Kinney Creek Executive Summary

CWCB STAFF INSTREAM FLOW RECOMMENDATION
January 24-25, 2022

UPPER TERMINUS:	headwaters in the vicinity of: UTM North: 4446549.34 UTM East: 404504.51
LOWER TERMINUS:	confluence with McQueary Creek at: UTM North: 4439523.21 UTM East: 409496.30
WATER DIVISION:	5
WATER DISTRICT:	51
COUNTY:	Grand
WATERSHED:	Colorado Headwaters
CWCB ID:	22/5/A-002
RECOMMENDER:	Bureau of Land Management (BLM)
LENGTH:	6.31 miles
EXISTING INSTREAM FLOW:	86CW0207, 1.0 cfs (1/1 – 12/31)
FLOW RECOMMENDATION:	0.7 cfs (05/01 - 07/15) - 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

The BLM recommended that the CWCB appropriate an increase to the existing ISF water right on a reach of Kinney Creek. Kinney Creek is located within Grand County and is approximately four miles northeast of Hot Sulphur Springs (See Vicinity Map). The stream originates near Elk Mountain and flows south-southeast until it reaches the Colorado River. The existing ISF water right on Kinney Creek was appropriated in 1986 for 1 cfs year round.

The proposed reach extends from the headwaters downstream to the confluence with McQueary Creek for a total of 6.31 miles. Forty-eight percent of the land on the proposed reach is managed by the BLM, 34% is managed by the United States Forest Service (USFS), and 18% is privately owned (See Land Ownership Map). BLM is interested in an additional ISF water right to protect this stream because it contains a population of Colorado River Cutthroat Trout identified as a core conservation population based on the Conservaton Agreement and Strategy for Colorado River Cutthroat Trout in the States of Colorado, Utah, and Wyoming (CRCT Coordination Team, 2006). In addtion, the upper portions of the stream reach have been designated as an Area of Critical Environmental Concern (ACEC) in BLM's land use planning process. According to BLM, "increasing the instream flow water right would assist in meeting the objectives of the conservation agreement and strategy and the ACEC."

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 Kinney Creek was sent to the mailing list in November and March of 2021. Staff sent notice letters to identified landowners adjacent to Kinney Creek based on information available through the county assessors website. A public notice about this recommendation was also published in the Middle Park Times on October 26, 2021.

Staff presented information about the ISF program and this recommendation to the Grand County Board of County Commissioners on November 9, 2021. In addition, staff emailed and

spoke with Neal Misbach, Lead Water Commisioner of the Upper Colorado River, on various dates in 2021 regarding water use practices and water availability on Kinney 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.

Kinney Creek is a cold-water stream that runs through forest then meadow at a high gradient. The stream runs through a valley that ranges from a quarter mile to a half mile in width. The forested portion was densely populated with trees until the 2020 East Troublesome Fire burned much of the watershed. The substrate of Kinney Creek is generally moderate in size, ranging from gravel to eight-inch cobbles. The channel contains many pool and undercut bank features, with a smaller quantity of riffle habitat due to the steep gradient. The BLM determined that the water quality was excellent for cold water species prior to the fire. Monitoring will be a priority of the BLM in the coming years to determine fire impacts on the ecosystem.

Many portions of the riparian community survived the East Troublesome Fire and CWCB staff saw evidence of regrowth. The riparian community is composed of willow, alder, brushes, sedges, and grasses. The BLM reintroduced beavers to the creek to create additional pool habitat and settle out some of the high sediment load from Elk Mountain. CWCB staff observed many beaver pools along the reach and landowners described frequent beaver activity.

BLM and Colorado Parks and Wildlife (CPW) identified a self-sustaining population of Blue Lineage Colorado River Cutthroat Trout, which is managed by the BLM and its partners as a core conservation population. The BLM also identified a diverse and robust community of macroinvertebrate species in 2019, supported by CWCB spot surveys in 2021. Local landowners have observed moose, elk, and mule deer along Kinney Creek.

Table 1. List of species identified in Kinney Creek.

Species Name	Scientific Name	Protection Status
Colorado River Cutthroat Trout Blue Lineage*	*Oncorhynchus clarki pleuriticus*	State - Species of Greatest Conservation Need State – Species of Special Concern
caddisfly	*Tricoptera*	None
damselfly	*Odonata*	None
mayfly	*Ephemeroptera*	None
stonefly	*Plecoptera*	None
aquatic beetle	*Coleoptera*	None
aquatic fly larve	*Diptera*	None
sedge	*Carex spp.*	None
rush	*Juncaceae*	None
water horsetail	*Equisetum fluviatile*	None
willow	*Salix spp.*	None
cottonwood	*Populus spp.*	None
alder	*Alnus Spp.*	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

BLM 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 macro-invertebrates (Nehring, 1979). BLM 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 three transects for this proposed ISF reach by BLM (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 1.66 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 Kinney Creek.

