

## Lottis Creek Executive Summary

---



### CWCB STAFF INSTREAM FLOW RECOMMENDATION January 24-25, 2022

UPPER TERMINUS: headwaters in the vicinity of:  
UTM North: 4284763.01 UTM East: 364436.07

LOWER TERMINUS: confluence with the Taylor River at:  
UTM North: 4293390.18 UTM East: 358183.27

WATER DIVISION: 4

WATER DISTRICT: 59

COUNTY: Gunnison

WATERSHED: East-Taylor

CWCB ID: 22/4/A-002

RECOMMENDER: High Country Conservation Advocates (HCCA)

LENGTH: 10.33 miles

EXISTING INSTREAM FLOW: 83CW227, 5 cfs (1/1 - 12/31)

FLOW RECOMMENDATION: 2.1 cfs (04/01 - 10/31) - increase



**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/2022-isf-recommendations>.

## **RECOMMENDED ISF REACH**

HCCA recommended that the CWCB appropriate an increase to the existing ISF water right on a reach of Lottis Creek. Lottis Creek is located within Gunnison County and is approximately 3.2 miles southwest of Taylor Park Reservoir (See Vicinity Map). The stream originates in the Fossil Ridge Wilderness and flows north-northwest until it reaches the confluence with the Taylor River, downstream of Taylor Park Reservoir. The existing ISF water right on Lottis Creek was appropriated in 1983 for 5 cfs year round.

The proposed reach extends from the headwaters downstream to the confluence with the Taylor River for a total of 10.33 miles. Eighty-four percent of the land on the proposed reach is managed by the United States Forest Service (USFS) and 16% is privately owned (See Land Ownership Map). HCCA is interested in protecting this stream to continue their mission to protect the health and natural beauty of the land, rivers, and wildlife in and around Gunnison County.

## **OUTREACH**

Stakeholder input is a valued part of the CWCB staff's analysis of ISF recommendations. Currently more than 1,100 people are subscribed to the ISF mailing list. Notice of the potential appropriation of an ISF water right on Lottis Creek was sent to the mailing list in March and November of 2021. Staff sent notice letters to identified landowners adjacent to Lottis Creek based on information available in the county assessors website. A public notice was also published in the Crested Butte News on October 28, 2021.

Staff presented information about the ISF program and this recommendation to the Gunnison County Board of County Commissioners on October 26, 2021. In addition, staff spoke with Bob Hurford, Division 4 Engineer, on November 3, 2021 regarding water availability on Lottis 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 is used to provide the Board with a basis for determining that a natural environment exists.

Lottis Creek is a high elevation stream that runs through riparian habitat with mixed pine and spruce forest, described by HCCA as diverse and high quality. The headwaters are located in the Fossil Ridge Wilderness, and the creek winds through a wide range of aquatic habitats including beaver pond complexes. Colorado Parks and Wildlife identified a robust recreational fishery including Colorado River Cutthroat Trout, Brook Trout, Brown Trout, and Rainbow Trout. In 2020, HCCA also observed a large variety of macroinvertebrates including caddisfly.

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

Species Name	Scientific Name	Protection Status
Colorado River Cutthroat Trout*	<i>Oncorhynchus clarkii pleuriticus</i>	State - Species of Greatest Conservation Need State - Species of Special Concern
Brook Trout	<i>Salvelinus fontinalis</i>	None
Brown Trout	<i>Salmo trutta</i>	None
Rainbow Trout	<i>Oncorhynchus mykiss</i>	None
caddisfly	<i>Tricoptera</i>	None
macroinvertebrates	various	None
beaver	<i>Castor canadensis</i>	None
willow	<i>Salix spp.</i>	None

\*indicates fish species native to Colorado

## 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

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 (Espégren, 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 macro-invertebrates (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

R2Cross data was collected at two transects for this proposed ISF reach by HCCA (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 summer flow of 7.10 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 Lottis Creek.**

