Water Commissioner, about water rights and water availability on all three streams on September 26, 2023.

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.

West Hubbard Creek is a first order headwaters stream and is a tributary of Hubbard Creek. It flows into the North Fork Gunnison near the town of Somerset. The creek flows through a narrow valley densely forested with stands of pine and aspen. The ISF reach has a high gradient channel with substrate that ranges from boulder to small cobbles to gravels. Fish habitat is complex and includes significant undercut banks, pocket pools, and deep pools created by boulders and large woody debris, both mature and recent, in the channel. There are some riffles in the reach that may be suitable for spawning though most of the riffle features are higher gradient. Step-pools are the dominant habitat features utilized by fish. There is plenty of overhead shading and deep pools which provide temperature refuge. The creek supports a healthy riparian environment with diverse riparian plants and abundant mosses; two species of caddisfly, stonefly larvae, and mayfly were observed during site visits.

West Hubbard Creek supports a self-sustaining population of Colorado River cutthroat trout (CRCT) of the Gunnison Basin lineage (Table 1). CRCT are a state species of special concern and are considered a federally sensitive species (CPW, 2015). CPW conducted fish surveys in 2009 and found multiple age classes based on length frequency data. Multiple age classes indicate that the cutthroat trout population are a self-sustaining population which have natural recruitment. While brook trout have recently invaded West Hubbard Creek, CPW is working with the Forest Service to design and build a fish barrier. Once that fish barrier construction project is complete, CPW plans to remove brook trout which have invaded the upper portions of the creek and recolonize native cutthroat trout to restore the population.

Table 1. List of species identified in West Hubbard Creek.

Species Name	Scientific Name	Status
Colorado River cutthroat trout - Gunnison Basin Lineage	<i>Oncorhynchus clarkii pleuriticus</i>	State - Species of Greatest Conservation Need State - Species of Special Concern

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

CPW 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). CPW 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

CPW collected R2Cross data at two transects for this proposed ISF reach (Table 2 and Site Map). 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 0.40 cfs and a summer flow of 6.5 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 West Hubbard Creek.

Date, XS #	Top Width (feet)	Streamflow (cfs)	Winter Rate (cfs)	Summer Rate (cfs)
08/21/2023, 1	11.9	0.86	0.28	8.60
08/21/2023, 2	11.9	0.86	0.52	4.45
			0.40	6.53

ISF Recommendation

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

0.40 cfs is recommended from October 1 to April 30. This rate meets two of three criteria for baseflow conditions maintaining adequate depth and wetted perimeter in riffles and providing sufficient holding habitats in pools. This will support fish during overwintering periods when metabolic activity is limited and will allow for movement throughout the channel over critical riffle features.

4.0 cfs is recommended from May 1 to May 14; this flow recommendation is reduced due to water availability limitations. This rate simulates snowmelt runoff initiation and maintains adequate wetted perimeter and depth, as well as swifter velocities as ice cover decreases.

6.5 cfs is recommended from May 15 to July 15. This recommendation meets all three hydraulic criteria for spring runoff through its recession. This flow rate will support fish when they are active feeding and spawning. This higher flow rate will support ideal conditions for cutthroat trout spawning which occurs in the early months of summer, as well as productivity of the macroinvertebrate community.

3.2 cfs is recommended from July 16 to July 31; this flow recommendation is reduced due to water availability limitations. It maintains adequate depth and wetted perimeter, as well as swift velocities, that support foraging, rearing and refuge habitats for fish, as well as a productive macroinvertebrate community.

1.3 cfs is recommended from August 1 to September 30; this flow recommendation is reduced due to water availability limitations. This flow recommendation will maintain adequate depth and wetted perimeter in riffles and supports fish movement throughout the channel. It will also provide good habitat availability in riffles, glides, and pools to facilitate rearing and growth during the later part of summer and fall.

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 West Hubbard Creek is 2.9 square miles, with an average elevation of 10,362 feet and average annual precipitation of 32.4 inches. West Hubbard Creek is a high elevation, steep gradient, snowmelt driven hydrologic system. 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 the reach of West Hubbard Creek recommended for an ISF water right.

Data Collection and Analysis

Historic Gage Analysis

The USGS operated a streamflow gage on West Hubbard Creek from 1960 to 1973 at a location near the lower terminus of the proposed reach (West Hubbard Creek Near Paonia, Co., USGS ID: 9132900). This gage record was compared to a nearby climate station to evaluate how the historical record compares to a longer record. Montrose No 2 (ID: USC00055722) is approximately 40 miles south of the proposed reach and climate data was analyzed from 1960 to present. When compared to the most recent thirty years of data the thirteen years of gaged data had slightly above average precipitation with one year above the 75th percentile (1965) and one year below the 25th percentile (1966).

