

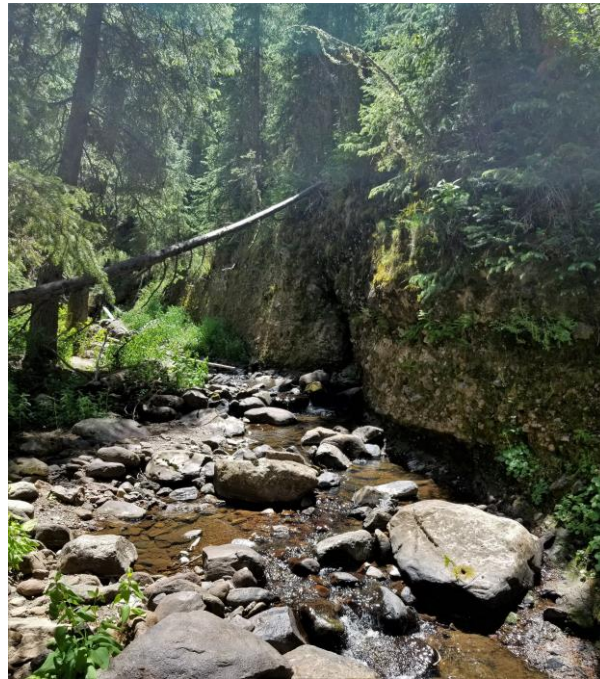


COLORADO

Colorado Water
Conservation Board

Department of Natural Resources

East Fork Little Cimarron River EXECUTIVE SUMMARY



CWCB STAFF INSTREAM FLOW RECOMMENDATION

UPPER TERMINUS: headwaters in the vicinity of
UTM North: 4233197.29 UTM East: 287899.31

LOWER TERMINUS: confluence with the Little Cimarron River
UTM North: 4241814.80 UTM East: 284446.65

WATER DIVISION: 4

WATER DISTRICT: 62

COUNTY: Gunnison

WATERSHED: Upper Gunnison

CWCB ID: 19/4/A-001

RECOMMENDER: Bureau of Land Management (BLM)

LENGTH: 6.45 miles

FLOW RECOMMENDATION: 1.0 cfs (01/01 - 04/30)
2.8 cfs (05/01 - 06/30)
1.2 cfs (07/01 - 12/31)



East Fork Little Cimarron River

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 BLM recommended that the CWCB appropriate an ISF water right on a reach of the East Fork Little Cimarron River because it has a natural environment that can be preserved to a reasonable degree. The East Fork Cimarron River is located within Gunnison County and originates at approximately 10,520 ft in elevation. It flows north from the foothills of the Cimarron Mountains for 6.45 miles before joining the Little Cimarron River at an elevation of approximately 8,492 ft (See Vicinity Map). The proposed reach extends from the headwaters downstream to the confluence with the Little Cimarron River. The Bureau of Land Management and U.S. Forest Service manage 65 percent of the land on the 6.45 mile proposed reach and 35 percent is privately owned (See Land Ownership Map).

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/2019ProposedISFRecommendations.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.

The East Fork Little Cimarron River is a cold-water, high gradient stream. It flows through a canyon with a valley floor averaging one-eighth mile in width. In the upper four miles, the river flows through several meadows with alluvial deposits. In the lower two miles, it flows through a narrow valley and is confined by bedrock. The river generally has medium to large-sized substrate, consisting of gravels, small cobbles, and small boulders. The river has a good mix of pools, small riffles, and runs.

Fisheries surveys have revealed a self-sustaining population of brook trout, and numerous fish of diverse age classes were observed during site visits. Fish cover is abundant in the form of large wood and over-hanging banks. Intensive macro-invertebrate surveys have not been conducted, but spot samples have revealed various species of mayfly, caddisfly, and stonefly.

In open meadow areas, the riparian community is generally comprised of willows, grasses, and sedges. In more confined reaches, the riparian community is generally comprised of blue spruce,

aspen, willow species, and alder. The riparian community is in very good condition, and provides shading and cover for fish habitat.