Date, XS #	Top Width (feet)	Streamflow (cfs)	Accuracy Range (cfs)	Winter Rate (cfs)	Summer Rate (cfs)
07/21/2020, 1	22.34	13.85	5.54 - 34.63	N/A	5.69
09/13/2020, 1	22.10	9.66	3.86 - 24.15	N/A	8.50
			Mean		7.10

### ISF Recommendation

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

An increase of 2.1 cfs is recommended from April 1 to October 31 to bring the total instream flow protection to 7.1 cfs. An increase is warranted because R2Cross modeling shows that the existing 5 cfs ISF water right does not fully protect habitat in the variety of riffle habitats on Lottis Creek. Depending on the geomorphology of individual riffles, 5.0 cfs does not fully meet average velocity criteria.

### 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.). 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 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) 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 Lottis Creek is 42.10 square miles, with an average elevation of 10,791 feet and average annual precipitation of 23.11 inches (See the Hydrologic Features Map). Hydrology of Lottis Creek is primarily driven by snowmelt runoff. There are no surface water diversions on the proposed reach, so hydrologic conditions are natural. There are several privately held instream flows on Lottis Creek and tributaries (court case W-1991 decreed in 1973).

### **Data Analysis**

#### *Representative Gage Analysis*

There is no current or historic streamflow gage on Lottis Creek. The closest identified gage is the Texas Creek at Taylor Park gage (USGS 09107500). The gage is located approximately 6.4 miles northeast from the proposed lower terminus. The gage has a record from 1929 - 1934, 1987 - 1992, and recently begun recording again in 2021. The drainage basin of the Texas Creek gage is 40.5 square miles, with an average elevation of 11,210 feet and average annual precipitation of 23.92 inches. Average precipitation and drainage area of the Texas Creek gage are so similar to the proposed instream flow reach on Lottis Creek that the gage was not scaled. There are no known diversions within the Texas Creek gage drainage basin.

Staff evaluated the NOAA Climate station, USC00051959 Crested Butte, period of record 1909 - present, to assess how 1929 - 1934 and 1987 - 1992 compared hydrologically to the most recent 30 years. At the time of this analysis, the 2021 precipitation data was not available. The climate station is located 19.8 miles northwest from the proposed lower terminus on Lottis Creek. Average precipitation in the last 30 years at the climate station was 23.69 inches. Based on this analysis, 9 of the 10 years were below average precipitation years, and 5 of those years were among the 10% driest years on record. Overall the record from the Texas Creek gage likely represents dry conditions.

#### *Water Rights Analysis*

The private instream flow rights on Lottis Creek are for 10 cfs above the confluence with Cameron Creek, 22.5 cfs between Cameron Creek and Cross Creek, 27.5 cfs between Cross Creek and Union Creek, 40 cfs between Union Creek and South Lottis Creek, and 60 cfs between South Lottis Creek and the Taylor River. The priority date for these flows is 1910 and the beneficial use is for stock water, recreation, fish culture, wildlife procreation, and heritage preservation. Although these private instream flow rights are extensive, they are not monitored, enforced, or legally protected by the CWCB.

CWCB staff made one streamflow measurement on the proposed reach of Lottis Creek as summarized in Table 3.

**Table 3. Summary of streamflow measurement for Lottis Creek.**

Visit Date	Flow (cfs)	Collector
10/26/2021	10.50	CWCB

#### **Water Availability Summary**

The hydrograph (See Complete Hydrograph) shows the median streamflow data at the representative gage on Texas Creek and the proposed ISF. Even though the flow data at the representative gage likely represents dry conditions, the median flow is well above the proposed increased amount. Staff has determined that water is available for an increase from April 1 to October 31.

#### **MATERIAL INJURY**

Because the proposed ISF on Lottis 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. (2021), the CWCB will recognize any uses or exchanges of water in existence on the date this ISF water right is appropriated.

