

Middle Hubbard Creek Executive Summary



CWCB STAFF INSTREAM FLOW RECOMMENDATION January 27-28, 2025

UPPER TERMINUS: headwaters in the vicinity of
UTM North: 4324090.67 UTM East: 270063.72

LOWER TERMINUS: Overland Ditch at
UTM North: 4325516.75 UTM East: 273218.73

WATER DIVISION/DISTRICT: 4/40

COUNTY: Delta

WATERSHED: North Fork Gunnison

CWCB ID: 21/4/A-007

RECOMMENDER: Colorado Parks and Wildlife (CPW)

LENGTH: 2.37 miles

FLOW RECOMMENDATION: 0.25 cfs (08/16 - 03/31)
0.6 cfs (04/01 - 04/30)
4.9 cfs (05/01 - 06/30)
2.9 cfs (07/01 - 07/31)
1.0 cfs (08/01 - 08/31)
0.5 cfs (09/01 - 10/31)



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

CPW recommended that the CWCB appropriate an ISF water right on a reach of Middle Hubbard Creek at the ISF Workshop in January 2020. Middle Hubbard Creek is located within Delta County and is approximately 11.5 miles north of the Town of Paonia (See Vicinity Map). The stream originates near the base of Crater Peak and flows northwest until it reaches the confluence with Hubbard Creek. Middle 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 headwaters downstream to the Overland Ditch for a total of 2.37 miles. The proposed reach is entirely on public lands managed under the Grand Mesa National Forest (See Land Ownership Map). CPW is interested in protecting this stream to preserve the natural environment which supports 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 Middle 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.

Middle Hubbard Creek is a first order headwaters stream and a tributary to Hubbard Creek. It flows into the North Fork Gunnison River 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 confined, high-gradient channel with substrate that ranges from small boulder to large cobbles and gravels with predominantly large substrate. Fish habitat is complex and includes large woody debris in the channel and deep pools providing slower-velocity refuge. High flow events access side channels which create backwater habitats. Large pools are the dominant habitat features used by resident trout. These pools are mainly created from either large boulder step-pool drops or log jams. Deadfall in the basin is significant. There is ample canopy cover providing shading, cover, and thermal refuge for the resident cutthroat trout. The creek supports a healthy riparian community. Macroinvertebrates are diverse and abundant and include three species of caddisfly and mayflies which were observed in the field.

Middle Hubbard Creek supports a self-sustaining population of Colorado River cutthroat trout (CRCT) of the Gunnison Basin lineage (Table 1). The population is considered a “core conservation population” meaning very high genetic purity because of limited hybridization with non-native trout species. CRCT are a state species of special concern and are considered a federally sensitive species (CPW, 2015). Multiple age classes indicate that the cutthroat trout population are self-sustaining with natural recruitment occurring.

Table 1. List of species identified in Middle 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 1.0 cfs and a summer flow of 5.3 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 Middle Hubbard Creek.

Date, XS #	Top Width (feet)	Streamflow (cfs)	Winter Rate (cfs)	Summer Rate (cfs)
08/14/2024, 1	19.45	1.0	0.99	8.02
08/14/2024, 2	15.53	1.0	1.09	2.57
			1.00	5.30

ISF Recommendation

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

0.25 cfs is recommended from November 1 to March 31; this flow recommendation is reduced due to water availability limitations. This flow rate will maintain adequate habitat availability in holding habitats like pools and deep glides to support fish during the overwintering period.

0.60 cfs is recommended from April 1 to April 30; this flow recommendation is reduced due to water availability limitations. This flow rate will maintain adequate wetted perimeter and sufficient depths in riffles to support fish as they transition into higher levels of metabolic activity and may begin to move throughout the channel.

4.9 cfs is recommended from May 1 to June 30; this flow recommendation is slightly reduced due to water availability limitations. This flow rate comes close to meeting sufficient depth, velocities, and wetted perimeter criteria and supports fish when they are actively feeding and spawning. This flow rate supports beneficial spawning conditions during spring runoff and high flow periods.

2.9 cfs is responsible from July 1 to July 31; this flow recommendation is reduced due to water availability limitations. This flow rate will maintain adequate depth and wetted perimeter as well as higher velocities that support rearing and refuge habitats for fish.

1.0 cfs is recommended from August 1 to August 31; this flow recommendation is reduced due to water availability limitations. This flow rate will maintain adequate wetted perimeter and depth in riffles and will provide plenty of habitat availability in deeper habitat features like pools and glides.