Table 1. List of species identified in East Fork Little Cimarron River.

Species Name	Scientific Name	Status
brook trout	<i>Salvelinus fontinalis</i>	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

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 six 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 1.20 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 2.84 cfs, which meets 3 of 3 criteria and is within the accuracy range of the R2Cross model.

Table 2. Summary of R2Cross transect measurements and results for East Fork Little Cimarron River.

Entity	Date	Streamflow (cfs)	Accuracy Range (cfs)	Winter Rate (cfs)	Summer Rate (cfs)
BLM	06/28/2017 #1	1.76	0.70 - 4.40	2.40	Out of range
BLM	06/28/2017 #2	2.21	0.88 - 5.53	1.63	2.84
BLM	07/12/2016 #1	0.64	0.26 - 1.60	1.13	Out of range
BLM	07/12/2016 #2	0.58	0.23 - 1.45	0.65	Out of range
BLM	07/28/2015 #1	0.45	0.18 - 1.13	0.59	Out of range
BLM	07/28/2015 #2	0.49	0.20 - 1.23	0.82	Out of range
			Mean	1.20	2.84

ISF Recommendation

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

2.8 cfs is recommended during the snowmelt runoff period from May 1 to June 30. This recommendation is driven by the average velocity criteria. Because this river is narrow and has limited physical habitat, 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 stage functions.

1.2 cfs is recommended from July 1 to December 31. This recommendation is driven by the depth and wetted perimeter criteria. As mentioned above, this river is narrow and has very limited physical habitat. This flow rate will allow passage between pools for full usage of the limited habitat.

1.0 cfs is recommended from January 1 to April 30. This flow rate is limited by water availability, but should prevent pools from freezing, allowing the fish population to successfully overwinter. Even though the base flow in this river 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.

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 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 East Fork Little Cimarron River is 6.76 square miles, with an average elevation of 10,216 ft and average annual precipitation of 27.05 inches (See the Hydrologic Features Map). There is a small on-channel reservoir located within the reach that is an undecreed flow-through pond used for stock and recreation. This pond does not appear to have any effect on water availability. There are no other decreed surface water diversions within the basin tributary to the proposed ISF. Due to the lack of diversions, hydrology in the drainage basin represents natural flow conditions.

Available Data

There are no current or historic streamgages in the vicinity of the proposed ISF reach or 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 the stream reach; however, there are no known surface diversions.

CWCB staff made two streamflow measurements on the proposed reach of East Fork Little Cimarron River as summarized in Table 3. Staff measured 0.16 cfs on the lower portion of the reach as the river flows through a narrow, steep canyon with large boulder and cobble substrate. The second streamflow measurement (0.23 cfs) was collected upstream in a low gradient reach that meanders through a broad, open valley.

Table 3. Summary of Streamflow Measurement Visits and Results for East Fork Little Cimarron River.

Visit Date	Flow (cfs)	Collector
06/27/2018	0.23	CWCB
06/27/2018	0.16	CWCB

Data Analysis

StreamStats provides the best available estimate of streamflow on East Fork Little Cimarron River.

Water Availability Summary

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

Material Injury

Because the proposed ISF on East Fork Little Cimarron River 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. (2018), 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.

