Spring Creek Executive Summary

CWCB STAFF INSTREAM FLOW RECOMMENDATION
January 24-25, 2022

UPPER TERMINUS:	headwaters in the vicinity of: UTM North: 4266062.60 UTM East: 187539.34
LOWER TERMINUS:	Crabtree Ditch headgate at: UTM North: 4258155.00 UTM East: 180820.03
WATER DIVISION:	4
WATER DISTRICT:	60
COUNTY:	Montrose
WATERSHED:	San Miguel
CWCB ID:	18/4/A-002
RECOMMENDER:	Bureau of Land Management (BLM)
LENGTH:	7.47 miles
FLOW RECOMMENDATION:	1.1 cfs (03/15 - 05/31)

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 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 ISF water right on a reach of Spring Creek. Spring Creek is located within Montrose County and is approximately 14 miles northwest from the town of Nucla (See Vicinity Map). The stream originates on the west slope of the Uncompahgre Plateau and flows southwest for 12 miles until it reaches the confluence with Tabeguache Creek.

The proposed reach extends from the headwaters downstream to the Crabtree Ditch headgate for a total of 7.47 miles. Eighty-five percent of the land on the proposed reach is managed by the United States Forest Service (USFS) and BLM, and 15% is privately owned (See Land Ownership Map). BLM is interested in protecting the riparian community and aquatic habit for macroinvertebrates on Spring Creek.

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 Spring Creek was sent to the mailing list in November 2021, March 2021, November 2020, March 2020, November 2019, March 2019, March 2018, November 2017, and March 2017. Staff sent notice letters to identified landowners adjacent to Spring Creek based on information in the county assessors website. A public notice regarding this recommendation was also published in the Montrose Daily Press on January 5, 2022.

Staff presented information about the ISF program and this recommendation to the Montrose County Board of County Commissioners on December 9, 2019 and October 3, 2017. Staff presented information at a meeting of the San Miguel Watershed Forum on October 21, 2019. Staff spoke with Water Commissioner Mark Ragsdale on June 5, 2017 regarding water availability on Spring Creek. Staff spoke with Kevin Thompson, an Aquatic Research Scientist for Colorado Parks and Wildlife on June 19, 2018 about his knowledge of Spring Creek. In

addition, CWCB and BLM staff met with landowners, and the Water Comissioner to discuss the proposed reach on May 12, 2021.

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.

Spring Creek is a cool-water stream with a high gradient that runs through a canyon along the southern side of the Uncompaghre Plateau. The stream valley is generally less than a quarter mile wide and contains a well-developed floodplain. Abundant wood within the channel forms frequent large pools separated by riffles and runs. Substrate in this reach is a mix of sand and cobble with the occasional outcropping of bedrock forming pools. Bank stability is excellent and is supported by numerous bedrock controls, a vigorous riparian community, and abundant woody debris.

The Colorado Natural Heritage Program (CNHP) conducted an assessment of this area in 1997 and identified Spring Creek as a potential conservation area based on the good condition of the riparian zone and upland communities (Lyon and Sovell, 2000). The riparian community is diverse and includes narrow-leaf cottonwood, three-leafed sumac, red-osier dogwood, and thin-leaf alder. CNHP noted that the vegetation was in excellent condition and unusually lush for the area. They also reported only traces on non-native species such as New Mexico privet and tamarisk. The forest on the canyon rim surrounding the stream is characterized as pinyon-juniper forest type, while the uplands lining the canyon walls are primarily oak woodland.

Spring Creek does not support a fish population, but a community of macroinvertebrates has been documented including stoneflies, mayflies, and caddisflies. Elk, black bear, mule deer, grouse and wild turkey were also observed in camera footage at the CWCB temporary gage.

The Spring Creek watershed was impacted by the Bull Draw Fire in 2018. CWCB staff observed turbid water and debris from the fire, including charred wood deposited several feet up on the banks near the temporary gage.

Table 1. List of species identified in Spring Creek.

Species Name	Scientific Name	Protection Status
mayfly	*Ephemeroptera*	None
stonefly	*Plecoptera*	None
caddisfly	*Trichoptera*	None
water strider	*Gerridae*	None
red-osier dogwood	*Cornus sericea*	None
thin-leaf alder	*Alnus incana*	None
narrow-leaf cottonwood	*Populus angustifolia*	None
three-leafed sumac	*Rhus trilobata*	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 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 two 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 winter flow of 0.88 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 1.13 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 Spring Creek.