#### **ADDITIONAL INFORMATION**

##### **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.



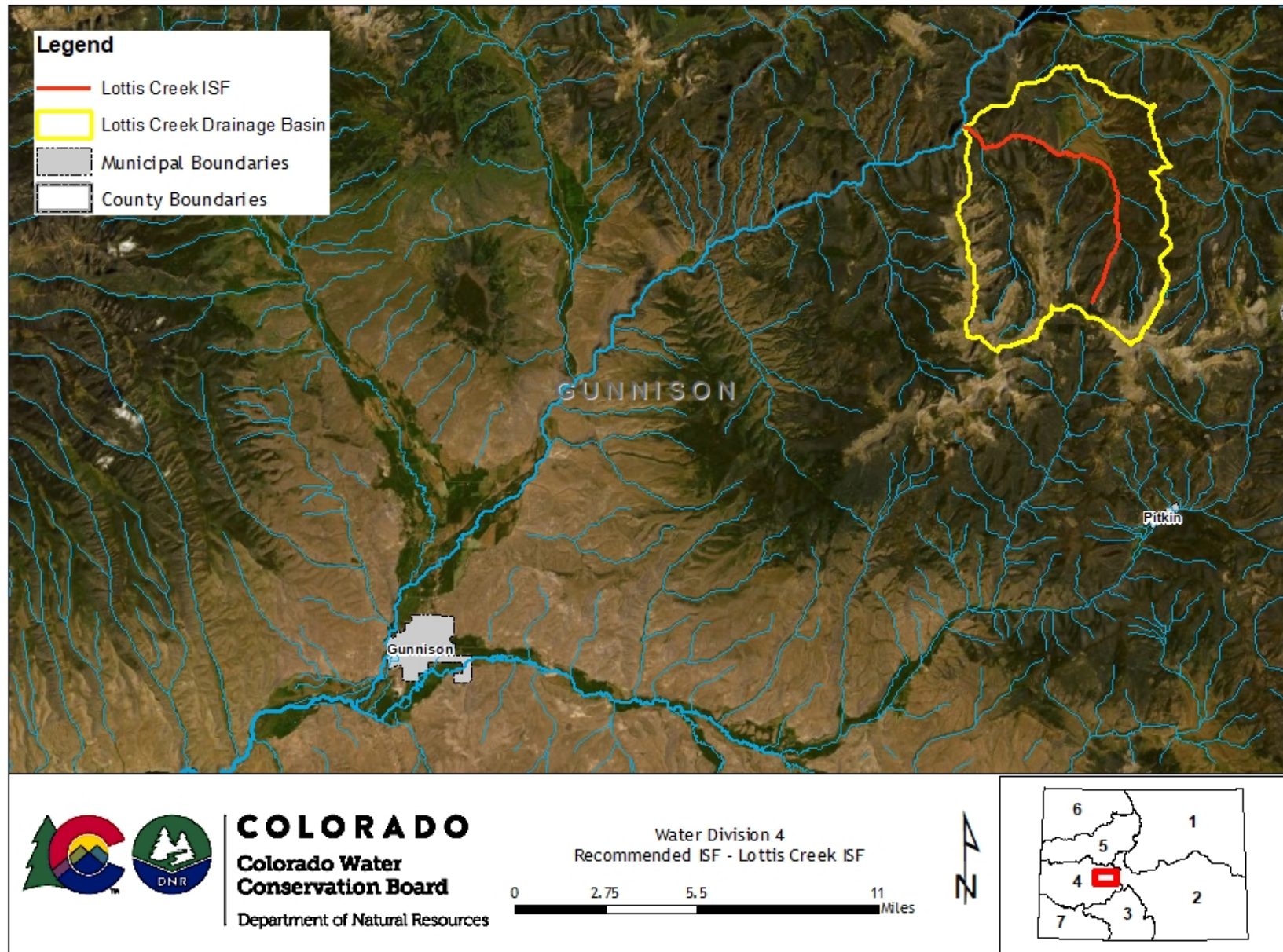
Nehring, B.R., 1979, Evaluation of Instream Flow Methods and Determination of Water Quantity Needs for Streams in the State of Colorado, Colorado Division of Wildlife.