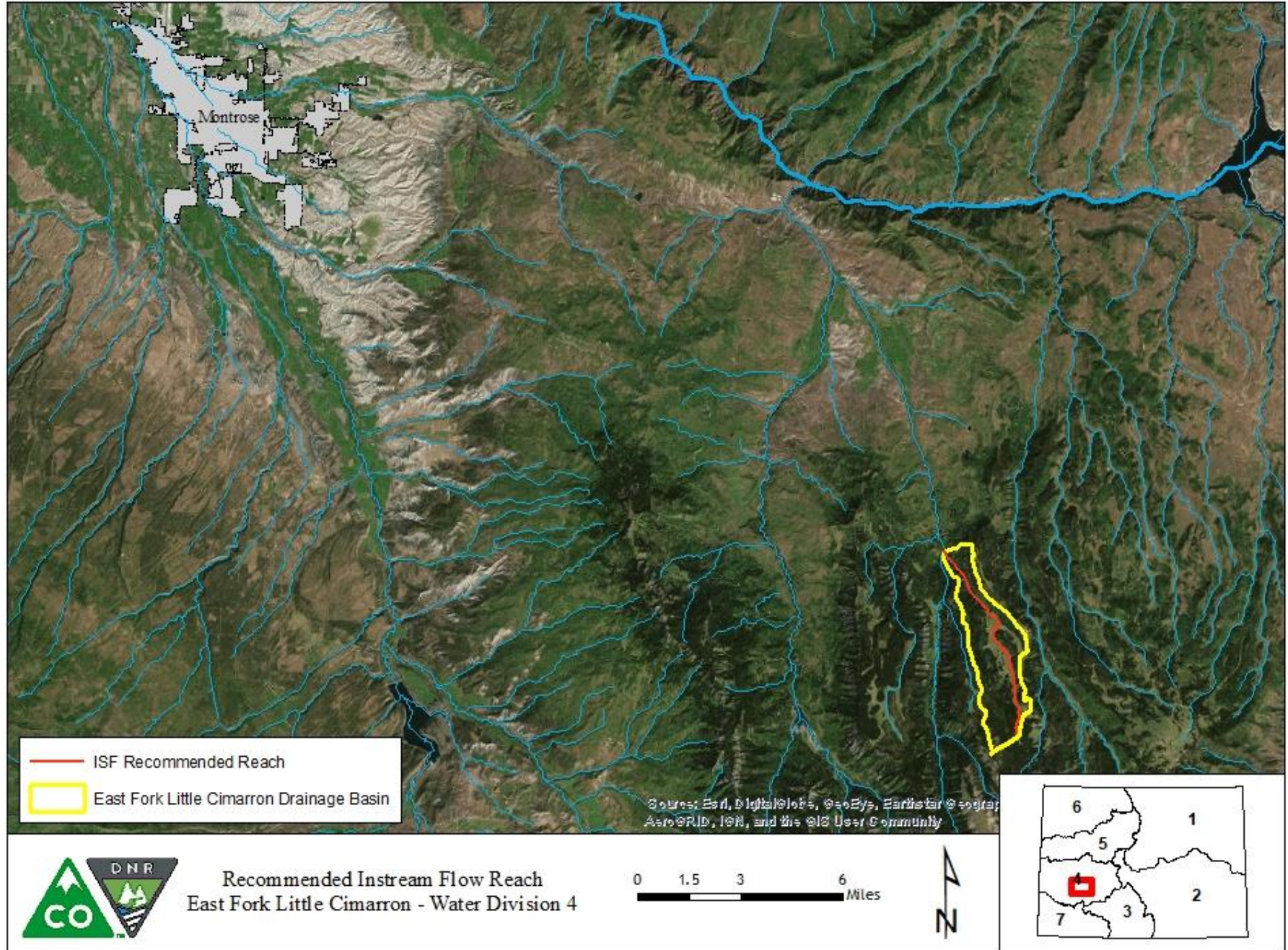
Nehring, B.R., 1979, Evaluation of Instream Flow Methods and Determination of Water Quantity Needs for Streams in the State of Colorado, Colorado Division of Wildlife.