Date, XS #	Top Width (feet)	Streamflow (cfs)	Accuracy Range (cfs)	Winter Rate (cfs)	Summer Rate (cfs)
06/16/2016, 3	8.50	1.79	0.72 - 4.48	0.96	1.34
06/16/2016, 4	7.80	1.98	0.79 - 4.95	0.82	0.87
			Mean	0.89	1.10

ISF Recommendation

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

1.1 cfs is recommended from March 15 to May 31. The BLM concludes that meeting all three criteria will maintain a wetted root zone in the alluvial aquifer during the key part of the growing season for the riparian community. Meeting all three instream flow criteria will also provide suitable conditions in the stream substrate for the aquatic macroinvertebrate community.

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 Spring Creek is 10.7 square miles, with an average elevation of 7,779 feet and average annual precipitation of 21.45 inches (See the Hydrologic Features Map). There are a number of known surface water diversions in the drainage basin tributary to the proposed ISF on Spring Creek (Table 3). These surface water diversions divert approximately 4.7 cfs, and there is approximately 9.6 AF in storage in the basin. Hydrology on Spring Creek is driven largely by snowfall on the west side of the Uncompahgre Plateau as well as rain events, particularly during monsoon season. Because of the relatively low elevation and the southwest aspect of the basin, runoff can start relatively early. This basin also experienced the Bull Draw Fire in 2018 which burned approximately 67% of the basin tributary to the proposed ISF.

Table 3. Primary surface water diversions in the vicinity of the proposed Spring Creek ISF. Diversions are listed roughly in order from upstream to downstream and the location relative to the CWCB gage is noted.

Structure Name	WDID	Decreed rate, cfs	Appropriation Date	Relative Location
Spring Creek Ditch No 3	6001693	1	1905	Above gage
Spring Creek Ditch No 2	6001692	1.74	1916	Above gage
Burrow Creek Ditch	6000541	0.87	1916	Above gage
Tilton Ditch	6000779	1	1915	Below gage
Thormalean Spring	6005058	0.0569	1919 & 1915	Below gage
Crabtree Ditch	600568	6	1932 & 1993	Below gage *

**The Crabtree Ditch is the proposed lower terminus.*

Data Analysis

Gage Analysis

There are no current or historic daily streamflow gages on Spring Creek. The nearest gage is the historic Tabeguache Creek near Nucla, CO gage (USGS 09176500), which operated from 1946 to 1953. This gage data was not used to assess water availability on Spring Creek because prorating the Tabeguache gage would not adequately reflect water use practices on Spring Creek.

Due to the lack of streamflow information, CWCB staff installed a temporary gage on Spring Creek 1.4 miles upstream from the proposed lower terminus. The drainage basin of this gage is 9.96 square miles, with an average elevation of 7,877 feet and average annual precipitation of 21.91 inches. This gage was installed on October 24, 2016 and maintained by CWCB staff with assistance from the BLM field office through fall of 2020. A number of data gaps exist due to various equipment issues. CWCB and BLM staff made 12 streamflow measurements on the proposed reach of Spring Creek as summarized in Table 4.

Table 4. Summary of streamflow measurement for Spring Creek.

Visit Date	Flow (cfs)	Collector
10/24/2016	0.22	CWCB
04/28/2017	3.33	BLM
05/29/2017	2.10	CWCB
05/29/2017	1.82	CWCB*
07/26/2017	0.47	BLM
04/09/2019	4.46	CWCB*
04/09/2019	5.64	CWCB
04/26/2019	7.40	BLM
05/08/2019	10.58	CWCB
08/01/2019	0.64	CWCB
10/22/2019	0.04	CWCB
03/05/2020	0.44	CWCB

*measurement located near the confluence with Tabeguache Creek and not included on the hydrographs.
The streamflow was very low and not measureable on 11/17/2017, 12/18/2017, and 4/3/2018.
The stream was observed to be dry on 8/23/2017, 7/3/2018, and 9/2/2020.

