# Wildcat Creek Executive Summary

**CWCB STAFF INSTREAM FLOW RECOMMENDATION**
**January 25-26, 2021**

| | |
|---|---|
| UPPER TERMINUS: | outlet of Green Lake<br>UTM North: 4301420.95 UTM East: 323800.20 |
| LOWER TERMINUS: | confluence Coal Creek<br>UTM North: 4304206.95 UTM East: 325687.24 |
| WATER DIVISION: | 4 |
| WATER DISTRICT: | 59 |
| COUNTY: | Gunnison |
| WATERSHED: | East-Taylor |
| CWCB ID: | 21/4/A-013 |
| RECOMMENDER: | High Country Conservation Advocates (HCCA) |
| LENGTH: | 2.48 miles |
| FLOW RECOMMENDATION: | 0.35 cfs (12/1 - 03/31)<br>0.65 cfs (04/01 - 04/30)<br>2.1 cfs (05/01 - 08/31)<br>0.6 cfs (09/01 - 11/30) |

COLORADO
Colorado Water Conservation Board
Department of Natural Resources

**Introduction**

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.

High Country Conservation Advocates (HCCA) recommended that the CWCB appropriate an ISF water right on a reach of Wildcat Creek because it has a natural environment that can be preserved to a reasonable degree. The proposed reach extends downstream from the outlet of Green Lake to the confluence with Coal Creek. Wildcat Creek is located within Gunnison County (See Vicinity Map), and originates in the Gunnison National Forest about 2.5 miles southwest of the Town of Crested Butte at an elevation of approximately 10,600 feet. It flows in a northeasterly direction for 2.48 miles before it joins Coal Creek at an elevation of 9,100 feet. Forty-five percent of the land on the proposed reach is privately owned, 30% is owned by the U.S. Forest Service, and 25% is owned by the Bureau of Land Management (BLM) (See Land Ownership Map). The BLM formally submitted a letter of support of HCCA's ISF recommendation on Wildcat Creek to the CWCB.

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/2021-isf-recommendations.

**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 is used to provide the Board with a basis for determining that a natural environment exists.

Wildcat Creek is a cold-water stream that runs through a primarily pine-spruce forest at a high gradient. The stream's low water temperatures are protected by the north-facing aspect of the watershed. The substrate of Wildcat Creek ranges from small gravel to large cobble and some boulders. Pool-drop features are frequent in the channel due its steep nature and substantial woody debris forms a mixture of riffles and small pools. The riparian community along the recommended reach has been described by BLM and HCCA as robust and in very good condition. The spruce and pine provide ample shade for the aquatic ecosystem and findings of BLM's land health analysis indicate good water quality in this reach of stream.

The riparian community and variety of habitat in Wildcat Creek supports a healthy aquatic ecosystem. Colorado Park and Wildlife identified a substantial cutthroat trout population in 2008, though it has yet to identify their lineage. The BLM identified a diverse and robust

community of macroinvertebrate species in August of 2019. In addition, an abundance and variety of wildlife tracks were found along the stream banks during site visits.

**Table 1. List of species identified in Wildcat Creek.**

| Species Name | Scientific Name | Protection Status |
|---|---|---|
| cutthroat trout- unknown lineage | *Oncorhynchus clarkii* | None |
| ameletus mayfly | *Ameletus Spp.* | None |
| blue quill mayfly | *Paraleptophlebia spp.* | None |
| blue-winged olive mayfly | *Baetis spp.* | None |
| dark red quills mayfly | *Cinygmula spp.* | None |
| spiny crawler mayfly | *Drunella doddsi* | None |
| western march brown mayfly | *Rhithrogena spp.* | None |
| capniidae stonefly | *Capniidae* | None |
| golden stonefly | *Hesperoperla pacifica* | None |
| green stonefly | *Choroperlidae* | None |
| sallfly stonefly | *Sweltsa spp.* | None |
| zapada stonefly | *Zapada spp.* | None |
| common forestfly stonefly | *Zapada cinctipes* | None |
| oregon forestfly stonefly | *Zapada oregonensis* | None |
| free-living caddisfly | *Rhyacophila brunnea-vemna* | None |
| neothremma caddisfly | *Neothremma spp.* | None |
| netspinning caddisfly | *Parapsyche elsis* | None |
| snow sedge caddisfly | *Psychoglypha spp.* | None |
| riffle beetle | *Heterlimnius corpulentus* | None |
| non-biting midge | *Chironomidae* | None |
| meringodixa midge larve | *Meringodixa spp.* | None |
| black fly larve | *Diptera* | None |
| pericoma moth fly larvae | *Pericoma spp.* | None |
| simulium black fly larvae | *Simulium spp.* | None |
| dance fly larvae | *Wiedemannia spp.* | None |
| lerbertia water mite | *Lebertia spp.* | None |
| sperchon mite | *Sperchon spp.* | None |
| springtail | *Collembola* | None |
| fingernail clam | *Pisidium spp.* | None |
| trombidiformes | *Trombidiformes* | None |
| worm | *Oligochaeta* | None |

