

Monitor Creek Executive Summary



CWCB STAFF INSTREAM FLOW RECOMMENDATION January 24-25, 2023

UPPER TERMINUS: confluence with Little Monitor Creek at
UTM North: 4270075.83 UTM East: 212258.00

LOWER TERMINUS: confluence Potter Creek at
UTM North: 4279535.32 UTM East: 220671.03

WATER DIVISION: 4

WATER DISTRICT: 40

COUNTY: Montrose

WATERSHED: Lower Gunnison

CWCB ID: 18/4/A-008

RECOMMENDER: Bureau of Land Management (BLM)

LENGTH: 8.29 miles

FLOW RECOMMENDATION: 4.6 cfs (04/01 - 05/31)
3.6 cfs (06/01 - 06/30)



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/2023-isf-recommendations>.

RECOMMENDED ISF REACH

BLM recommended that the CWCB appropriate an ISF water right on a reach of Monitor Creek. Monitor Creek is located within Montrose County and is approximately 24 miles west of Montrose (See Vicinity Map). The stream originates on the east side of the Uncompaghere Plateau and flows northeast until it reaches the confluence with Potter Creek, which is a tributary to Roubideau Creek and the Gunnison River.

The proposed reach extends from the confluence with Little Monitor Creek downstream to the confluence with Potter Creek for a total of 8.29 miles. The entire proposed reach is on BLM public land (See Land Ownership Map). BLM is interested in protecting this stream to assist in long-term management of riparian and aquatic habitats.

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 Monitor Creek was sent to the mailing list in March 2017, March 2018, March 2019, November 2019, March 2020, November 2020, March 2021, November 2021, March 2022, and November 2022. Staff sent letters to identified landowners adjacent to Monitor Creek based on information from the county assessors website. A public notice about this recommendation was also published in the Montrose Daily Press on December 21, 2022.

Staff presented information about the ISF program and this recommendation to the Montrose County Board of County Commissioners on October 3, 2017, December 9, 2019, and November 22, 2022. In addition, staff communicated with Bob Hurford, Division Four Engineer and Luke Reschke, Lead Water Commissioner several times regarding water rights and water use practices on Monitor Creek.

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.

The headwaters of Monitor Creek form on the eastern side of the Uncompaghe Plateau, just north of Divide Road and Tabeguache Basin. Monitor Creek is part of several stream systems within the Roubideau Creek watershed. The creek runs parallel to Cottonwood and Potter Creeks, separated by long narrow mesas. The steep stair-step sandstone slopes of the mesas surrounding Monitor Creek form a deepening canyon. Monitor Creek is very steep at the headwaters and decreases in gradient as the canyon deepens. The ISF reach begins at a moderate gradient in the canyon and water temperatures are generally cool.

The streambed substrate is variable, consisting of large to small boulders, cobbles, gravel, sand, and silt. The channel is mostly single-thread at low flows, with coarse-substrate riffles. At higher flows, the stream braids over varying levels of the floodplain. Monitor Creek has large, flashy changes in flow causing an actively moving streambed and significant overbank flows. The channel is complex and includes riffles, runs, and pools. Many of the pools are deep enough to support fish year-round, even at very low flows in dry years. Woody debris, algae, and aquatic plants provide habitat and food sources for fish and macroinvertebrates.

Monitor Creek supports Bluehead Sucker and Flannelmouth Sucker, which are identified in Colorado as state species of greatest conservation need and by the BLM as sensitive species (Table 1). Monitor Creek provides important spawning habitat for these species during runoff and nursery habitat for young native fish. Biological surveys have also found Speckled Dace, White Sucker, and Rainbow Trout.

Macroinvertebrate surveys in 2003, 2004 and 2018 found the community to be diverse and abundant. CWCB staff observed the following taxa in the field: dragonfly, damselfly, water boatmen, giant water striders, giant water bugs, aquatic diving beetles, whirligig beetles, chironomids, spinner caddisfly, crawdads, and midges. In 2018, a bioassessment was conducted under the guidelines of Colorado Public Health and Environment's (CDPHE) Aquatic Life Use Attainment Policy using Colorado's multi-metric index. The calculated score of 46.5 indicates the creek is capable of sustaining a wide variety of water biota for the region.