Date, XS #	Top Width (feet)	Streamflow (cfs)	Accuracy Range (cfs)	Winter Rate (cfs)	Summer Rate (cfs)
07/31/2020, 1	6.29	1.00	0.40 - 2.50	N/A	1.67
07/31/2020, 2	7.38	0.93	0.37 - 2.33	N/A	1.45
06/23/2021, 1	7.78	1.78	0.71 - 4.45	N/A	1.85
			Mean		1.66

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

An increase of 0.7 cfs is recommended from May 1 through July 15 to bring the total instream flow protection to 1.7 cfs. This recommendation is driven by the average depth criteria. Kinney Creek has limited riffle habitat, so protecting this flow rate will ensure that the limited habitat can be fully utilized during the snowmelt and summer period. During May and June, the cutthroat trout population is completing spawning, and during July the trout are actively moving between pools. Protecting flows during this period will allow the fish population to complete important parts of its life cycle before cold temperatures arrive.

This increase in ISF protection is warranted because R2Cross modeling shows that the existing 1.0 cfs ISF water right does not fully protect habitat in the variety of riffle habitats on Kinney Creek. Depending on the geomorphology of individual riffles, 1.0 cfs does not fully meet either the average depth or 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 Kinney Creek is 5.96 square miles, with an average elevation of 9,311 feet and average annual precipitation of 22.2 inches (See the Hydrologic Features Map). The 2020 East Troublesome Creek Fire burned portions of the drainage basin, primarily on the BLM and USFS lands.

There is limited use of water in the Kinney Creek drainage basin associated with the proposed ISF reach. The Dennis Ditch (see Table 3) and a 5 acre foot reservoir are the only decreed water rights. There is also an undecreed diversion that diverts water at a point approximately 2,000 feet upstream from the lower terminus. This diversion does not have a measuring device and no diversion records are kept (personal communication with Neal Misbach, 2021). There are additional diversions downstream from the proposed reach, including the Kinney No. 2 Ditch (3.5 cfs, appropriation date 1934) and the Kinney Ditch (1.75 cfs, appropriation date 1884). The Kinney Ditch is senior to the Dennis Ditch and has placed calls in 2012 and 2018.

Table 3. Decreed diversion structure located within the proposed ISF reach on Kinney Creek.

WDID	Structure Name	Decreed Flow rate, cfs	Appropriation Date	Location
5100603	Dennis Ditch	2.75	1915	Midway through the ISF reach.

Data Analysis

Gage Data and CWCB Measurements

There is not a current or historic streamflow gage on Kinney Creek. A number of nearby gages were evaluated, but none appeared to be representative of Kinney Creek due to differences in water use patterns. Due to the small number of diversions in the proposed reach and the recent fire that will likely alter hydrology for a number of years, staff determined that installing a temporary gage would not be effective in this case. CWCB staff made two streamflow measurements at different locations in the proposed reach of Kinney Creek as summarized in Table 4.

Table 4. Summary of streamflow measurements for Kinney Creek.

Visit Date	Flow (cfs)	Location
06/14/2021	2.51	Above Dennis Ditch
06/14/2021	0.77	Below the Dennis Ditch

Diversion Records

In some cases, diversion records can be used to provide an indication of water availability in a stream reach. In this situation, there are diversion records for most of the water uses in Kinney Creek; however, in some years the diversion rates are estimated or corrected due to no measuring device or submerged measuring devices. Despite this, an effort was made to evaluate water availability by adding the Kinney No 2 Ditch and the Kinney Ditch records together for the available years of record from 1977 to 2020. The summed records were then prorated to account for the contributions from Kinney Creek at the lower terminus based on the relative drainage basin size and precipitation (proration factor is 0.62). This provides a rough estimate of the portion of the water for the diversions that may be coming through the proposed ISF reach. This method does not explicitly account for impacts from the Dennis Ditch, diversions on McQueary Creek, the undecreed diversion structure (that does not have records that can be evaluated), or return flows. Diversion records are also rarely a perfect proxy for streamflow due to water user decisions on when to start or stop irrigation which do not always perfectly correspond to water availability. Nevertheless, the median and the 95% confidence interval for the median of the summed and prorated diversion records were calculated to provide additional insight.

