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Fourth of July Creek
EXECUTIVE SUMMARY

CWCB STAFF INSTREAM FLOW RECOMMENDATION

UPPER TERMINUS:	Headwaters in the vicinity of UTM North: 4223472.28	UTM East: 307162.58
LOWER TERMINUS:	Carris Thompson Ditch headgate UTM North: 4225851.27	UTM East: 299652.37
WATER DIVISION:	4	
WATER DISTRICT:	62	
COUNTY:	Gunnison, Hinsdale	
WATERSHED:	Upper Gunnison (HUC#: 14020002)	
CWCB ID:	16/4/A-003	
RECOMMENDER:	Bureau of Land Management	
LENGTH:	6.0 miles	
FLOW RECOMMENDATION:	1.1 cfs (4/1-7/31) 0.6 cfs (8/1-3/31)	

Fourth of July Creek

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.

The Bureau of Land Management (BLM) recommended that the CWCB appropriate an ISF water right on a reach of Fourth of July Creek. This reach is located within parts of Gunnison and Hinsdale Counties about 8 miles northeast of Lake City (See Vicinity Map). Fourth of July Creek originates on the north flank of the Calf Creek Plateau at an elevation of 12,200 ft in the Powderhorn Wilderness Area. The creek flows in a northwesterly direction as it drops to an elevation of 8,240 feet where it joins the Lake Fork Gunnison River. The proposed reach extends from the headwaters downstream to the Carris Thompson Ditch headgate. Eighty percent of the land on the 6.0 mile proposed reach is publicly owned and managed by the BLM (See Land Ownership Map). The BLM recommended this reach of Fourth of July Creek because it has a natural environment that can be preserved to a reasonable degree with an ISF water right.

The information contained in this report and the associated supporting data and analyses (located at http://cwcb.state.co.us/environment/instream-flow-program/Pages/2016ProposedISFRecommendations.aspx) form the basis for staff's ISF recommendation to be considered by the Board. This report provides sufficient information to support the CWCB findings required by ISF Rule 5i on natural environment, water availability, and material injury.

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.

Fourth of July Creek is a cold-water, high gradient stream. It flows through a canyon with a valley floor approximately one eighth mile in width. The stream cuts through alluvial deposits in the narrow valley and is confined by bedrock in many locations. The stream generally has small-sized substrate, consisting of gravels, small cobbles and small boulders. The stream has a good mix of pools, small riffles and runs. While deep pool habitat is absent, the existing pools are sufficient for overwintering fish.

Fisheries surveys have revealed a self-sustaining population of brook trout. Intensive macro-invertebrate surveys have not been conducted, but spot samples have revealed various species of mayfly, caddisfly and stonefly.

The riparian community is generally comprised of blue spruce, aspen, willow species and alder. The riparian community is in very good condition and provides abundant shading and cover for fish habitat.

Table 1. List of fish species identified in Fourth of July Creek.

Species Name	Scientific Name	Status
brook trout	*Salvelinus fontinalis*	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.

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 most easily visualized as the stream habitat types that would dry up first should streamflow cease. The field data collected consists of streamflow measurements and surveys of channel geometry at a transect and 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 quantification of the amount of water needed for summer and winter periods based on empirical studies of fish species preferences. 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 four 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 0.67 cfs, which meets 2 of 3 criteria and is within the accuracy range of the R2Cross model.

Table 2. Summary of R2Cross transect measurements and results for Fourth of July Creek.

Entity	Date	Streamflow (cfs)	Accuracy Range (cfs)	Winter Rate (cfs)	Summer Rate (cfs)
BLM	7/18/2013 - 1	0.42	0.2 – 1.1	0.83	1.10*
BLM	7/18/2013 - 2	0.37	0.1 – 0.9	0.40	Out of range
BLM	7/25/2014 - 1	0.40	0.2 – 1.0	0.65	Out of range
BLM	7/25/2014 - 2	0.39	0.2 – 1.0	0.81	Out of range
			Mean	**0.67**	**1.10**

Note: 1.1 cubic feet per second is within the confidence interval for the data set collected on 07/18/2013. 1.1 cubic feet per second provides 0.94 feet per second average velocity, which is very close to the 1.0 foot per second criteria used in the R2Cross program.