Amphibians were also found during the biological surveys including Woodhouse Toads and Northern Leopard Frogs, which are identified as a Colorado species of special concern and a species of greatest conservation need. Monitor Creek also supports a number of other animals including great blue heron, western whiptail, prairie rattlesnake, hummingbirds, desert bighorn sheep, black bear, mule deer, and mountain lion. The riparian community is comprised of narrowleaf cottonwood, red osier, dogwood, coyote willow, and herbaceous plants that are similar to grass.

Table 1. List of species identified in Monitor Creek.

Species Name	Scientific Name	Status
Bluehead Sucker	<i>Catostomus discobolus</i>	BLM - Sensitive Species State - Species of Greatest Conservation Need
Flannelmouth Sucker	<i>Catostomus latipinnis</i>	BLM - Sensitive Species State - Species of Greatest Conservation Need
Rainbow Trout	<i>Oncorhynchus mykiss</i>	None
Speckled Dace	<i>Rhinichthys osculus</i>	None
Northern Leopard Frog	<i>Rana pipiens</i>	State - Species of Greatest Conservation Need State - Species of Special Concern
aquatic beetle	<i>Coleoptera</i>	None
aquatic fly larve	<i>Diptera</i>	None
back swimmer	<i>Nototectidae</i>	None
chironomid fly	<i>Chronomides</i>	None
crawdada	<i>decapodadecapoda</i>	None
damselfly	<i>Zygoptera</i>	None
dragonfly	<i>Anisoptera</i>	None
giant water bug	<i>Belostomatidae</i>	None
water boatmen	<i>Corixidae</i>	None
water horsetail	<i>Equisetum fluviatile</i>	None
water strider	<i>Gerridae</i>	None
whirligig beetle	<i>Gyrinidae</i>	None
great blue heron	<i>Ardea herodias</i>	None
western whiptail	<i>Cnemidophorus tigris</i>	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 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, survey of channel geometry and features at a cross-section, and 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, 2001). 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 a 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 reach of stream. The R2Cross model results in a winter flow of 2.44 cfs and a summer flow of 4.63 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 Monitor Creek.

Date, XS #	Top Width (feet)	Streamflow (cfs)	Winter Rate (cfs)	Summer Rate (cfs)
05/10/2012, 1	22.71	2.00	3.20	5.52
05/10/2012, 2	19.00	1.96	1.68	3.75
			2.44	4.63

ISF Recommendation

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

4.6 cfs is recommended from April 1 to May 31 during the peak snowmelt season. This recommendation is driven by the average velocity criteria. Monitor Creek experiences consistently low flows during late summer and fall, so it is important to protect as much physical habitat as possible during the limited time when snowmelt runoff flows are available. Protecting this flow rate will help ensure that habitat and passage is available for native species that spawn in the creek.

3.6 cfs is recommended from June 1 to June 30 during the early summer period. This recommendation is driven by limited water availability. This flow rate meets two of three ISF

criteria. This flow rate will assist adult fish, young-of-the-year, and larvae in returning to Roubideau Creek and Gunnison River after spawning is complete.

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.

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 Monitor Creek is 30.1 square miles, with an average elevation of 7,710 feet and average annual precipitation of 19.1 inches. Hydrology throughout the Uncompahgre Plateau demonstrates a relatively early snowmelt runoff pattern that is also influenced by monsoon and late season storms.

There are a number of water uses in the basin tributary to the proposed ISF on Monitor Creek. There are seven active surface water diversions upstream from the proposed upper terminus. The sum of active surface water diversions in the Monitor Creek basin is 67.13 cfs (See the Hydrologic Features Map and Detailed map). The largest of these is the Big Monitor Ditch No 1

(WDID 4001426, 51.85 cfs, appropriated in 1918). There are also 412 acre feet in active storage rights, 0.53 cfs for a number of springs and pipelines, and 0.4 cfs for well water rights. None of these water rights are known to completely dry up Monitor Creek. In addition, there are some diversions that import or export water into the Monitor basin. The Everlasting Ditch (WDID 4001435, 27 cfs, appropriated in 1901 and 1964), which diverts from Cottonwood Creek, irrigates lands in the Monitor Creek basin and may contribute additional flow. The 25 Mesa Upper Little Monitor Ditch (WDID 4001319, 7 cfs, appropriated in 1904) diverts water from Little Monitor Creek, which is used on lands in both the Monitor Creek and Cottonwood Creek basins. Based on these water uses, hydrology is altered.