Staff used a longer term climate station record to evaluate the hydrologic conditions during the five years the CWCB gage operated. The Columbine Pass climate station was the closest climate station identified with a relatively long period of record (USS0008L02S). This station is located roughly 13 miles east from the proposed lower terminus on Spring Creek. The Columbine climate station recorded precipitation data from 1987 – 2020. The average annual precipitation during this time frame was 32.5 inches. The average annual precipitation in 2016 was 24.5 inches, in 2017 was 24.6 inches, in 2018 was 19.9 inches, in 2019 was 40.2 inches, and in 2020 was 16.2 inches. In four of the five years in which the gage collected data, the precipitation at the climate station was less than the 25th percentile. Therefore in most years the streamflow at the gage is likely to represent well below average conditions with the exception of 2019.

The CWCB streamgage was installed in the fall of 2016 and measured moderate base flows until spring runoff in 2017. Runoff in 2017 started in late February or early March and peaked in mid-May, receding to near zero flow by September. 2018 was particularly dry across the State and in the southwest. 2019 had relatively high snowpack and runoff started in March and showed significantly higher streamflow than in previous years. It should be noted that the data from 2019 was impacted both by high precipitation and the wildfire upstream from the gage. These factors result in flashier high flow events as well sudden drops in streamflow that may be caused by ash and other debris temporarily blocking the channel. The BLM estimates that it will take three to five years for the vegetation in the basin to recover (Jedd Sondergard, BLM personal communication). Issues with the gage resulted in missing data in early winter of 2018, July of 2019, and much of the 2019/2020 winter.

The CWCB streamgage data was adjusted by subtracting the diversion record for the Tilton Ditch. The Tilton Ditch is the only intervening surface diversion between the CWCB gage and the lower terminus. This structure is decreed for 1 cfs and typically diverts water from mid-April to late July or August. In some cases, the reported diversion rates were considerably above the gaged streamflow, in those instances the gage values were set to zero. This results in some sudden changes to zero flow, particularly in mid-May of 2017, which may not be accurate.

The CWCB streamgage data was not adjusted to account for the small (approximately 5%) difference in additional contributing drainage basin below the gage. No other adjustments were made to the CWCB streamgage data. Due to the short period of record, median streamflow and 95% confidence intervals for median streamflow were not calculated. Assessing water availability based on this gage data is challenging because most years of data represent below average precipitation and fire impacts resulted in unusual runoff patterns in 2019. Nevertheless, 2017 and 2020 (below average years) and 2019 (an above average year) show that runoff started in early March and flows were elevated at the gage until at least mid-May. Both of those years show significant periods during the proposed ISF when streamflow is above 1.1 cfs.

Diversion Record Analysis

In some cases, diversion records can be used to provide an indication of water availability in a stream reach. The Crabtree Ditch is the proposed lower terminus and has diversion records from 1974 to 2020 that show use in most years. The decreed flow rate for this structure is 6.0 cfs; however, the Crabtree water right is the most junior water right in the basin and typically diverts less due to water limitations. This diversion is usually used from mid-April to late July or August. It is not typically used during the early period of runoff. Based on the available Crabtree Ditch records, median diversions and 95% confidence intervals for median diversions were calculated and are displayed on the hydrograph. The upper confidence interval for median diversions indicates that 1.1 cfs is available from May 20 to June 13.

Water Commissioner

Staff contacted the Water Commissioner Mark Ragsdale (various personal communications) and Division Engineer Bob Hurford (November 5, 2019) to discuss hydrology on Spring Creek. According to Mr. Ragsdale, who has been the Water Commissioner for the last 15 years, spring runoff starts around mid-March and tapers off to near zero or zero flow during mid to late summer. Mr. Ragsdale confirmed that the recommended ISF flow rates were realistic although not available in all years such as 2018. He also stated that the Bull Draw Fire altered hydrology in 2019 and impacted water users' ability to divert.

Water Availability Summary

The hydrographs (See Complete and Detailed Hydrographs) show the available data from the adjusted CWCB temporary gage as well as the median and upper confidence intervals for the Crabtree Ditch diversion records. With the exception of 2018, the temporary gage data demonstrates that runoff typically starts in late February to early March, and that flows can be in excess of 1.1 cfs through May and typically peak between March and May. The upper 95% confidence interval for median Crabtree diversion records indicate that flows of 1.1 cfs are available in late May until early June. Based on the combination of the CWCB gage data, the Crabtree diversion records, and discussions with the Water Commissioner, staff concludes that water is available for the seasonal ISF flow rates recommended for Spring Creek.