Daily gage data was used to calculate median daily streamflow for the entire period of record (POR) and sufficient data exists to calculate a 95% confidence interval for median streamflow (See Complete Hydrograph). Median hydrology with a confidence interval is used to analyze water availability for the recommended reach. Streamflow peak in June before slowly receding to baseflow conditions by September.

Site Visit Data

CWCB staff accompanied CPW staff in a data collection field campaign for West Hubbard Creek on August 21, 2023.

Water Availability Summary

The hydrograph shows median daily streamflow and the upper confidence interval for median daily streamflow based on the historic gage on West Hubbard Creek and includes the proposed ISF rate. The proposed ISF flow rate is below the upper confidence interval of median streamflow. Staff concludes that water is available for appropriation on West Hubbard Creek.

MATERIAL INJURY

If decreed, the proposed ISF on West Hubbard 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 Parks and Wildlife, 2015, State Wildlife Action Plan: A strategy for conserving wildlife in Colorado. <https://cpw.widencollective.com/assets/share/asset/nbenjdfemj>

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>

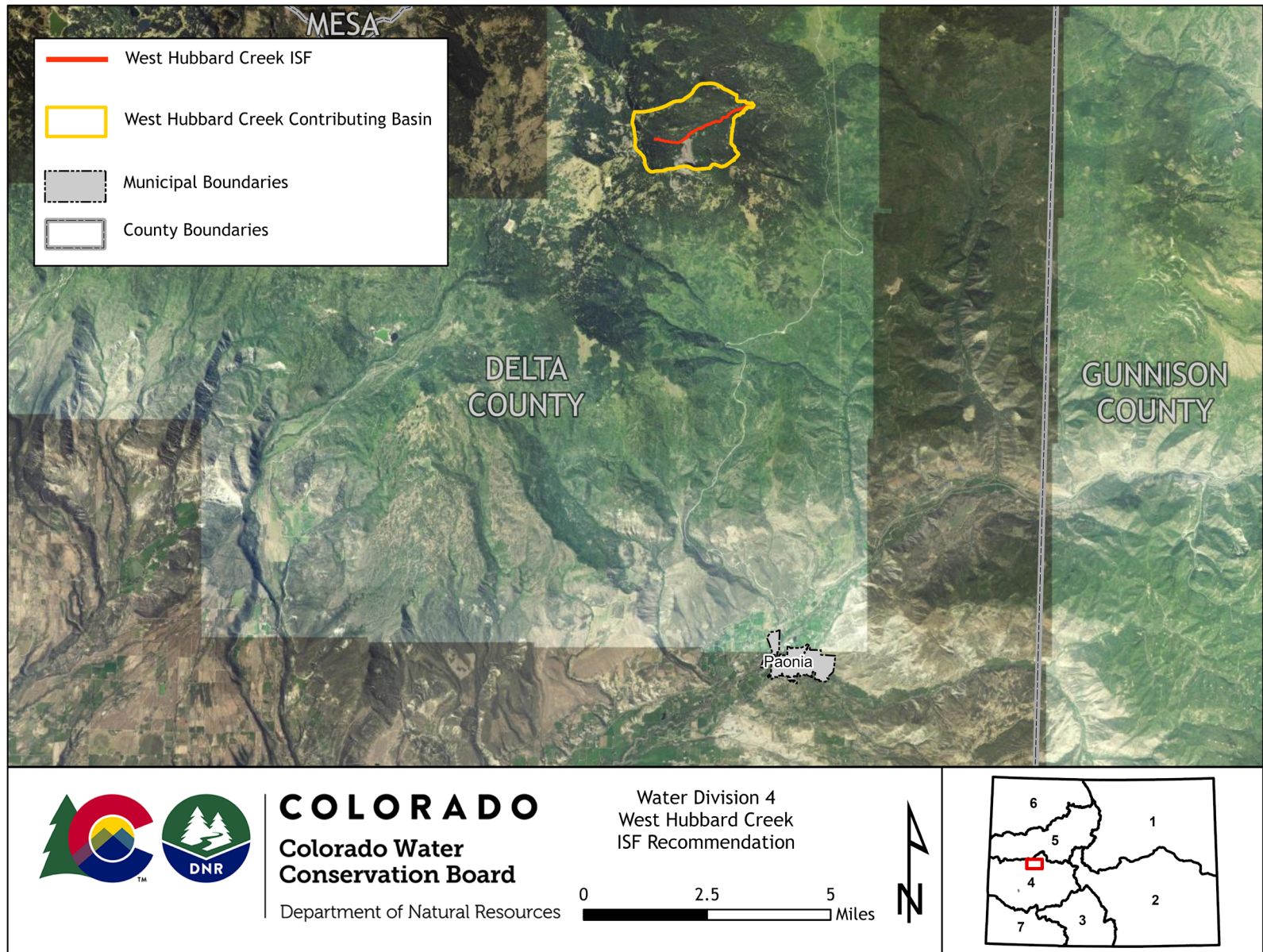
Nehring, B.R., 1979, Evaluation of instream flow methods and determination of water quantity needs for streams in the state of Colorado, Colorado Division of Wildlife.