Data Collection and Analysis

Gage Data

There are no current or historic streamflow gages on Monitor Creek. No representative gages on nearby streams were identified due to a general lack of gages in the region and the high level of water use in the nearest streams with gages.

CWCB Gage and Staff Measurements

CWCB staff installed a temporary gage on Monitor Creek approximately 150 feet upstream from the confluence with Potter Creek. This gage operated from 6/8/2017 through present and data was processed through 6/30/2022. There are a number of data gaps in the record due to equipment failures, disruptions to gage maintenance due to COVID-19, and two high flow events that dislodged equipment. Streamflow measurements collected to maintain this gage as well as other measurements made by BLM and the USGS are shown in Table 3.

Table 3. Summary of streamflow measurements for Monitor Creek.

Visit Date	Flow (cfs)	Collector
5/20/2003	12.89	USGS
5/25/2004	2.32	USGS
6/12/2014	0.84	BLM
4/8/2015	3.55	BLM
7/23/2015	0.97	BLM
5/4/2016	30.32	BLM
3/10/2017	0.28	CWCB
4/13/2017	32.15	BLM
4/19/2017	57.7	CWCB
5/22/2017	14.48	BLM
6/8/2017	1.53	CWCB
6/22/2017	0.37	CWCB

Visit Date	Flow (cfs)	Collector
6/26/2017	0.09	BLM
7/13/2017	0.75	CWCB
8/24/2017	0.12	CWCB
3/20/2018	0.04	CWCB
3/21/2018	0.08	CWCB
4/3/2018	0.09	CWCB
5/10/2018	0.09	CWCB
7/3/2018	0.02	CWCB
8/22/2018	0.03	CWCB
4/8/2019	3.35	CWCB
4/11/2019	11.61	CWCB
5/3/2019	48.31	BLM
5/15/2019	55.13	CWCB
6/19/2019	5.07	CPW
7/31/2019	0.25	CWCB
10/17/2019	0.06	CWCB
3/4/2020	0.06	CWCB
5/13/2020	0.55	CPW
10/1/2020	0.05	CWCB
4/5/2021	0.02	CWCB
5/11/2021	0.03	CWCB
7/22/2021	0.04	CWCB
9/14/2021	0	CWCB
2/23/2022	0.04	CWCB
3/26/2022	0.02	CPW
4/28/2022	47.53	CPW
5/6/2022	23.2	CPW

Visit Date	Flow (cfs)	Collector
6/9/2022	0.12	CPW
6/22/2022	0.08	CWCB

A nearby weather station was reviewed to assess how the 2017-2022 gage record compared to a longer-term record for the area. The nearest climate station with a relatively long record is at Columbine Pass (USS0008L02S, 1986 to 2022) located near the headwaters of Monitor Creek, approximately 24 miles southwest from the proposed lower terminus. Figure 1 shows cumulative snow water equivalent (SWE) totals for 2017-2022 in comparison to the 30-year average (downloaded from the Colorado River Basin Forecast Center on 12/19/2022). Peak SWE in 2018 was the lowest on record, 2020 and 2021 were below average, and 2017, 2019, and 2022 were above average. This information demonstrates a range of precipitation in the area during the CWCB gage record.