MATERIAL INJURY

Because the proposed ISF on Spring 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.

Lyon, P. and J. Sovell, 2000, A Natural Heritage Assessment; Sand Miguel and Western Montrose Counties, Colorado, prepared for San Miguel County through the Colorado Natural Heritage Program.

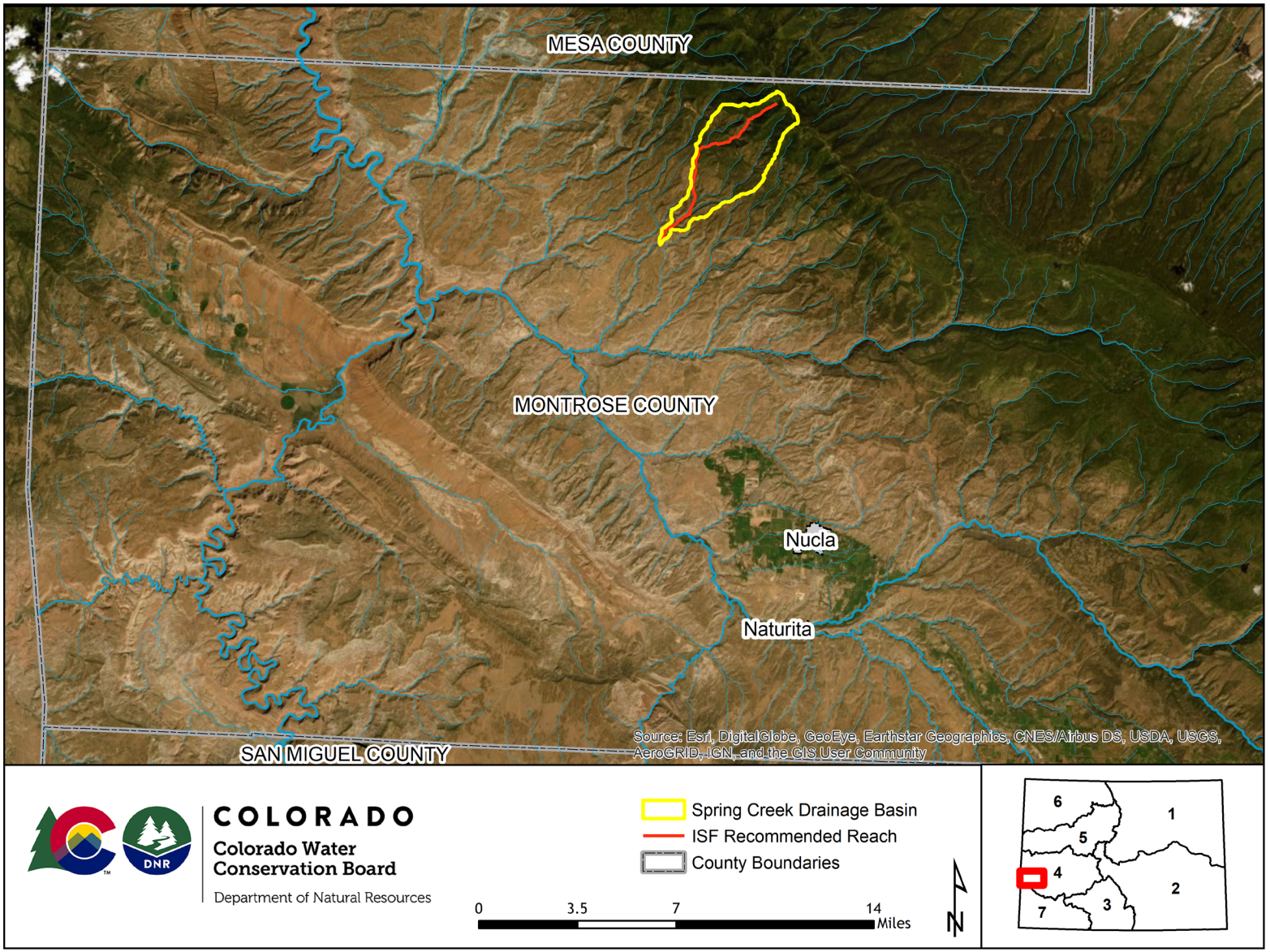
Nehring, B.R., 1979, Evaluation of Instream Flow Methods and Determination of Water Quantity Needs for Streams in the State of Colorado, Colorado Division of Wildlife.