StreamStats

StreamStats was also used to evaluate water availability at the proposed lower terminus. As the Dennis Ditch is located midway through the reach, staff reduced the StreamStats based estimates of mean-monthly streamflow by the mean-monthly diversion record for the Dennis Ditch (based on the available diversion records from 1981 to 2020). In addition, the Dennis Ditch is not operated in a manner that sweeps Kinney Creek (personal communication June 2021).

Water Availability Summary
The hydrograph (See Complete Hydrograph) shows StreamStats results for mean-monthly streamflow reduced by the mean-monthly diversion record for the Dennis Ditch as well as the upper 95% confidence interval for the summed and prorated diversion records from Kinney No 2 Ditch and Kinney Ditch. The StreamStats based results indicate that significant water is available, while the diversion records suggest that substantially less water is available. Staff elected to rely primarily on the modified StreamStats flow results for runoff and the diversion record analysis which shows more limited water availability in mid to late summer. Based on this analysis, Staff concluded that water is available for appropriation.

MATERIAL INJURY
Because the proposed ISF on Kinney 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.

CRCT Coordination Team, 2006, Conservation Strategy for Colorado River Cutthroat Trout (Oncorhynchus clarkii pleuriticus) in the States of Colorado, Utah, and Wyoming. Colorado Division of Wildlife, Fort Collins.

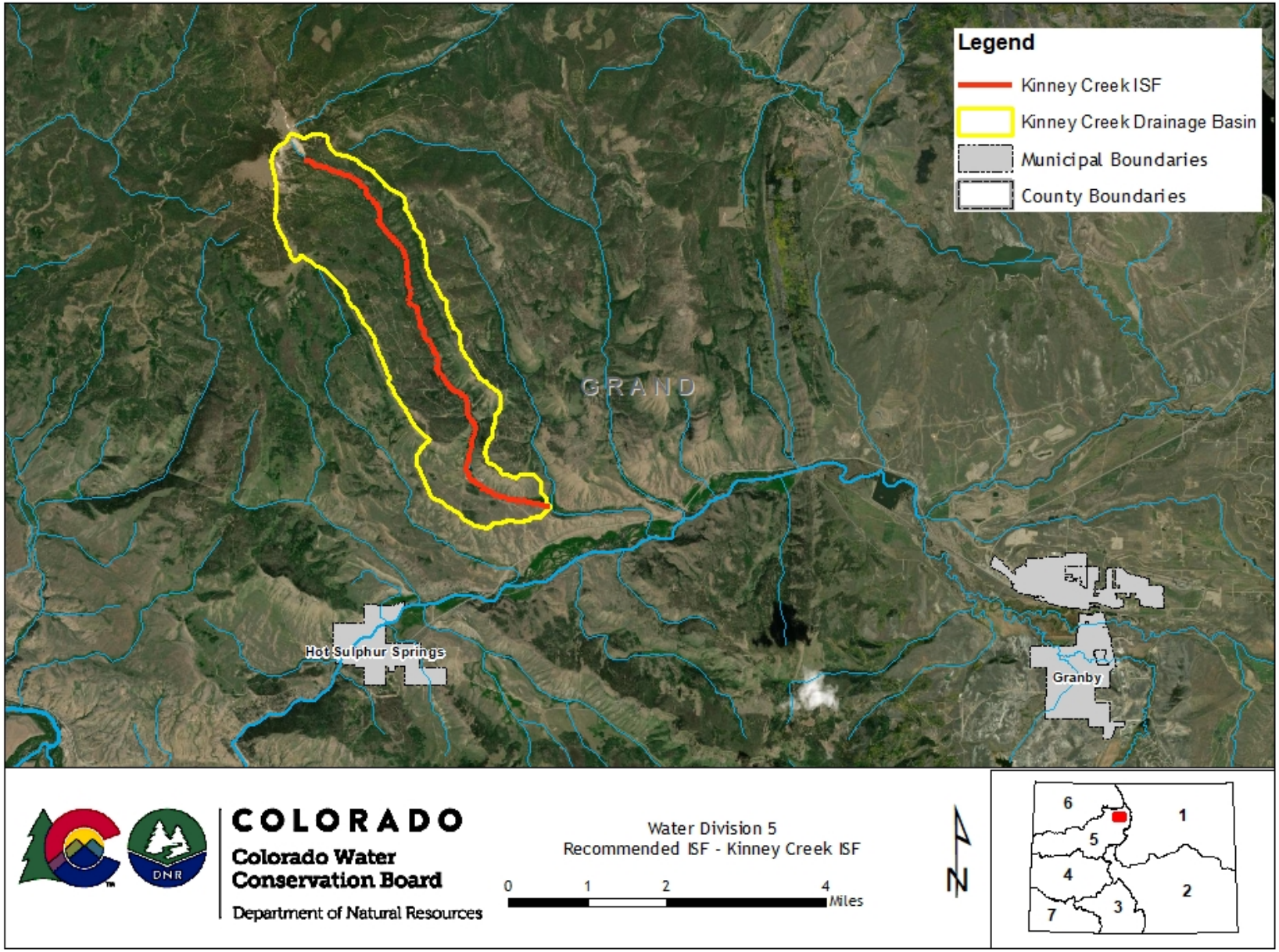
Espegren, G.D., 1996, Development of Instream Flow Recommendations in Colorado Using R2CROSS, Colorado Water Conservation Board.