Metadata Descriptions

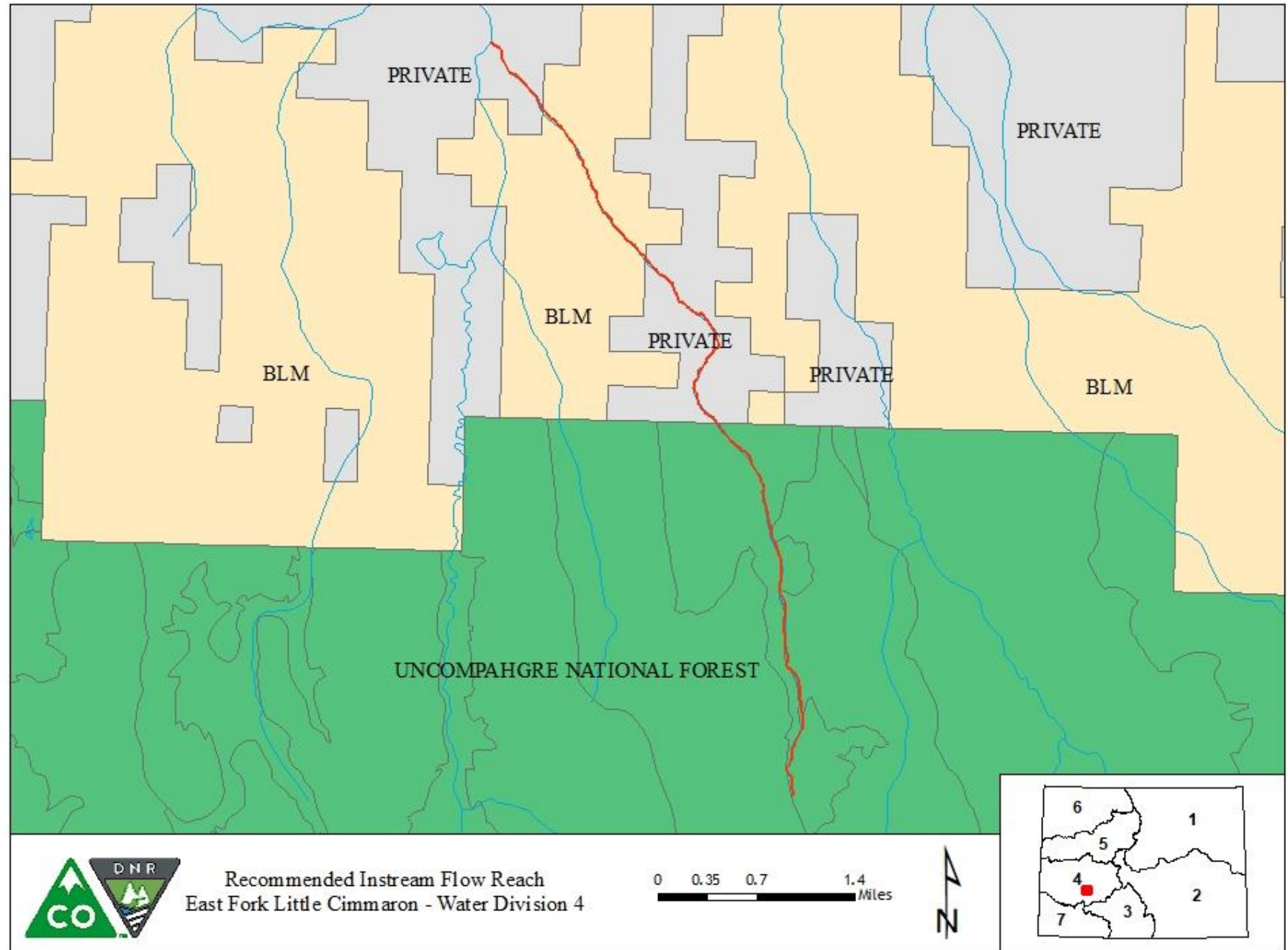
The UTM locations for the upstream and downstream termini were derived from CWCB GIS using the National Hydrography Dataset (NHD).

Projected Coordinate System: NAD 1983 UTM Zone 13N.