Metadata Descriptions

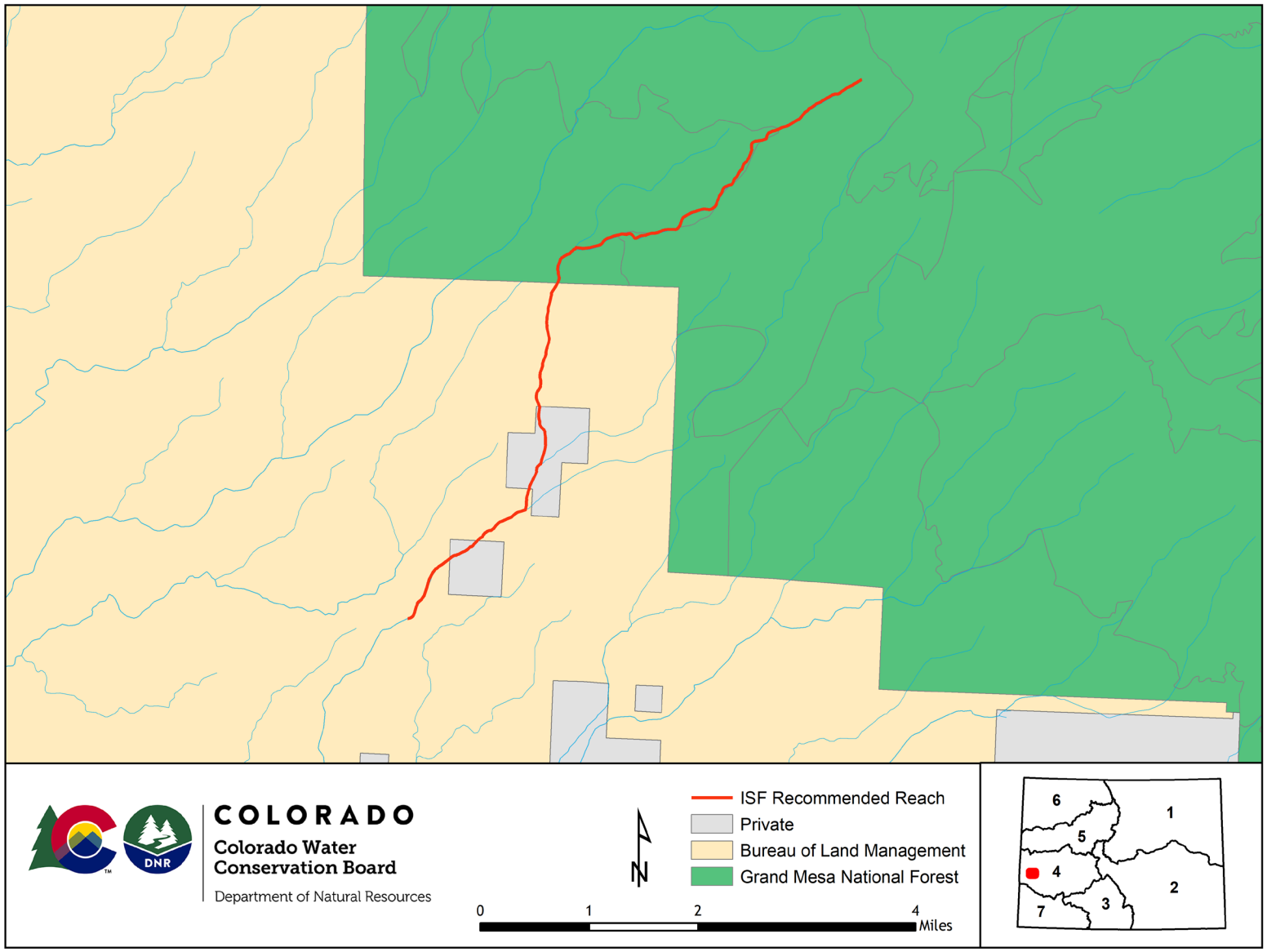
The UTM locations for the upstream and downstream termini were derived from CWCB GIS using the National Hydrography Dataset (NHD).