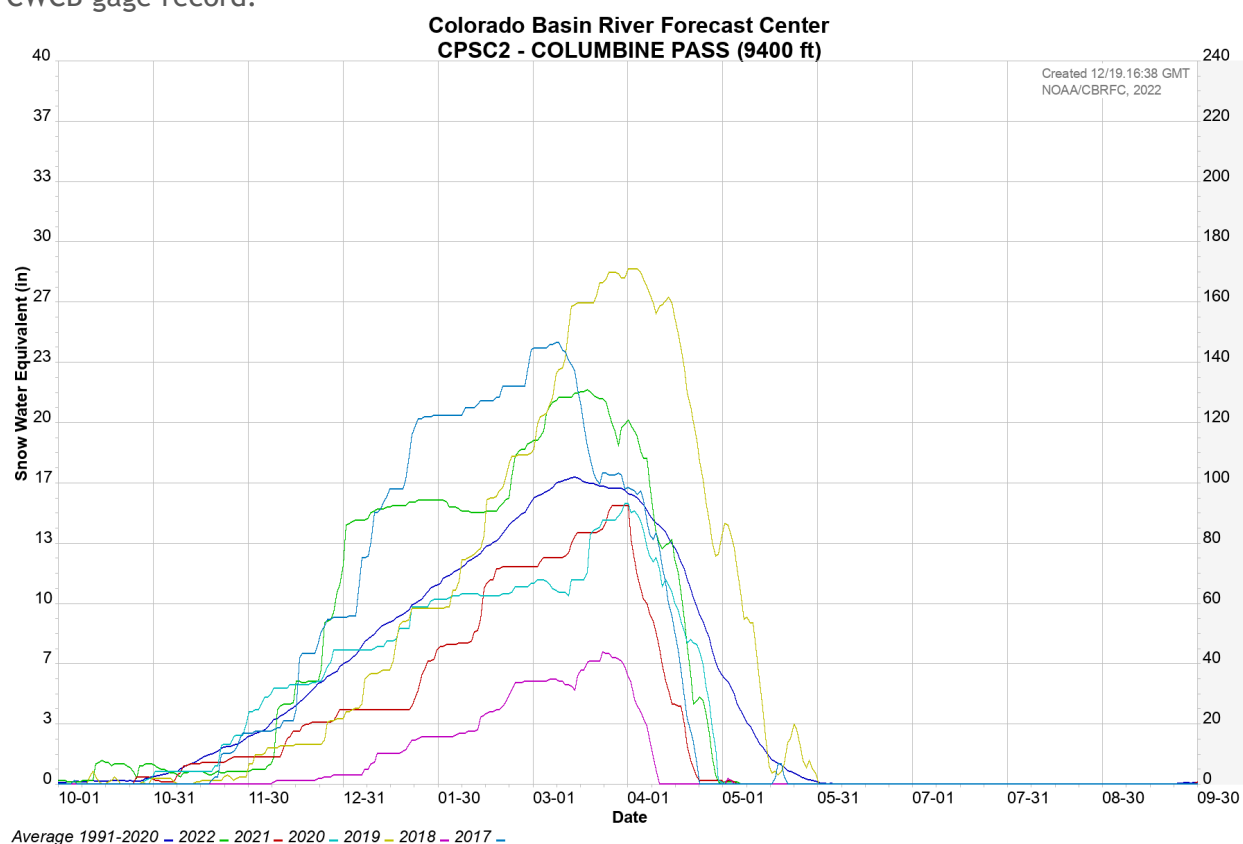


Figure 1. Cumulative SWE for 2014 to 2022 and median SWE from 1991 to 2020 downloaded from the Colorado River Basin Forecast Center on 12/19/2022.

Staff also evaluated streamflow gages to better understand potential streamflow given that persistent low soil moisture in recent years has impacted how much snowfall becomes streamflow. The Dallas Creek gage and San Miguel gages (USGS 09147000 Dallas Creek near Ridgway and USGS 0917700 San Miguel River at Uravan) were selected because they were reasonably close to the Uncompaghre Plateau. The gages are not impacted by large reservoirs;

however, they are in different basins and have significant water uses. Years with complete data (provisional or approved data, filling missing data in 2022 with the long-term average) from 1992 to 2022 was used to calculate annual water volumes and basic percentiles. Data from these gages show that 2019 was very wet (greater than 75th percentile); 2017 was wet or wettest (greater than the 50th percentile for the San Miguel River and greater than 75th percentile for Dallas Creek); 2018, 2020, 2021, and 2022 were in the driest category (less than 25th percentile). 2018 and 2020 were exceptionally dry with annual water volumes less than the 10th percentile. Therefore, the CWCB gage data contains a range of year types, but the majority of years in the record are likely to reflect dry or exceptionally dry conditions.

The CWCB temporary gage data also shows a wide range in streamflow between 2017 and 2022. High flows in 2017 dislodge the newly installed gage, but the gage was likely installed after the majority of snowmelt runoff. There was little to no measured streamflow in 2018 or 2021 (although some data is missing in 2021), and just a short duration peak in 2020. Streamflow was higher in 2022 and in 2019, which also dislodged the gaging equipment. Due to the short period of record at the gage and significant variability in flows between years, mean-monthly streamflow was calculated using the entire available record rather than median daily streamflow.