0.50 cfs is recommended from September 1 to October 31; this flow recommendation is reduced due to water availability limitations. This low rate will provide sufficient wetted perimeter in riffles and adequate habitat availability in deeper features like pools and glides. It will facilitate longitudinal movement to find overwintering habitats.

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 Middle Hubbard Creek is 1.4 square miles, with an average elevation of 10,444 feet and average annual precipitation of 30.3 inches. Middle 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 Middle Hubbard Creek recommended for an ISF.

Data Collection and Analysis

Historic Gage Analysis

The USGS operated a streamflow gage on Middle Hubbard Creek from 1960 to 1968 (Middle Hubbard Creek Near Paonia, Co., USGS ID: 9132800). 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).

Mean monthly streamflow data was calculated from daily gage data for the entire period of record (POR) and used to analyze water availability (See Complete Hydrograph). Mean monthly flows peak in June before slowly receding to baseflow conditions beginning in September.

Site Visit Data

CWCB staff joined CPW staff during R2Cross data collection field work campaign. No additional CWCB site visits occurred.

Water Availability Summary

The hydrograph shows mean-monthly streamflow for the historic gage on Middle Hubbard Creek and includes the proposed ISF rate. The proposed ISF flow rate is below the mean-monthly streamflow. Staff concludes that water is available for appropriation on Middle Hubbard Creek.

MATERIAL INJURY

If decreed, the proposed ISF on Middle 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>

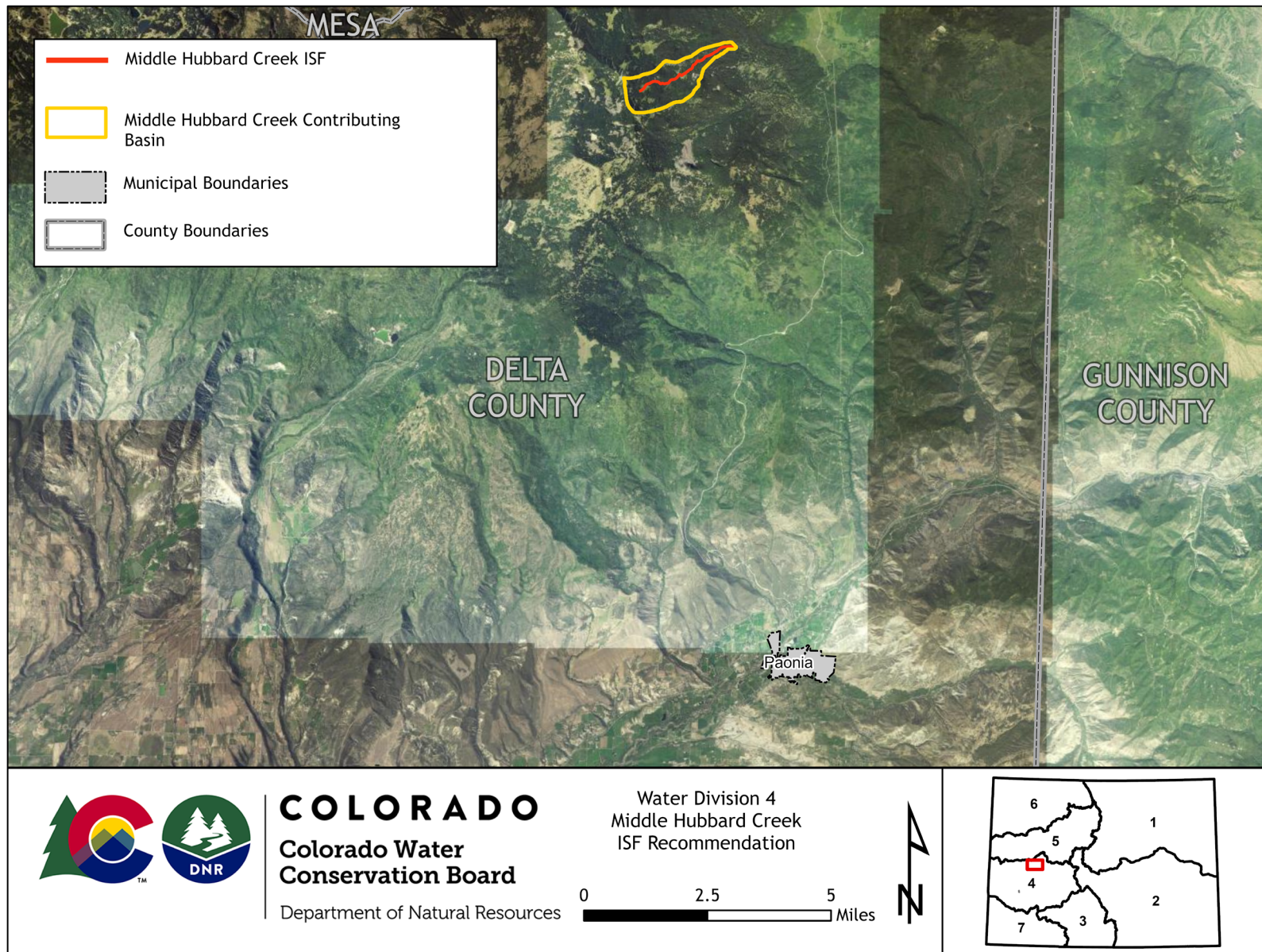
Nehring, B.R., 1979, Evaluation of instream flow methods and determination of water quantity needs for streams in the state of Colorado, Colorado Division of Wildlife.