Projected Coordinate System: NAD 1983 UTM Zone 13N.

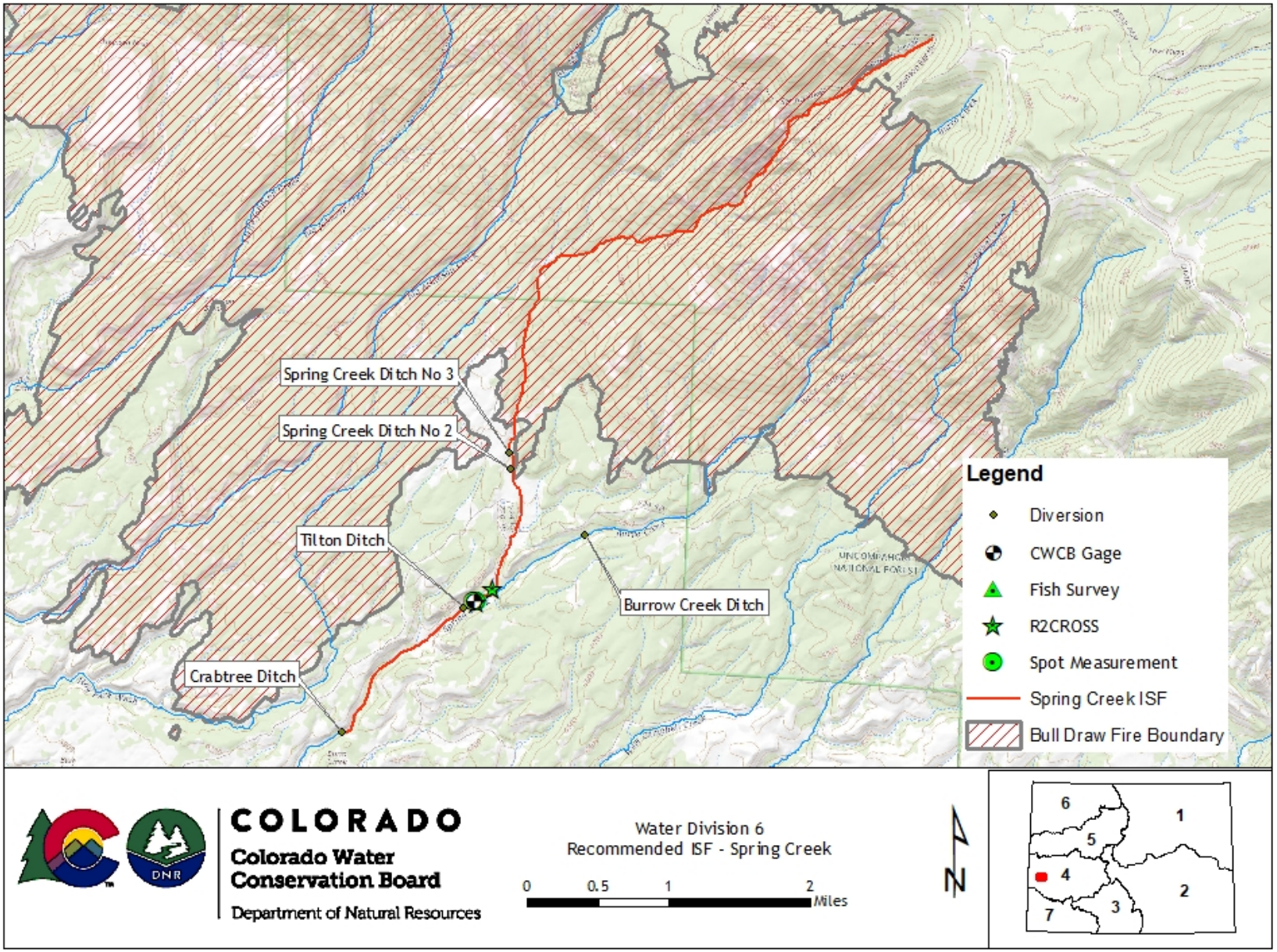
VICINITY MAP