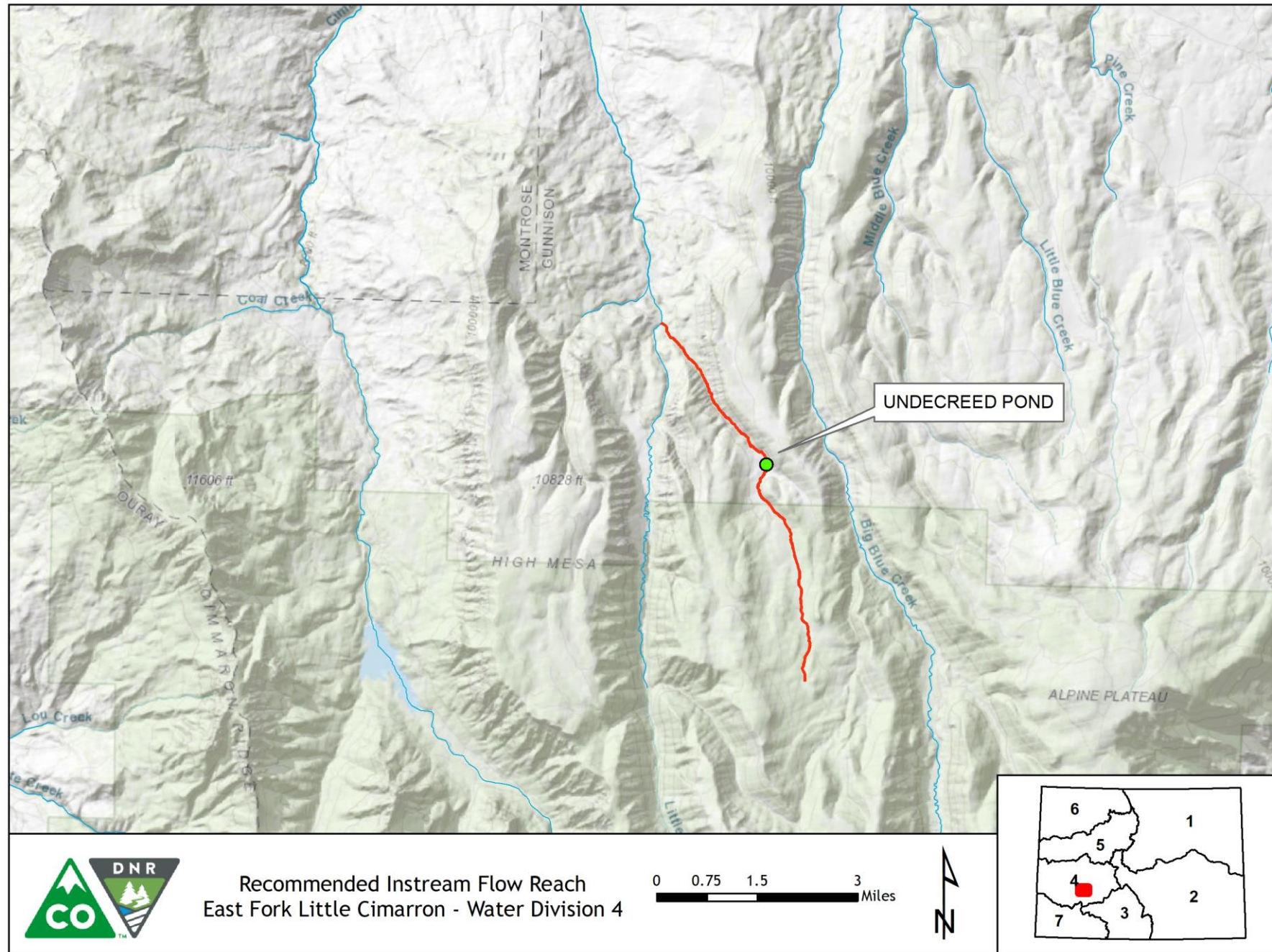
VICINITY MAP



LAND OWNERSHIP MAP

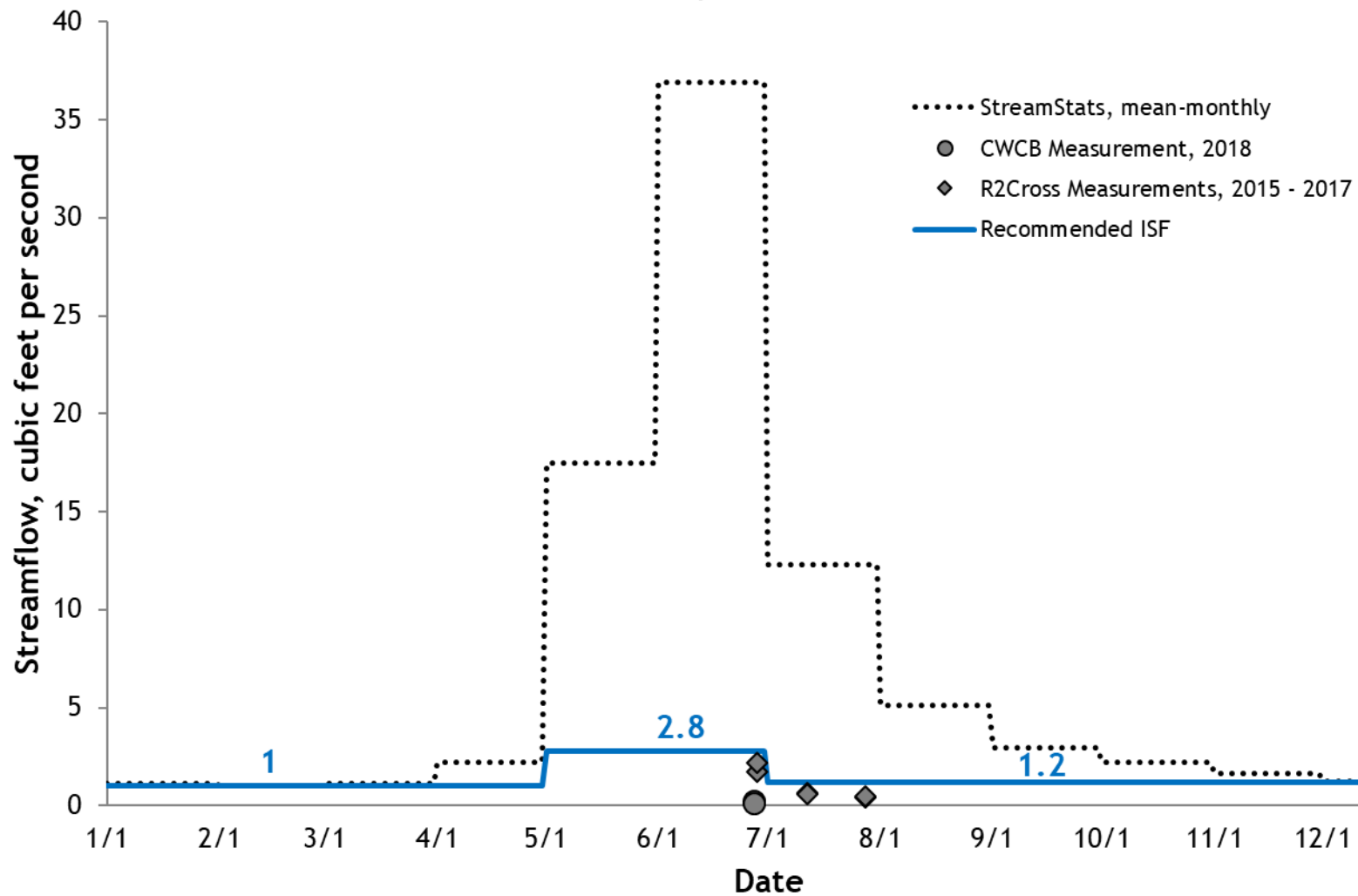


HYDROLOGIC FEATURES MAP



COMPLETE HYDROGRAPH

East Fork Little Cimarron River confl Little Cimarron River



DETAILED HYDROGRAPH