Water Availability Summary

The hydrograph (See Complete Hydrograph) shows mean-monthly streamflow calculated from the CWCB temporary gage and other spot streamflow measurements. Staff has concluded that water is available for appropriation.

MATERIAL INJURY

As a new junior water right, the proposed ISF on Monitor Creek 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 Department of Public Health and Environment, 2020, Aquatic life use attainment: methodology to determine to use attainment for rivers and streams. Retrieve from URL: <https://www.coloradosmp.org/wp-content/uploads/2022/03/Policy-10-1-v.-2020.pdf>

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>

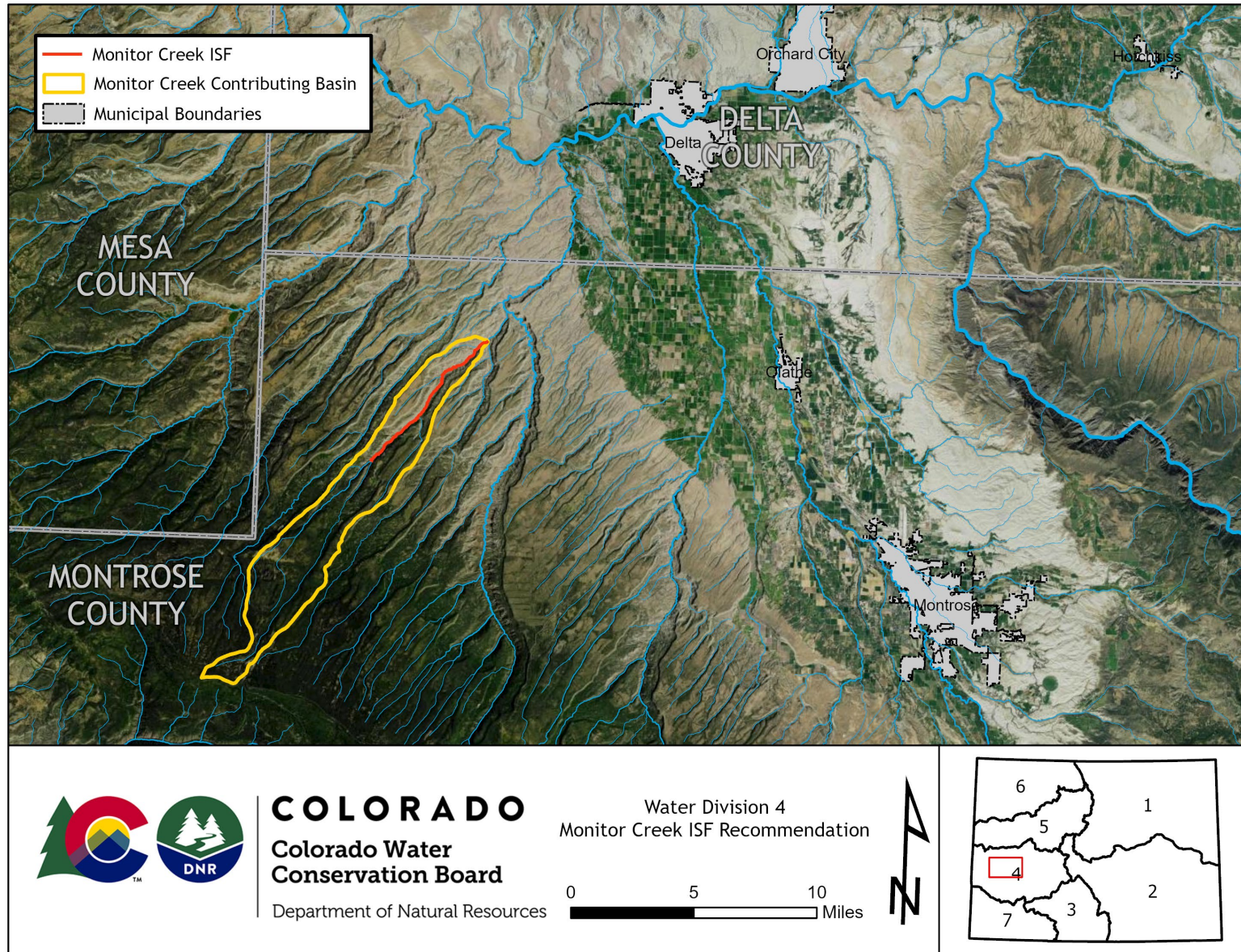
Nehring, B.R., 1979, Evaluation of instream flow methods and determination of water quantity needs for streams in the State of Colorado, Colorado Division of Wildlife.