ISF Recommendation

The BLM recommends flows of 1.1 cfs (4/1 – 7/31), and 0.6 cfs (8/1 – 3/31) based on R2Cross modeling analyses, biological expertise, and staff's water availability analysis.

1.1 cubic feet per second is recommended during the snowmelt runoff period from April 1 to July 31. This recommendation is driven by the average velocity criteria. This creek is narrow and has limited physical habitat, so it is important to protect a flow rate that makes most of this habitat available to the fish population while they are completing critical life history functions during the warm weather months.

0.6 cubic feet per second is recommended from August 1 to March 31. This recommendation is driven by the average velocity criteria. This flow rate should prevent pools from freezing, allowing the fish population to successfully overwinter. Even though the base flow in this creek is small, it is extremely consistent, allowing the fishery to persist.

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 Fourth of July Creek is 5.52 square miles, with an average elevation of 10,700 ft and average annual precipitation of 21.26 inches. There is one known surface water diversion used to fill and refresh a 1.8 AF pond within the basin tributary to the proposed ISF (Fourth of July Feeder PL, 1985 appropriation date, 2 cfs until pond is full, then 0.2 cfs). There are no known transbasin imports or exports. Hydrology in this drainage basin represents essentially natural flow conditions. See the Hydrologic Features Map for more information.

Available Data

There are no current or historic streamflow gages in the vicinity of the proposed ISF reach or in nearby drainages that would be representative of streamflow in this reach. In some cases, diversion records can be used to provide an indication of water availability in a stream reach. The Carris Thompson ditch, (1912 appropriation date, 4 cfs) is located at the lower terminus. However, while the diversion record provides some information about streamflow, it is not a perfect measure of streamflow because years in which water is available but not taken may be recorded as zero.

CWCB staff made two streamflow measurements on the proposed reach of Fourth of July Creek. These measurements are included in the water availability analysis.

Data Analysis

The Carris Thompson ditch has daily records from 11/1/1973 through 10/31/2014. However, many years have no records or record zero flow diverted. Several years of the record include the water commissioner comment, “water available but not taken” (1994, 1995, 1999, 2000, 2001, and 2002). These years were omitted from the analysis of median diversions. The remaining 18 to 20 years of data, depending on the day of the year, were used to estimate median diversions and 95% confidence intervals for the median diversion.

StreamStats was also used to estimate of mean-monthly streamflow.

Water Availability Summary

The hydrographs (See Complete and Detailed Hydrographs) show StreamStats results for mean-monthly streamflow as well as median and the upper 95% confidence interval for median diversions

for the Carris Thompson Ditch. The proposed ISF rates are below the StreamStats estimates at all times and below the upper 95% confidence interval for the median diversion during most of the typical irrigation season. Staff has concluded that water is available for appropriation.

Material Injury

Because the proposed ISF on Fourth of July 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. (2015), 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.