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.

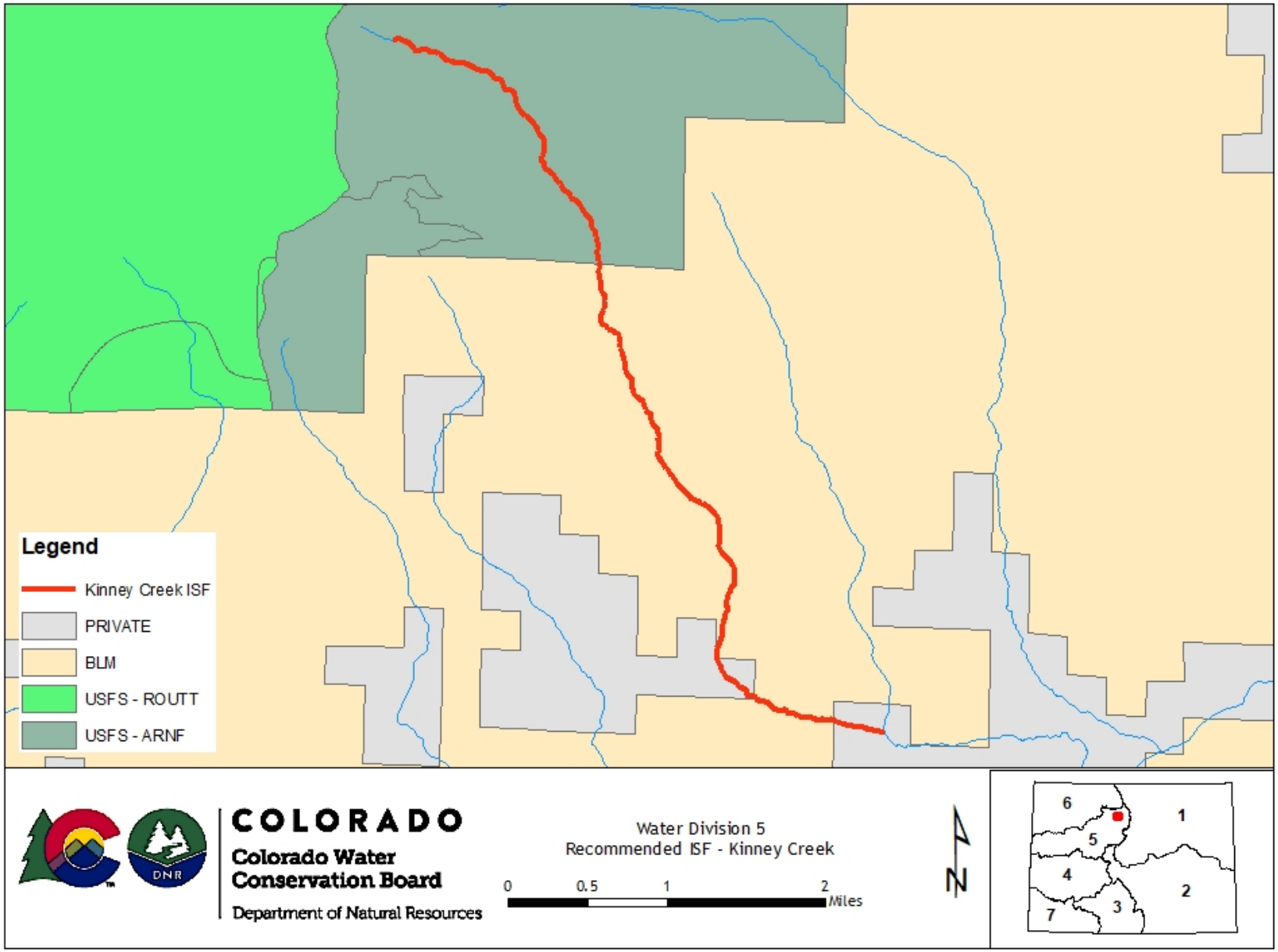
Metadata Descriptions
The UTM locations for the upstream and downstream termini were derived from CWCB GIS using the National Hydrography Dataset (NHD).