**Metadata Descriptions**

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

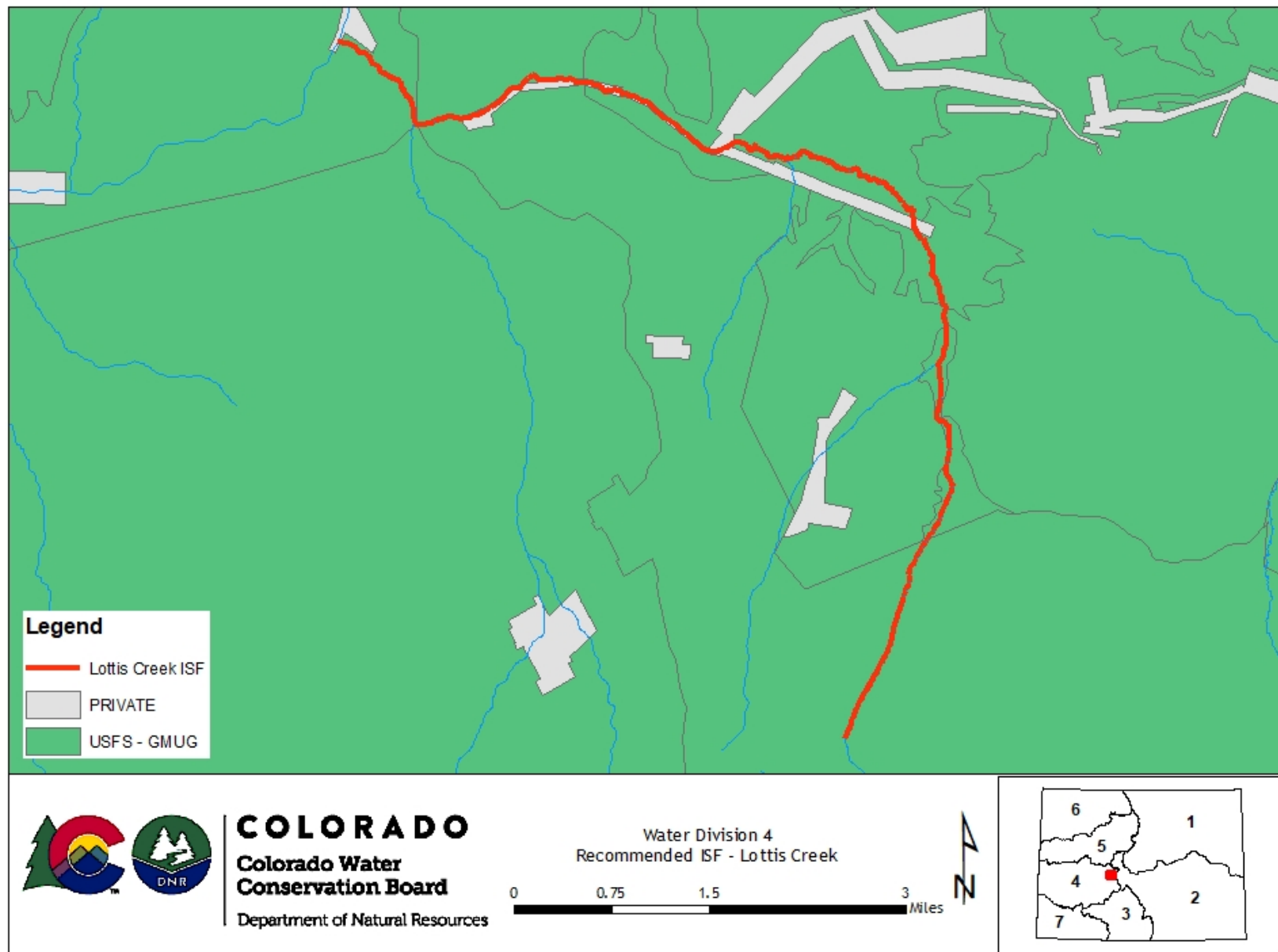
Projected Coordinate System: NAD 1983 UTM Zone 13N.