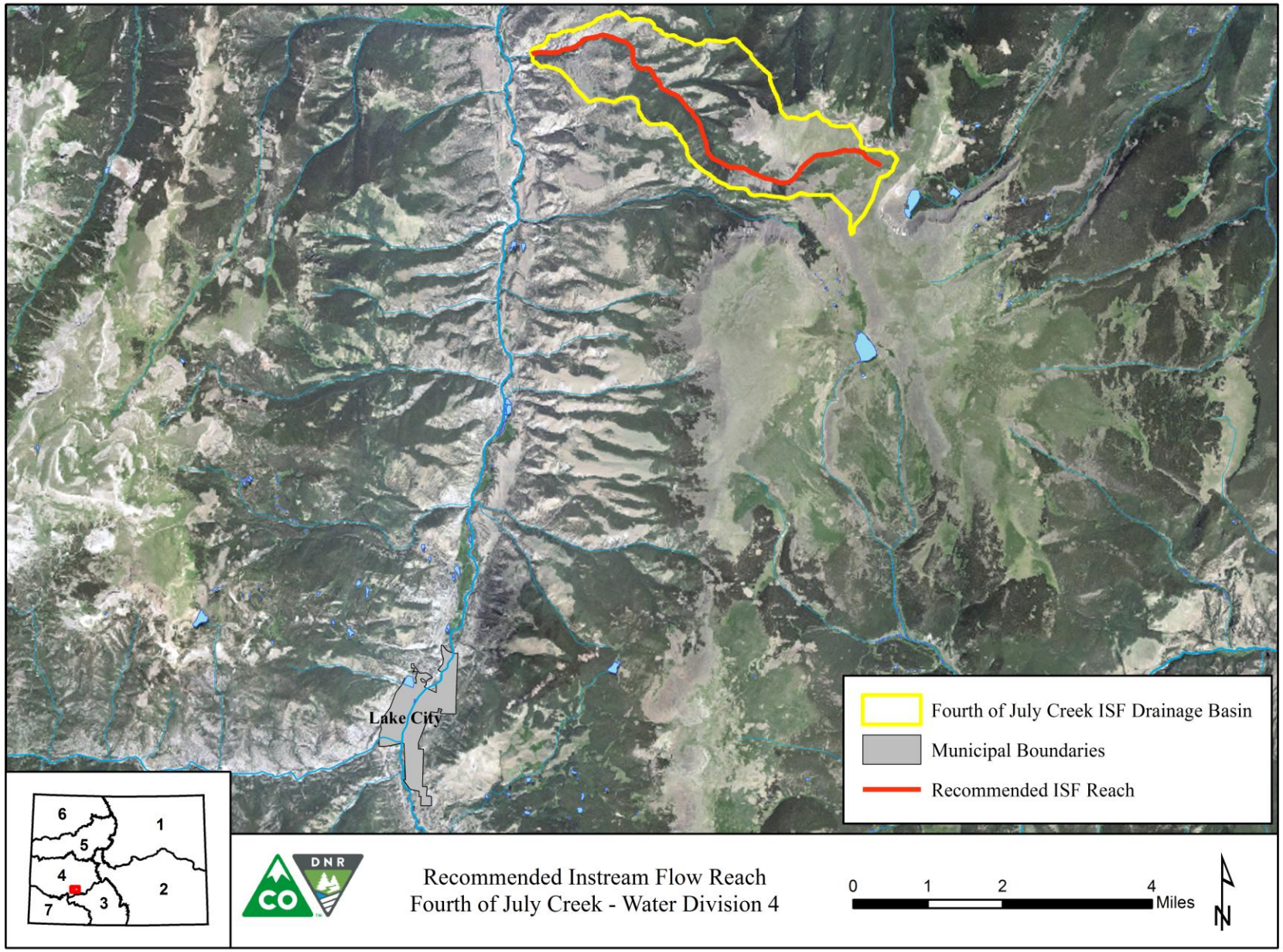
Nehring, B.R., 1979, Evaluation of Instream Flow Methods and Determination of Water Quantity Needs for Streams in the State of Colorado, Colorado Division of Wildlife.