Metadata Descriptions

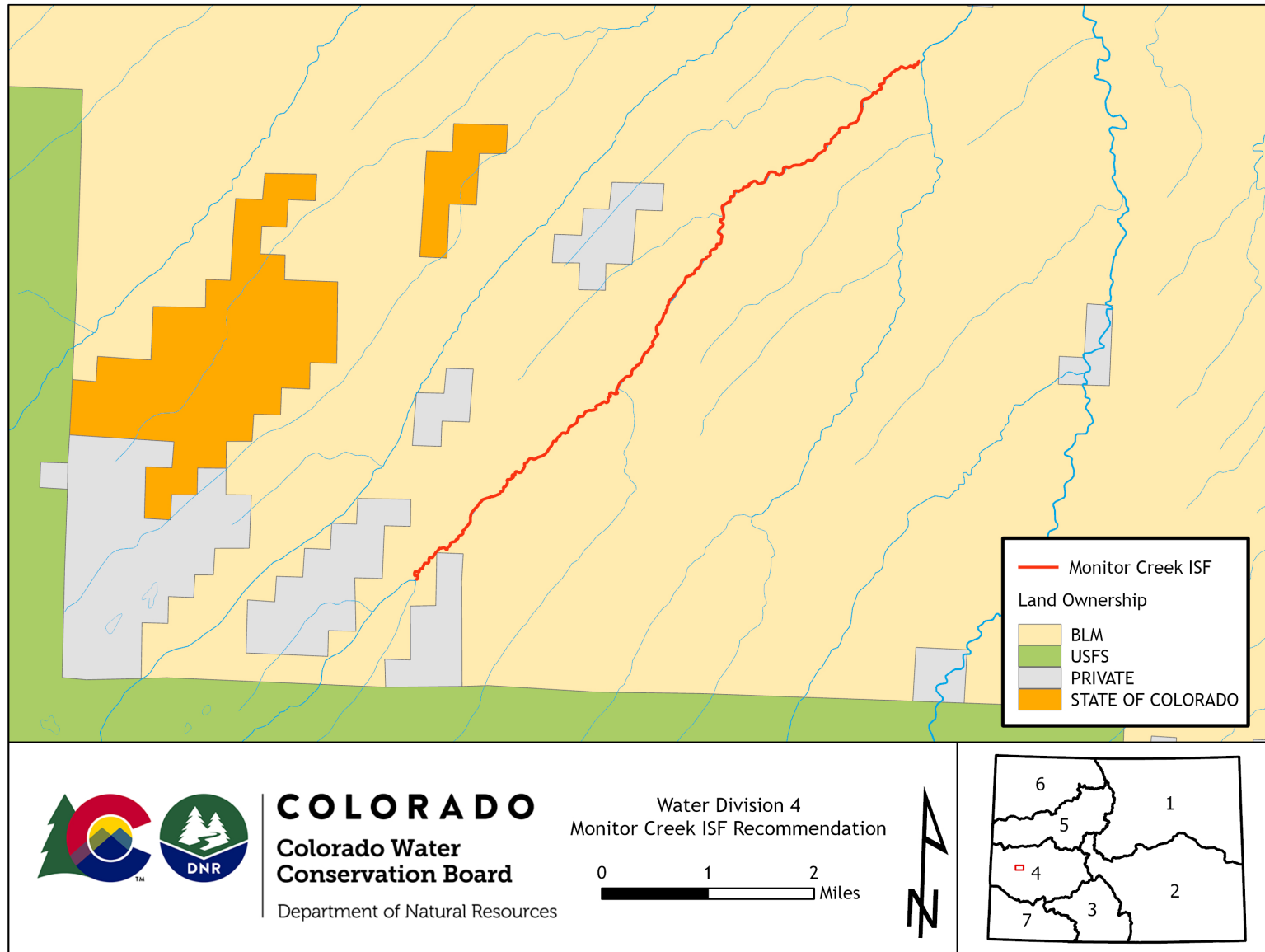
The UTM locations for the upstream and downstream termini were derived from CWCB GIS using the National Hydrography Dataset (NHD).