Metadata Descriptions

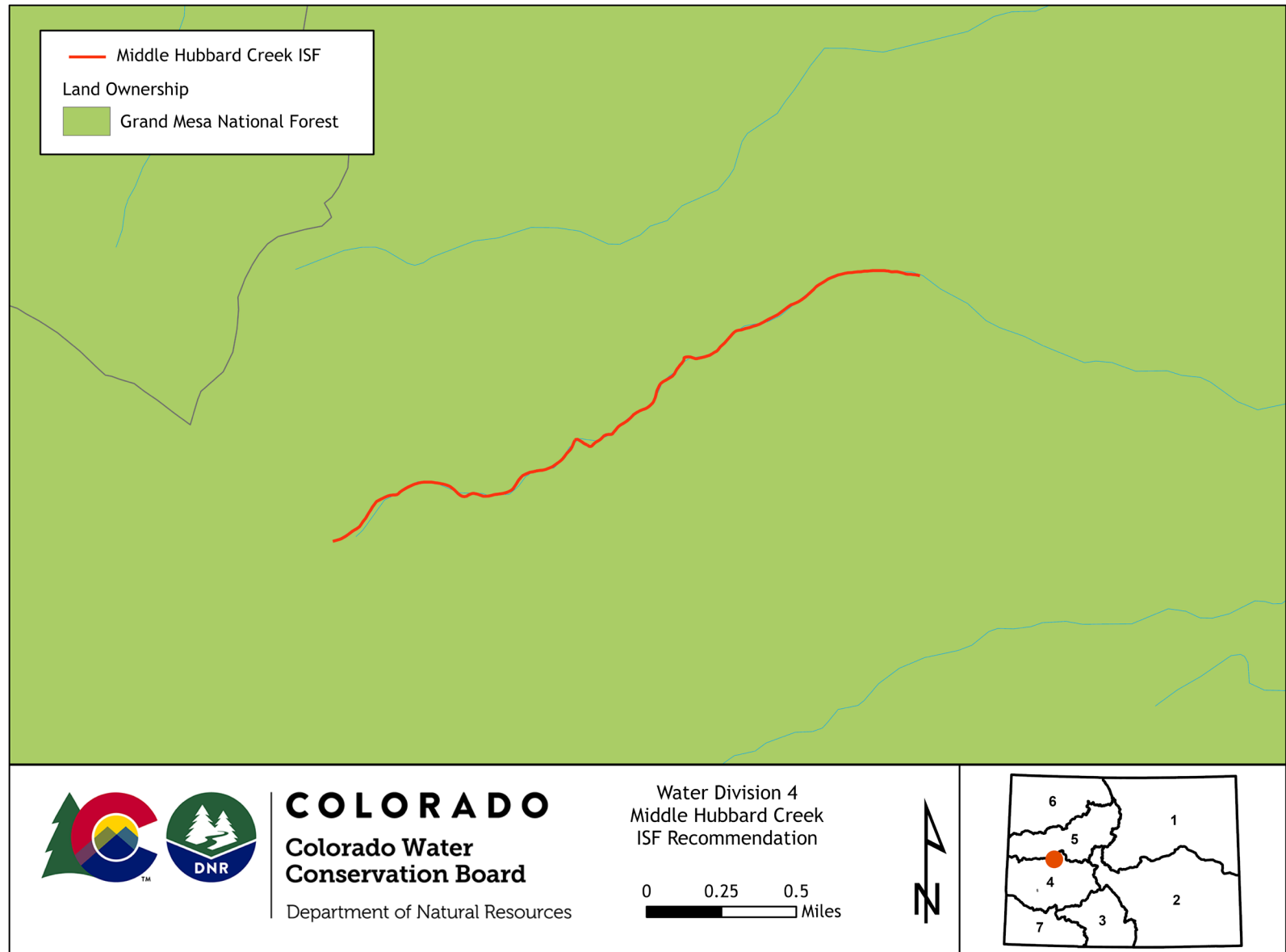
The UTM locations for the upstream and downstream termini were derived from CWCB GIS using the National Hydrography Dataset (NHD).