**ISF Quantification**
CWCB staff relies upon 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 methodology 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). Riffles are a stream habitat type that are most easily visualized as sections of the stream that would dry up first should streamflow cease. The data collected consists of a streamflow measurement, survey of channel geometry and features at a single transect, and survey of the longitudinal slope of the water surface.

The field data is used to model three hydraulic parameters: 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 interprets the model results to develop an initial recommendation for summer and winter flows. The summer flow recommendation is based on meeting 3 of 3 hydraulic criteria. The winter flow recommendation is based on meeting 2 of 3 hydraulic criteria. The model's suggested accuracy range is 40% to 250% of the streamflow measured in the field. Recommendations that fall outside of the accuracy range may not give an accurate estimate of the hydraulic parameters necessary to determine an ISF rate.

The R2Cross methodology provides 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 Analysis**
HCCA collected R2Cross data at 3 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 0.87 cfs, which meets 2 of 3 criteria and is within the accuracy range of the R2Cross model. The R2Cross model results in a summer flow of 2.12 cfs, which meets 3 of 3 criteria and is within the accuracy range of the R2Cross model. 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 Wildcat Creek.**

| Date, Xsec # | Top Width (feet) | Streamflow (cfs) | Accuracy Range (cfs) | Winter Rate (cfs) | Summer Rate (cfs) |
|---|---|---|---|---|---|
| 10/09/2019, 1 | 10.40 | 0.28 | 0.11 - 0.70 | 0.36 | Out of range |
| 06/24/2020, 2 | 8.20 | 2.71 | 1.08 - 6.78 | Out of range | 2.44 |
| 06/24/2020, 3 | 11.45 | 2.77 | 1.11 - 6.93 | 1.38 | 1.79 |
| | | | Mean | 0.87 | 2.12 |

**ISF Recommendation**

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

0.35 cfs is recommended from December 1 through March 31. This flow rate was reduced due to water availability limitations, but will still protect base flows.

0.65 cfs is recommended from April 1 through April 30. This flow rate was reduced due to water availability limitations.

2.1 cfs is recommended from May 1 through August 31. This flow rate meets all 3 of the R2Cross criteria.

0.60 cfs is recommended from September 1 through November 30. This flow rate was reduced due to water availability limitations.

**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.

**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.). Although extensive and time-consuming investigations of all variables may be possible, staff takes a pragmatic and cost-effective approach to analyzing water availability. This approach focuses on streamflows 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) will be used to evaluate streamflow. Other streamflow information such as short-term gages, temporary gages, spot streamflow measurements, diversion records, and StreamStats will be used when long-term gage data is not available. StreamStats, a statistical hydrologic program, uses regression equations developed by the USGS (Capesius and Stephens, 2009) to estimate mean flows for each month based on drainage basin area and average drainage basin precipitation. Diversion

records will also be 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; 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 Wildcat Creek is 2.0 square miles, with an average elevation of 10,370 feet and average annual precipitation of 31.12 inches (See the Hydrologic Features Map). The proposed upper terminus is Green Lake, which is a the CWCB decreed a NLL water right on in Case No. 77W3358 with an appropriation date of May 12, 1976.

The Town of Crested Butte has a water supply intake on Coal Creek located approximately 0.8 miles west of the proposed lower terminus. This structure, the Crested Butte Water Ditch and Wildcat Pipeline (WDID 5900842, 6 cfs, appropriation date 1893), has a decreed alternative point pipeline on Wildcat Creek that mostly serves as a backup intake for the system. The pipeline is located approximately 0.1 miles upstream from the proposed lower terminus. The intake to the system is continuously open, but the system does not have the ability to take the full decreed rate due to the size of the pipeline. The diversion structure currently does not have the ability to sweep the stream, but in an emergency, a temporary structure may be put in place to do so.

**Data Analysis**

*StreamStats*

There are no current or historic streamgages on the proposed ISF reach. The nearest gage is the Elk Creek at Coal Creek above Crested Butte, CO gage (USGS 9110990) located approximately 2.8 miles southwest from the proposed lower terminus. The gage is a seasonal gage, which operates from April to November in most years. The period of record for the gage is 2017 to 2020. Due to the short period of seasonal records, this gage was not used in this analysis. StreamStats provides the best available estimate of streamflow on Wildcat Creek. In addition, CWCB staff made one streamflow measurement on the proposed reach of Wildcat Creek as summarized in Table 3.