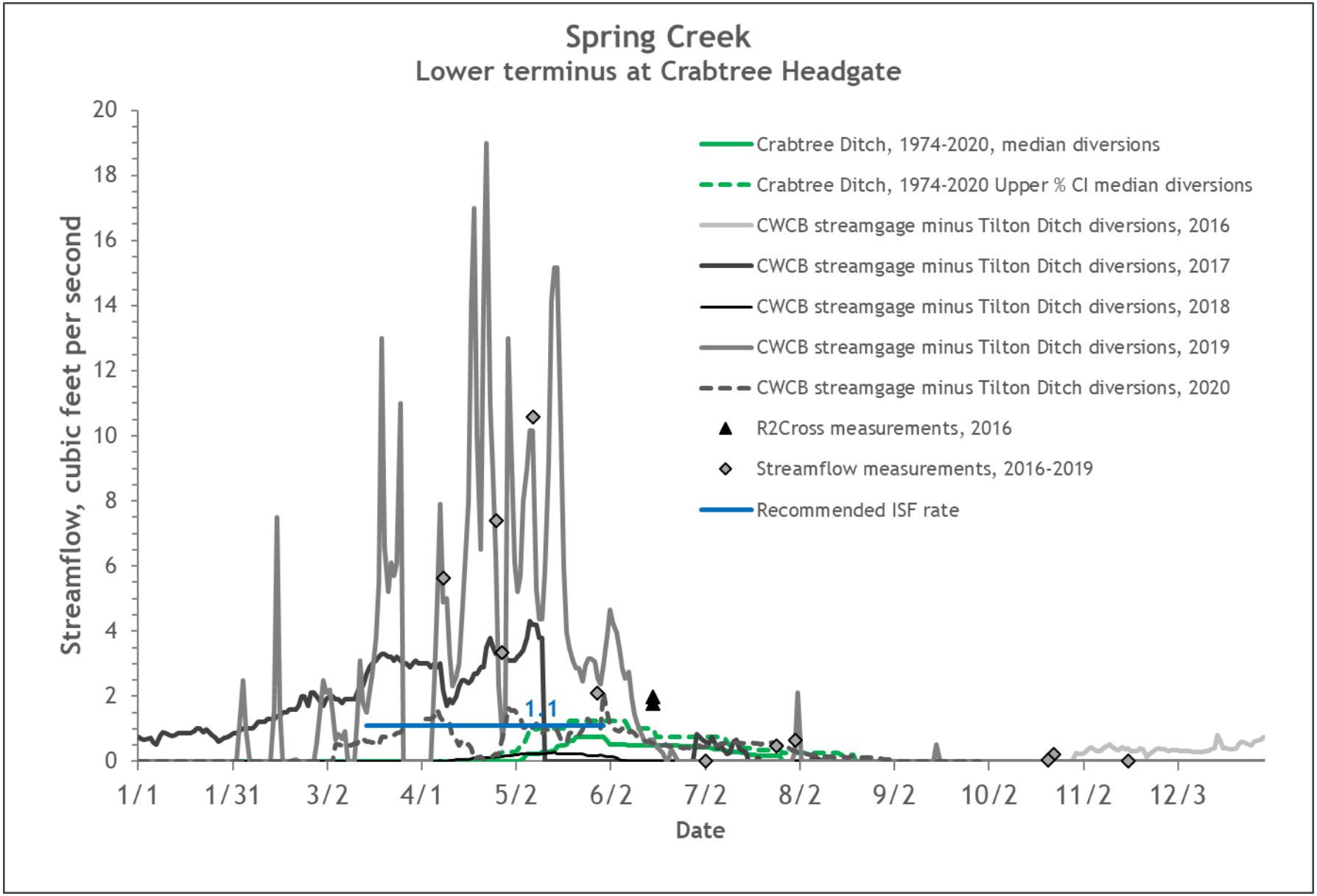
LAND OWNERSHIP MAP



HYDROLOGIC FEATURES MAP



COMPLETE HYDROGRAPH



DETAILED HYDROGRAPH