Metadata Descriptions

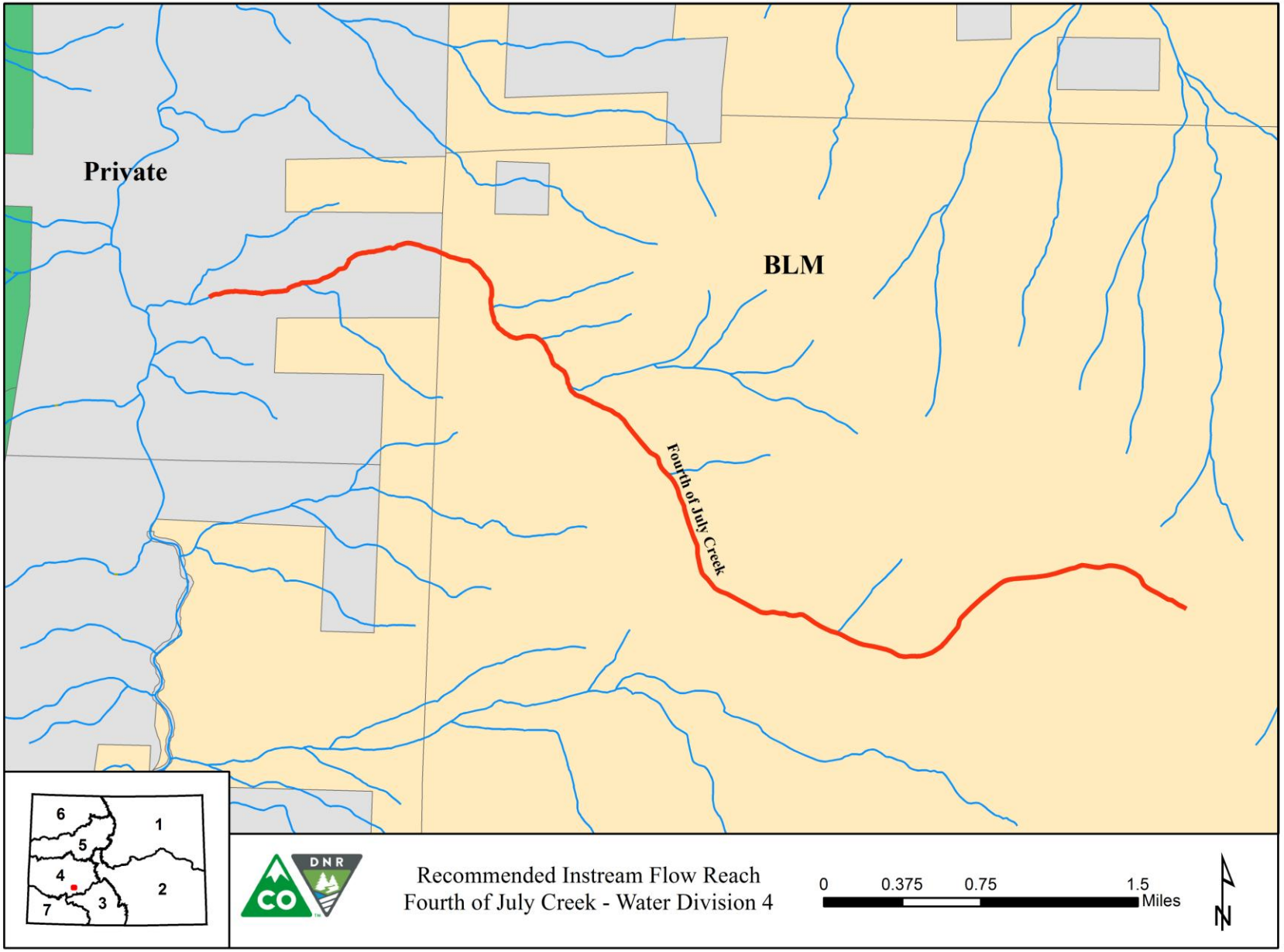
The UTM locations for the upstream and downstream termini were derived from CWCB GIS using the National Hydrography Dataset (NHD).

Projected Coordinate System: NAD 1983 UTM Zone 13N.