**Table 3. Summary of Streamflow Measurement Visits and Results for Wildcat Creek.**

| Visit Date | Flow (cfs) | Collector |
|---|---|---|
| 09/30/2020 | 0.05 | CWCB |

*Diversion Adjustment*
Staff spoke with the Director of Public Works from the Town of Crested Butte, who estimated that the Crested Butte Water Ditch and Wildcat Pipeline diverts approximately 5% of the water in the creek at low flows (Shea Early, personal communication, 12/9/2020). To account for diversions made at the Wildcat Pipeline, StreamStats estimates were adjusted down by approximately 5%.

**Water Availability Summary**
The hydrograph (See Complete Hydrograph) shows the StreamStats results for mean-monthly streamflow. Staff has concluded that water is available for appropriation.

**Material Injury**
Because the proposed ISF on Wildcat Creek 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. (2020), the CWCB will recognize any uses or exchanges of water in existence on the date this ISF water right is appropriated.

**Citations**
Capesius, J.P. and V.C. Stephens, 2009, Regional regression equations for estimation of natural streamflow statistics in Colorado, Scientific Investigations Report 2009-5136.

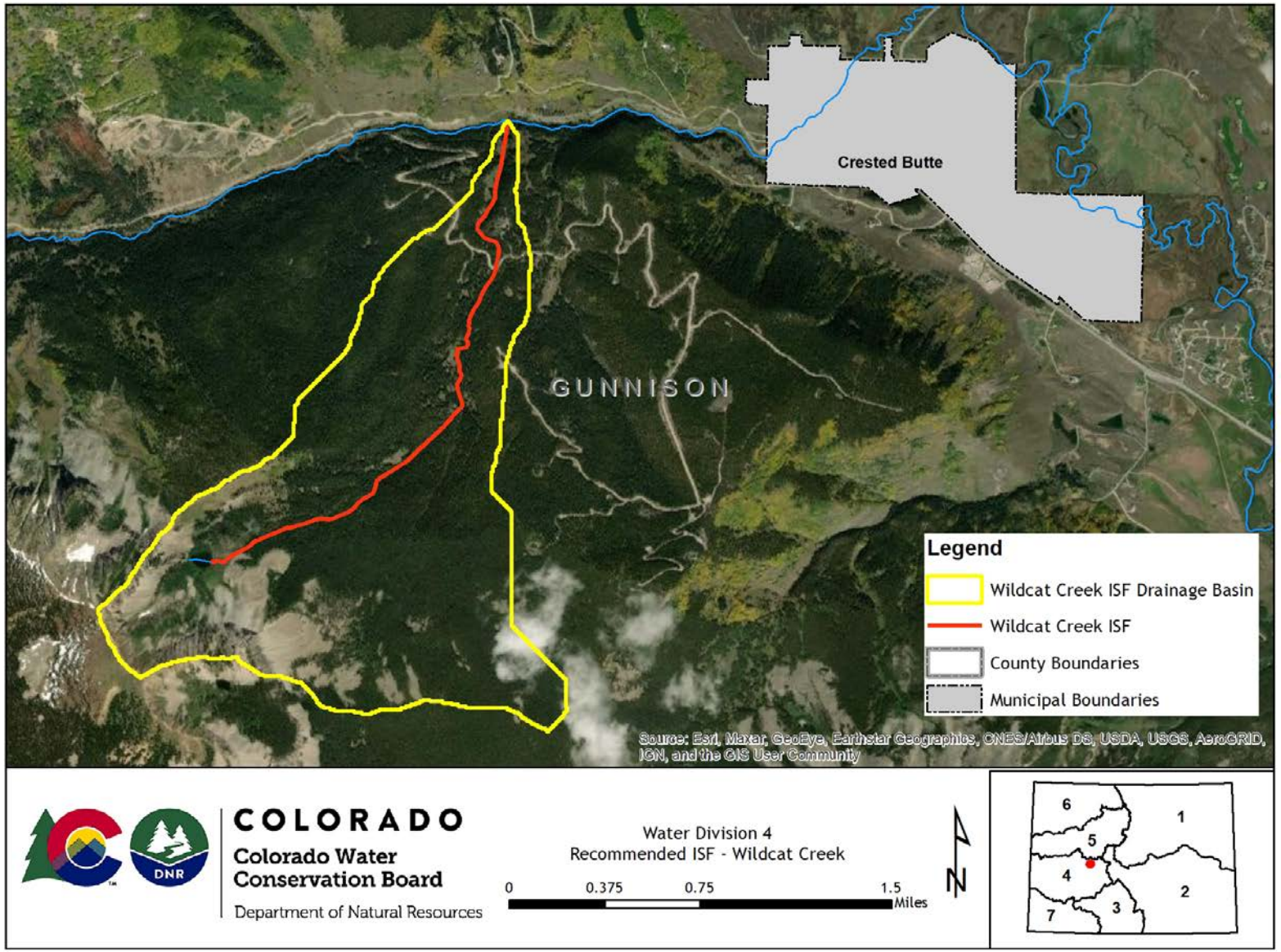
Espegren, G.D., 1996, Development of Instream Flow Recommendations in Colorado Using R2CROSS, Colorado Water Conservation Board.