Metadata Descriptions

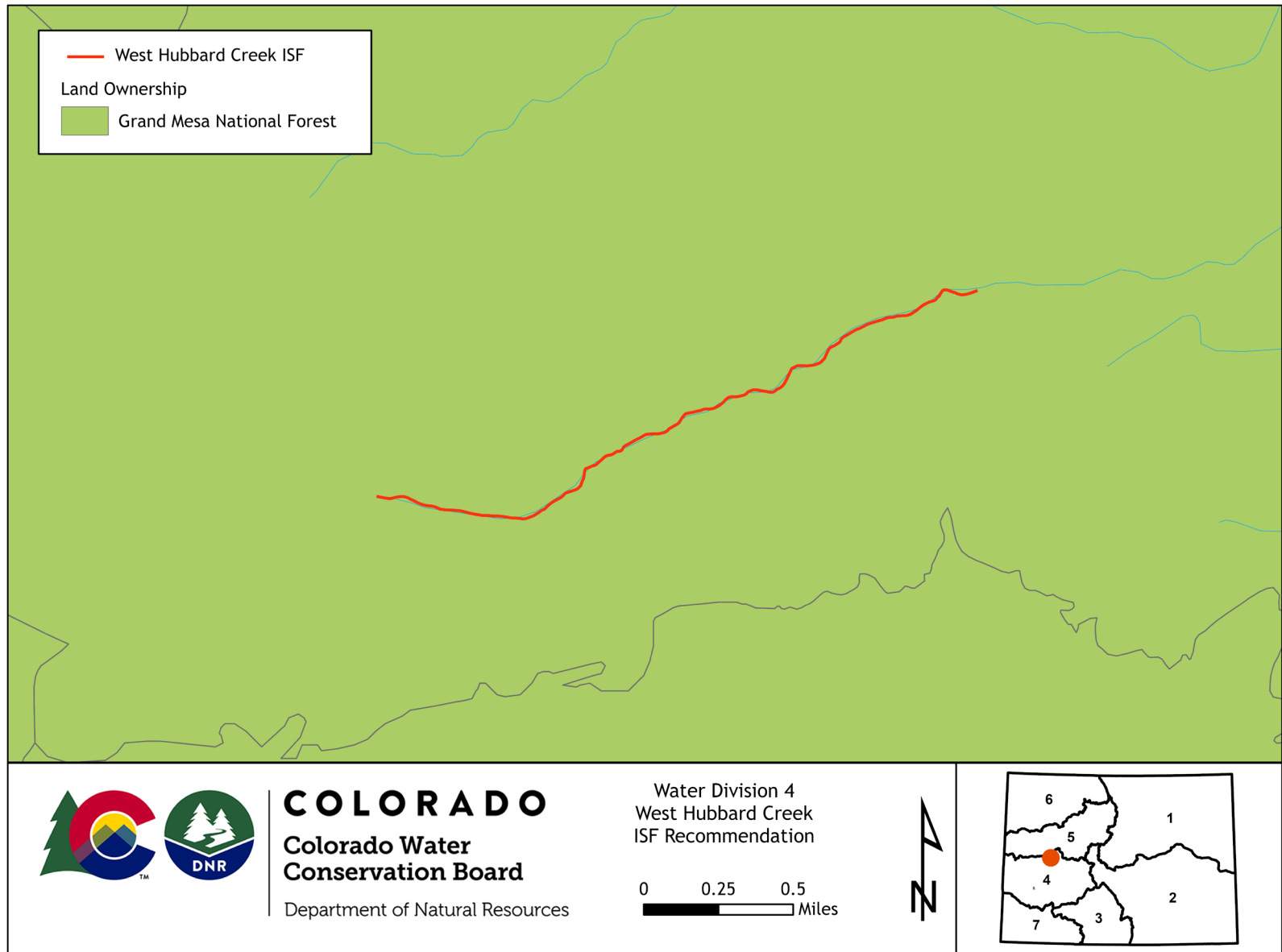
The UTM locations for the upstream and downstream termini were derived from CWCB GIS using the National Hydrography Dataset (NHD).