## VICINITY MAP

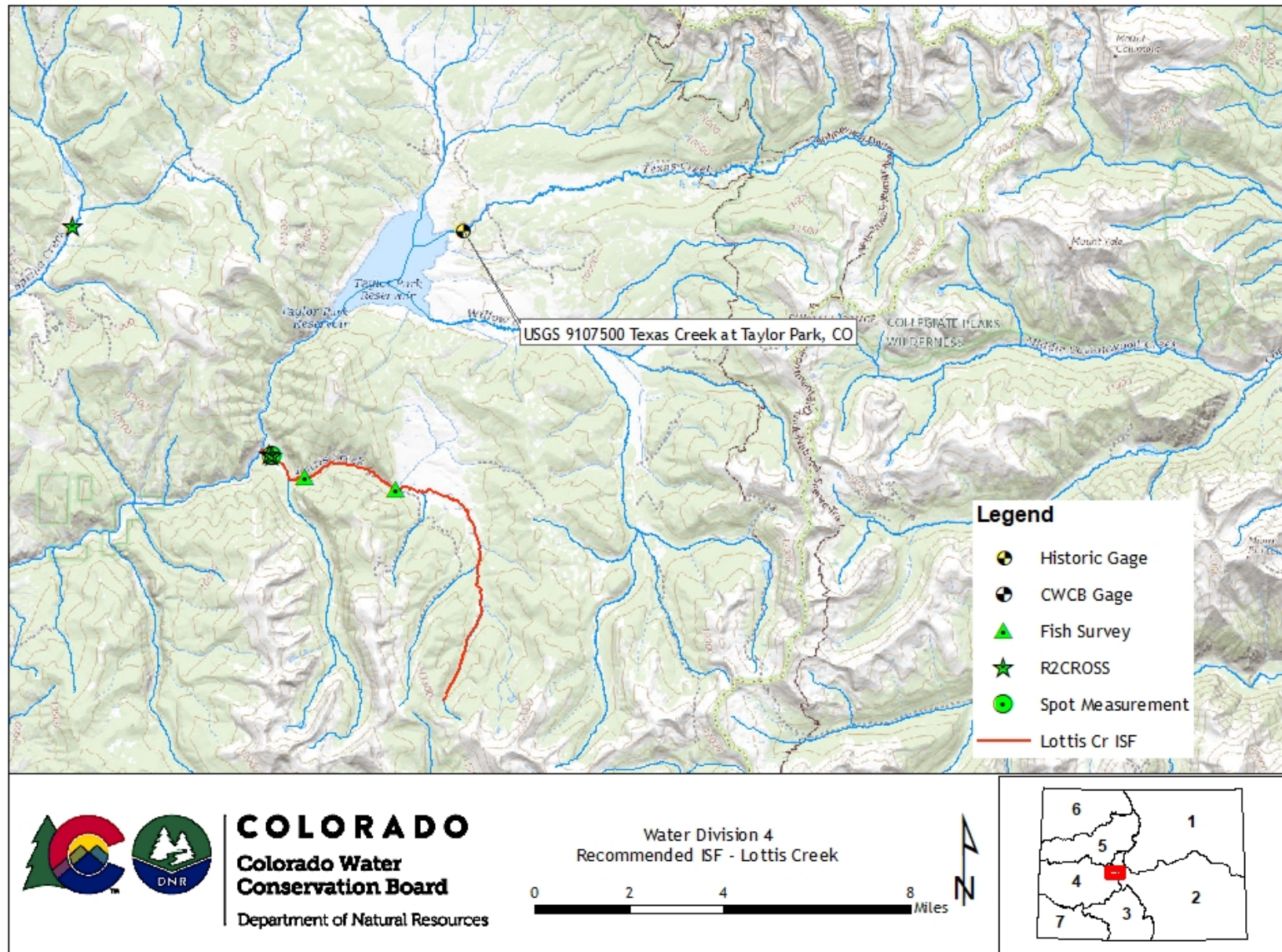




## LAND OWNERSHIP MAP



## HYDROLOGIC FEATURES MAP



## COMPLETE HYDROGRAPH