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.

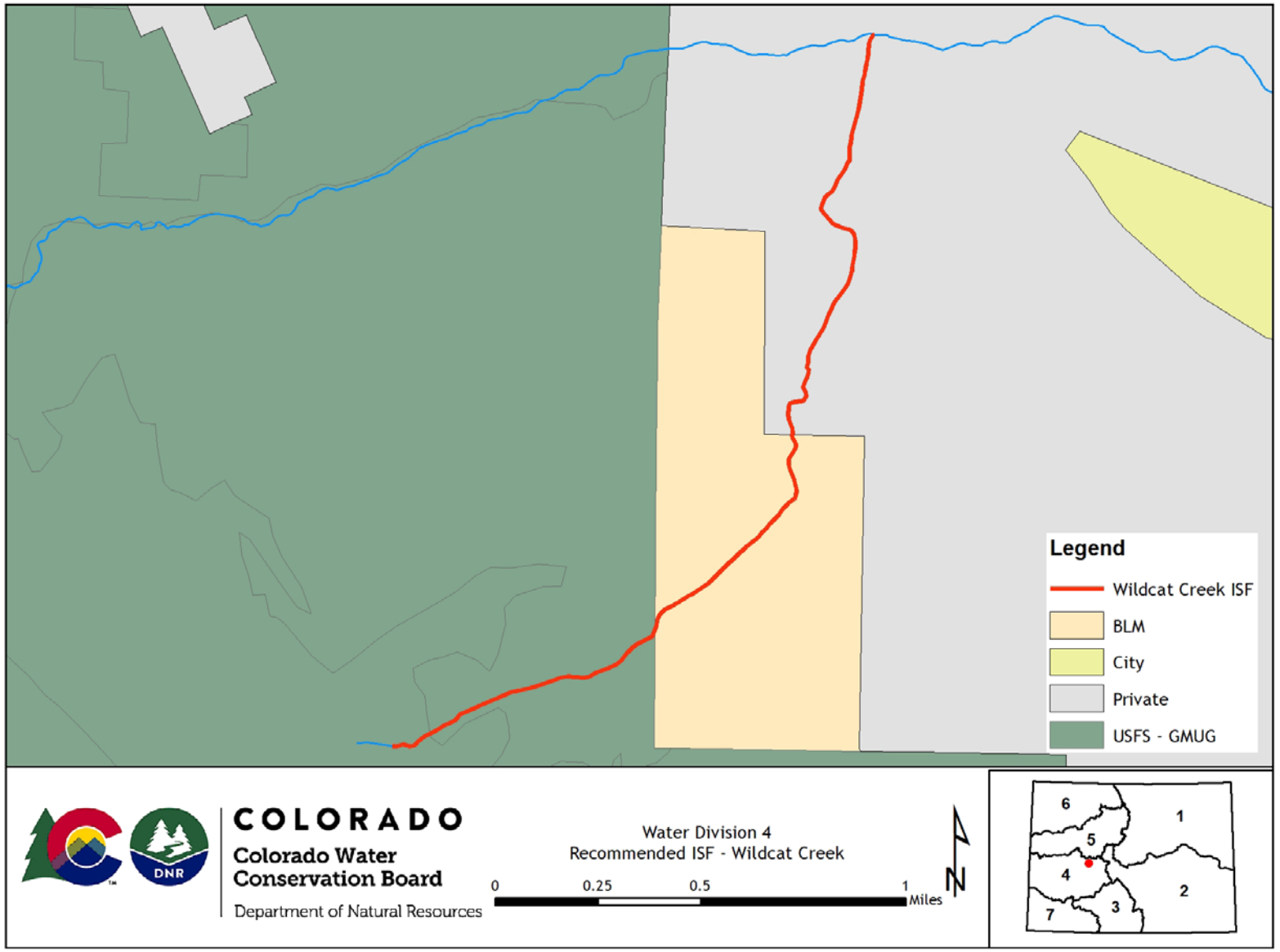
**Metadata Descriptions**
The UTM locations for the upstream and downstream termini were derived from CWCB GIS using the National Hydrography Dataset (NHD).