Projected Coordinate System: NAD 1983 UTM Zone 13N.

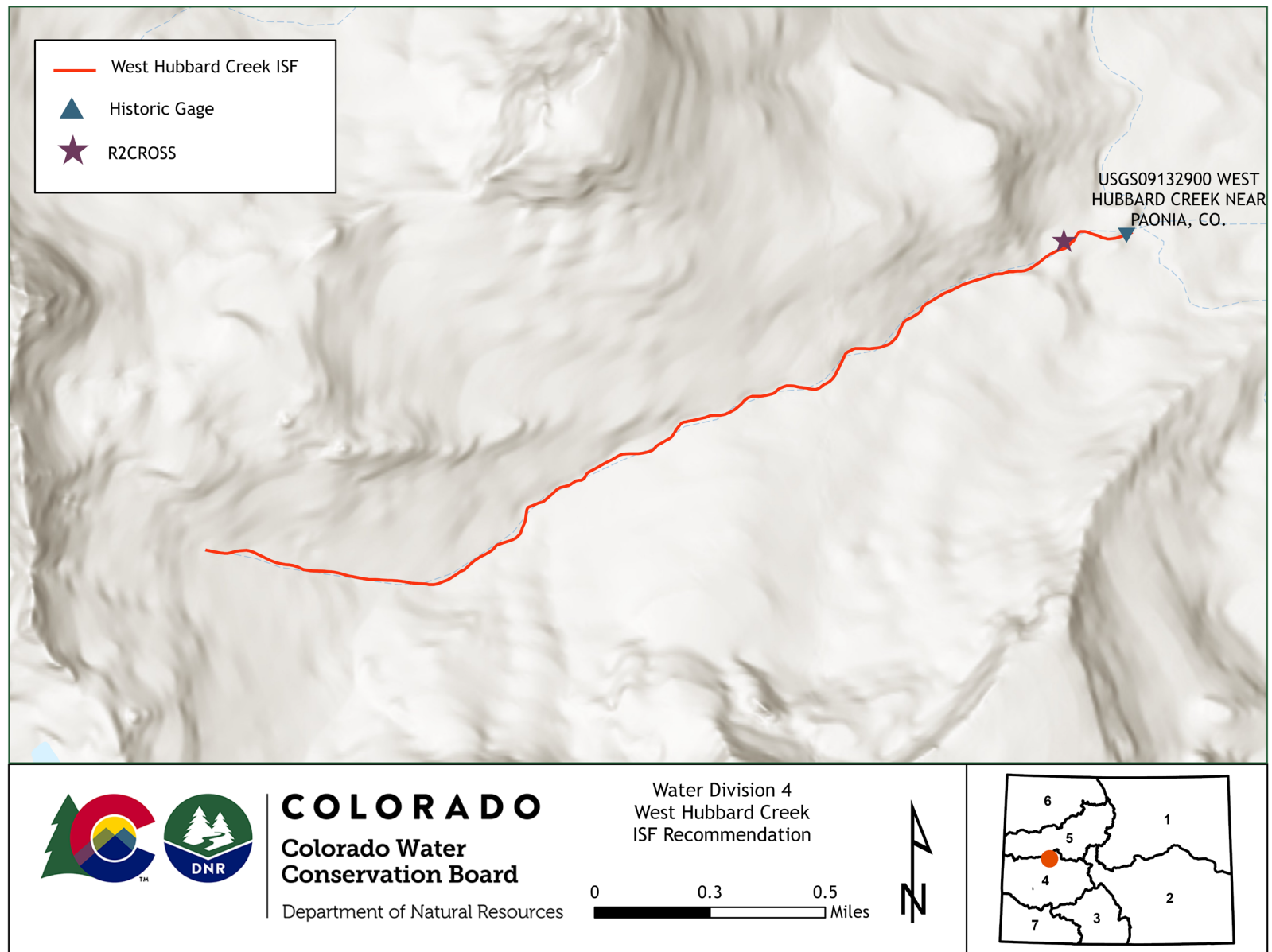
VICINITY MAP



LAND OWNERSHIP MAP



SITE MAP



COMPLETE HYDROGRAPH

West Hubbard Creek Lower terminus at the Overland Ditch