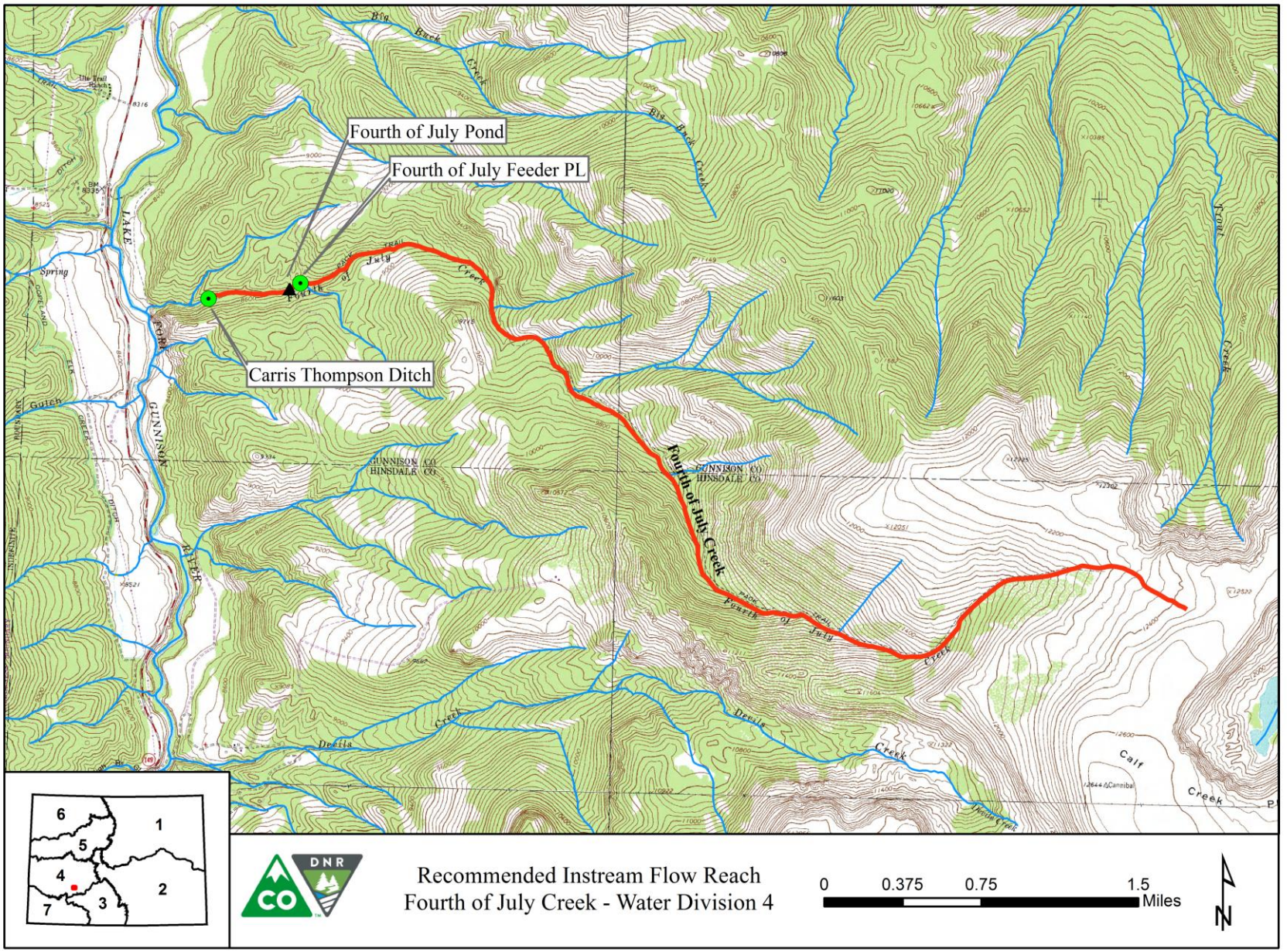
VICINITY MAP



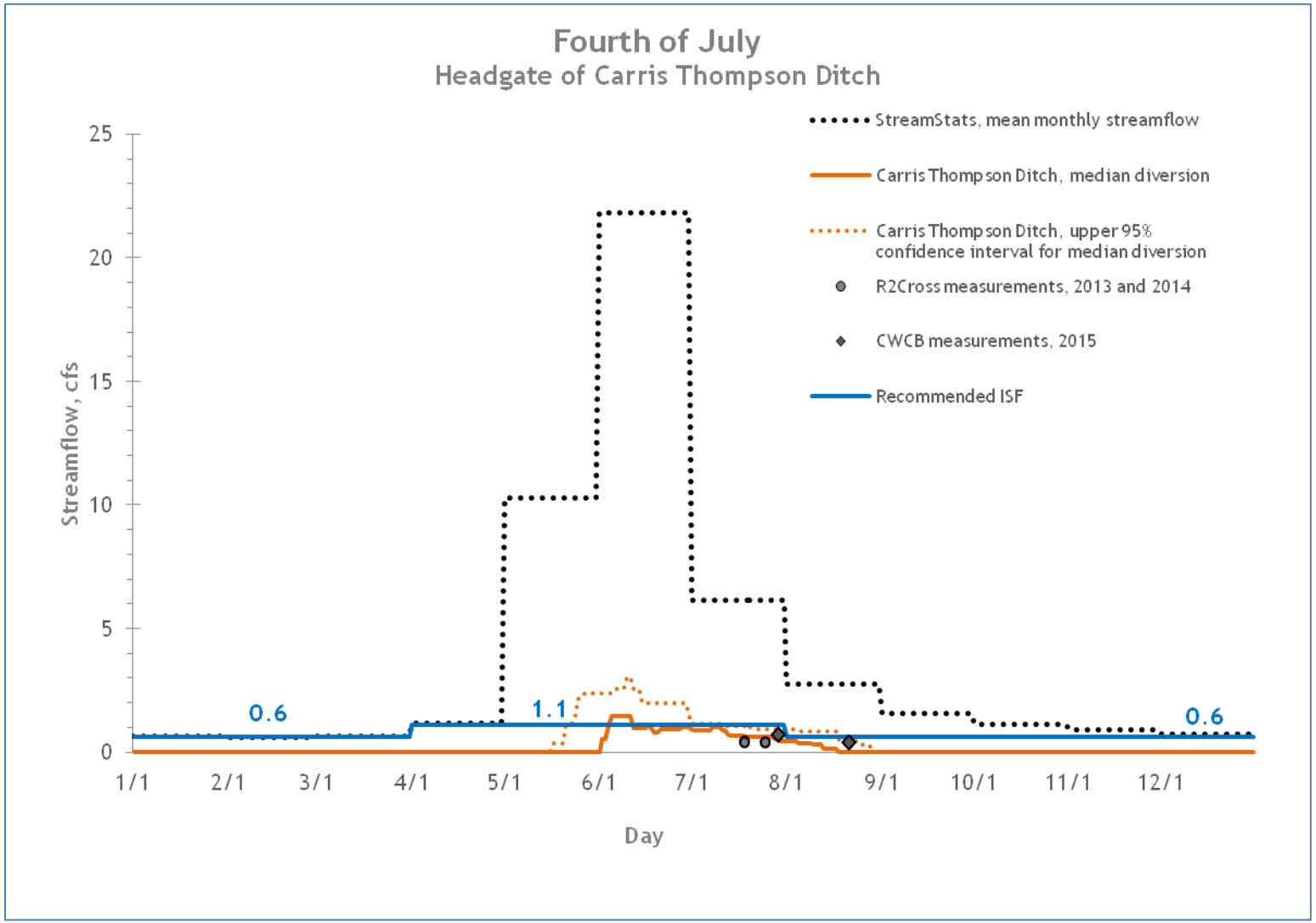
LAND OWNERSHIP MAP



HYDROLOGIC FEATURES MAP



COMPLETE HYDROGRAPH



DETAILED HYDROGRAPH