Projected Coordinate System: NAD 1983 UTM Zone 13N.

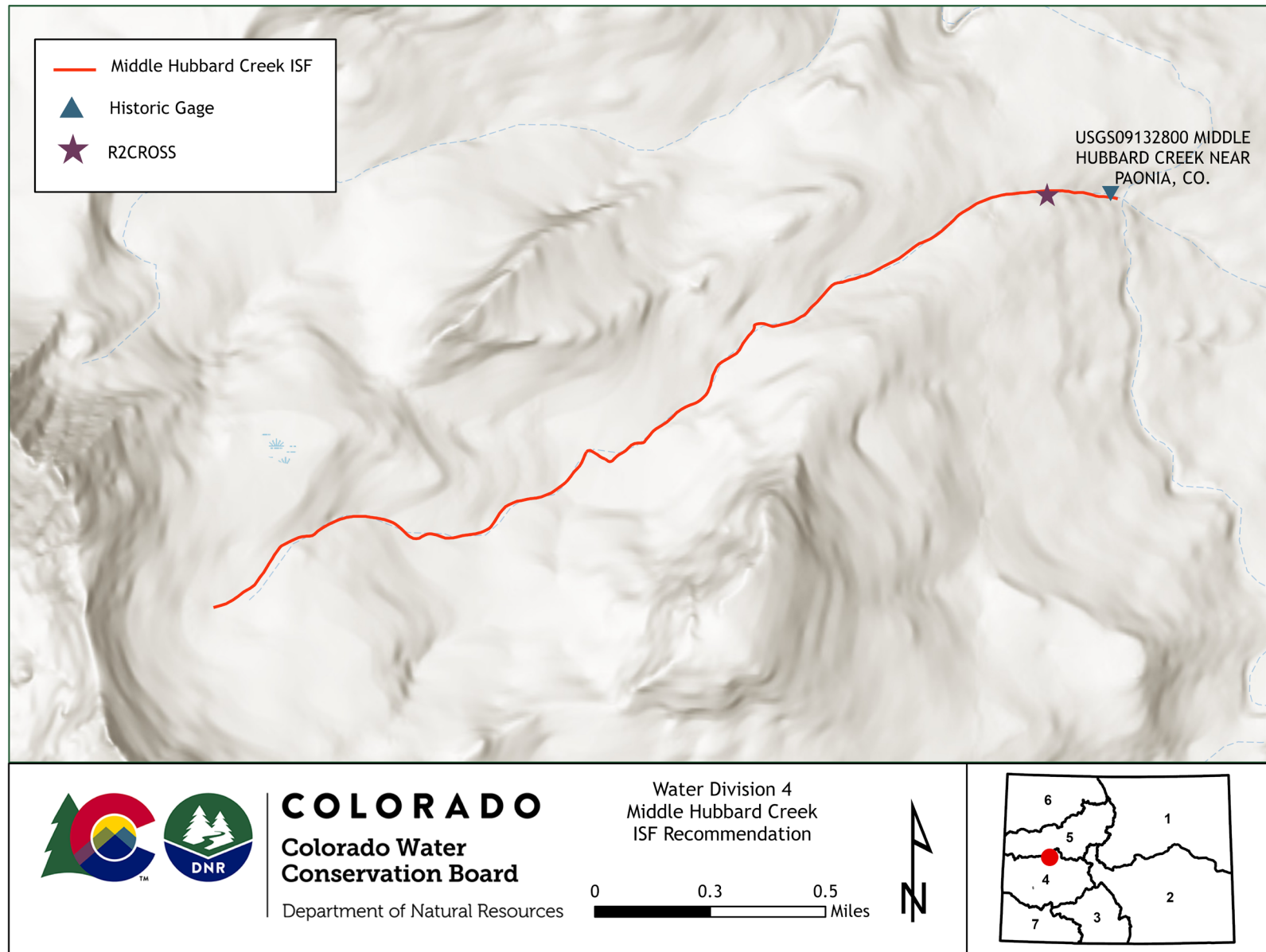
VICINITY MAP



LAND OWNERSHIP MAP



SITE MAP



COMPLETE HYDROGRAPH