Projected Coordinate System: NAD 1983 UTM Zone 13N.

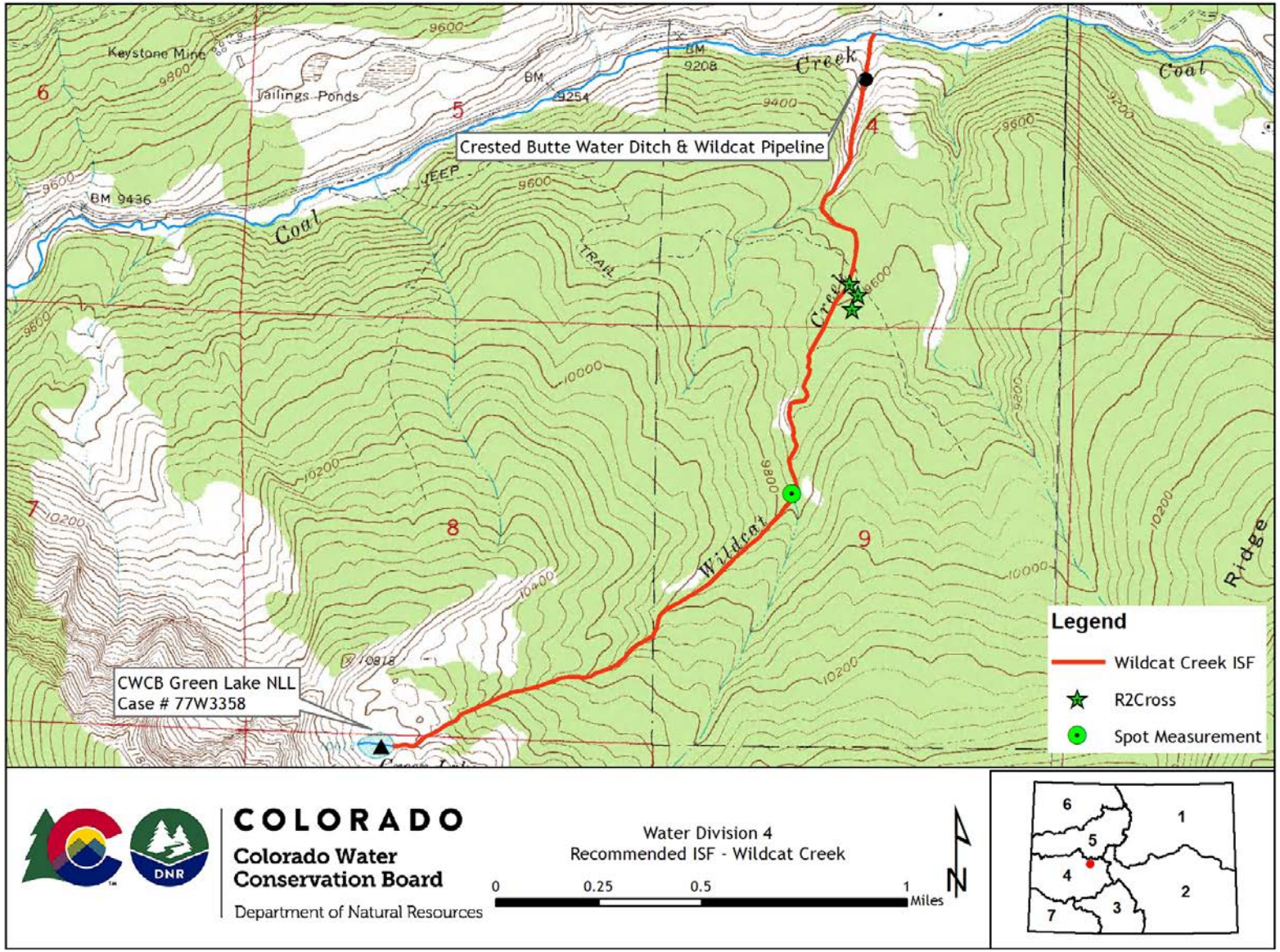
VICINITY MAP



LAND OWNERSHIP MAP



## HYDROLOGIC FEATURES MAP



COMPLETE HYDROGRAPH