Projected Coordinate System: NAD 1983 UTM Zone 13N.

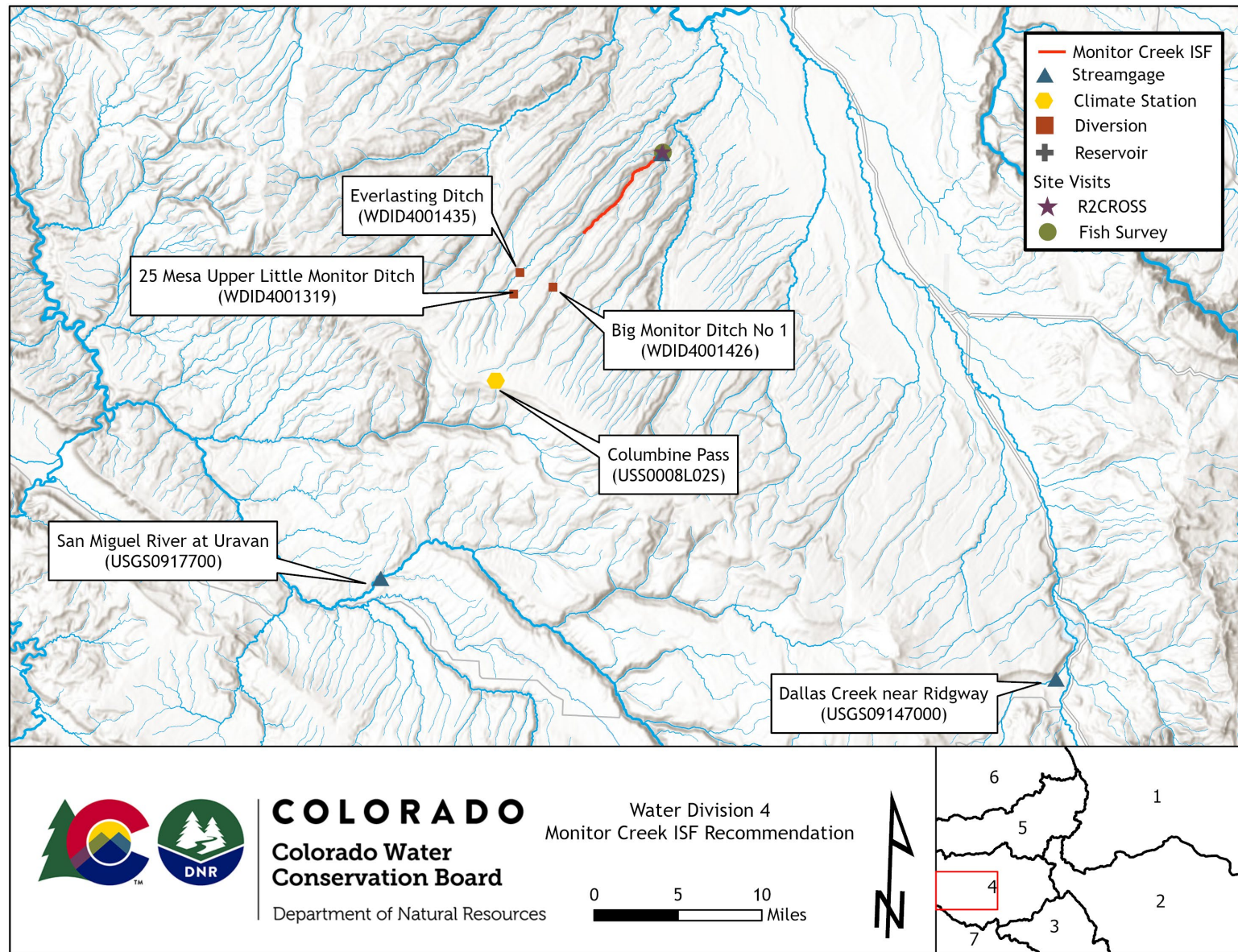
VICINITY MAP



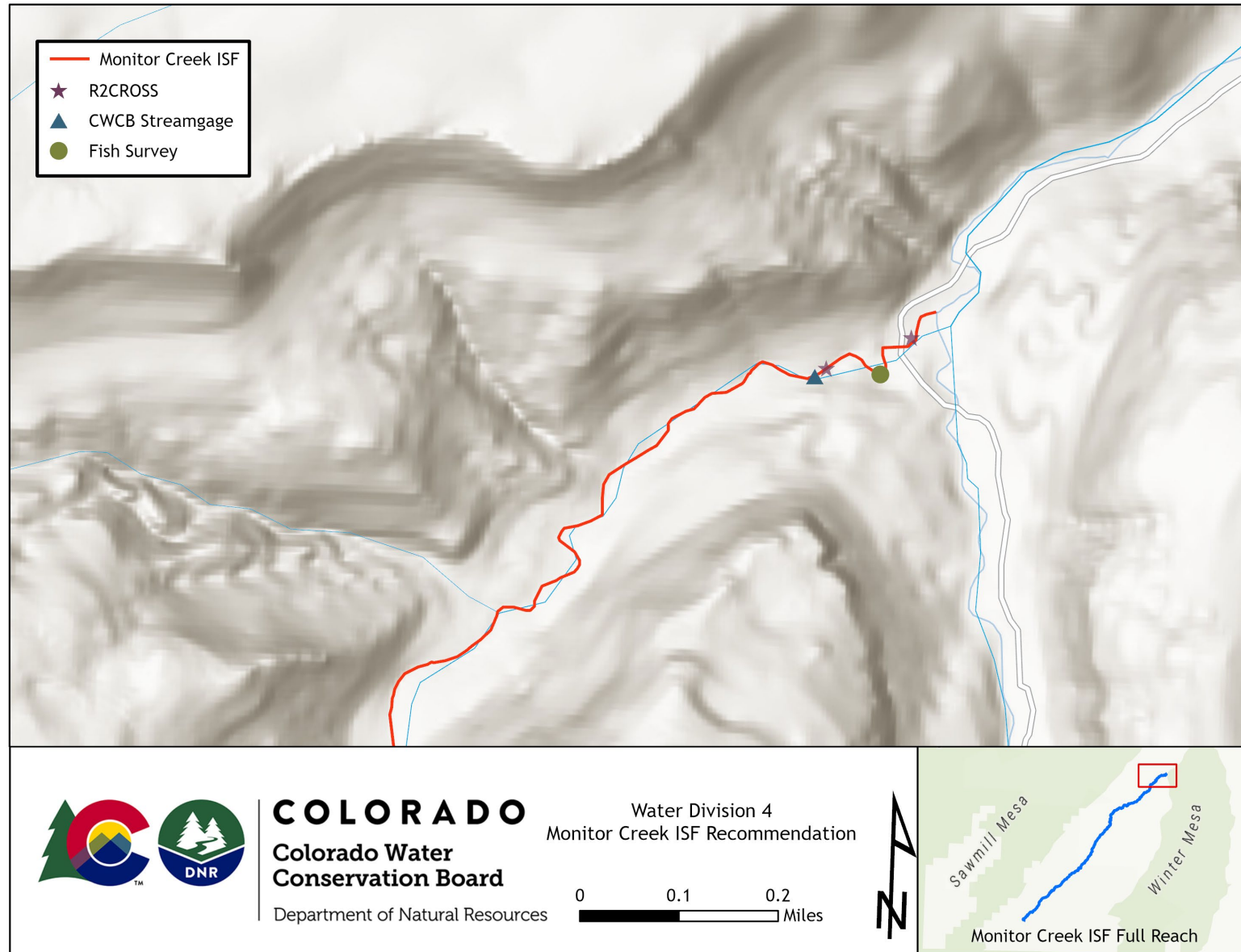
LAND OWNERSHIP MAP



HYDROLOGIC FEATURES MAP



DETAILED HYDROLOGIC FEATURES DETAILS MAP



COMPLETE HYDROGRAPH