Projected Coordinate System: NAD 1983 UTM Zone 13N.

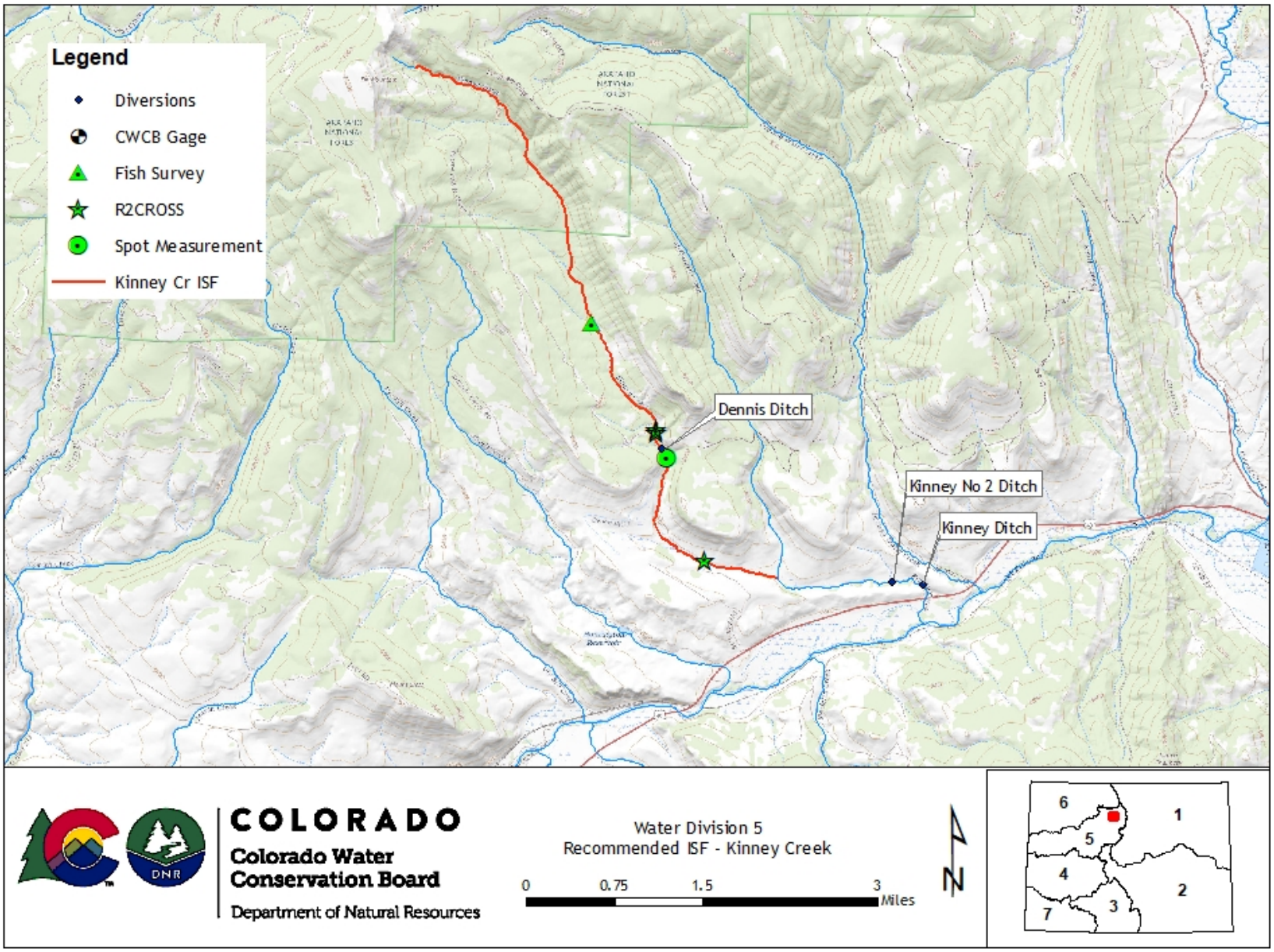
VICINITY MAP



LAND OWNERSHIP MAP



HYDROLOGIC FEATURES MAP



COMPLETE HYDROGRAPH