<u>Stream:</u> East Creek (Upper)

Executive Summary

Water Division: 4
Water District: 42
CPW#: 46498
CWCB ID: 14/4/A-004

Segment: CONFLUENCE NORTH EAST CREEK TO EAST CREEK DITCH HDGT AT

Upper Terminus: CONFLUENCE NORTH EAST CREEK AT
UTM North: 4313551.60 UTM East: 196614.12

Lower Terminus: EAST CREEK DITCH HDGT AT
UTM North: 4319600.29 UTM East: 200178.68

Watershed: Lower Gunnison (HUC #: 14020005)
Counties: Mesa
Length: 4.94 miles
USGS Quad(s): Whitewater
Flow Recommendation: 1.6 cfs (3/15 – 6/30)
0.25 cfs (7/1 – 3/14)

Staff Analysis and Recommendation

Summary

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/2014ProposedInstreamFlowAppropriations.aspx) form the basis for staff's instream flow recommendation to be considered by the Board. It is staff's opinion that the information contained in this report is sufficient to support the findings required by ISF Rule 5.40.

Colorado's Instream Flow Program was created in 1973 when the Colorado State Legislature recognized "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 CWCB with the exclusive authority to appropriate and acquire instream flow and natural lake level water rights. In order to encourage other entities to participate in Colorado's Instream Flow Program, the statute directs the CWCB to request instream flow recommendations from other state and federal agencies. The Bureau of Land Management (BLM) recommended this segment of East Creek to the CWCB for a water right under the Instream Flow Program. East Creek is being considered because it has a natural environment that can be preserved to a reasonable degree with an instream flow water right.

East Creek is approximately 15 miles long and originates in Unaweep Canyon at an elevation of 6,900 feet. It flows in a northeasterly direction as it drops to an elevation of 4,600 feet where it joins the Gunnison River. Ninety-nine percent of the land on the 4.94 mile segment addressed by this report is publicly owned (see Table 1). East Creek is located within Mesa County and the total drainage area of the creek is approximately 118 square miles.

The subject of this report is a segment of East Creek from the confluence with North East Creek extending downstream to the East Creek Ditch. The proposed segment is located approximately 20 miles south of Grand Junction. Staff has received one recommendation for this segment from the BLM, which is discussed below.

Instream Flow Recommendation

BLM recommended flows of 1.6 cfs (3/15 – 6/30) and 0.25 cfs (7/1 – 3/14), based on its May 15, 2012 data collection efforts and staff's water availability analyses.

Land Status Review

Table 1. Summary of land ownership data in the vicinity of the proposed ISF on East Creek.

Upper Terminus	Lower Terminus	Total Length (miles)	Land Ownership	
			% Private	% Public
Confluence North East Creek	East Creek Ditch HDGT	4.94	1%	99%

All of the public lands in this segment are managed by the BLM.

Biological Data

East Creek is a cool-water, moderate gradient stream in a narrow canyon confined by bedrock. Some portions of the stream are directly adjacent to a major state highway, but most parts of the stream typically have good bank stability and good vegetative cover. Most portions of the stream have recovered from historic overgrazing, and typically have good mix of riffle and run habitat with large substrate. In areas that have not fully recovered from historic overgrazing, the stream is wider, has less cover, and less bank stability.

Fishery surveys indicate that East Creek supports a self-sustaining population of speckled dace in the upper parts of this reach, and a spawning population of flannelmouth sucker, bluehead sucker, and white sucker in the lower parts of the reach. BLM believes that the stream provides an important spawning area for sensitive native fishes that reside in the Gunnison River. The creek also supports a population of northern leopard frog, which is found on BLM's sensitive species list.

The riparian community along East Creek is robust, providing cover and shading for the stream. The riparian community is comprised mainly of Narrowleaf cottonwood, Rio Grande cottonwood, Lanced Leaf Cottonwood and various species of willow.

Field Survey Data

BLM staff used the R2Cross methodology to quantify the amount of water required to preserve the natural environment to a reasonable degree. The R2Cross method requires that stream discharge and channel profile data be collected in a riffle stream habitat type. Riffles are most easily visualized as the stream habitat types that would dry up first should streamflow cease. This type of hydraulic data collection consists of setting up a transect, surveying the stream channel geometry, and measuring the stream discharge.

Biological Flow Recommendation

The CWCB staff relied upon the biological expertise of the BLM to interpret output from the R2Cross data collected to develop the initial, biologic instream flow recommendation. This initial recommendation is designed to address the unique biologic requirements of each stream without regard to water availability. Three instream flow hydraulic parameters, average depth, percent wetted perimeter, and average velocity are used to develop biologic instream flow recommendations. Colorado Parks and Wildlife has determined that maintaining these three 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 invertebrates (Nehring 1979; Espegren 1996).

For this segment of stream, two data sets were collected, with the results shown in Table 2 below. Table 2 shows who collected the data (Party), the date the data was collected (Date), the measured discharge at the time of the survey (Q), the accuracy range of the predicted flows based on Manning's Equation (250% and 40% of Q), the summer flow recommendation based on meeting 3 of 3 hydraulic criteria, and the winter flow recommendation based upon 2 of 3 hydraulic criteria. Recommendations

that fall outside of the accuracy range of the model, over 250% of the measured discharge or under 40% of the measured discharge may not give an accurate estimate of the necessary instream flow rate required.

Table 2. Summary of R2Cross measurements and analysis for East Creek

Party	Date	Q (cfs)	Accuracy Range (cfs)	Winter (2/3) (cfs)	Summer (3/3) (cfs)
BLM	5/15/2012	0.94	0.4 – 2.3	1.97	Out of Range
BLM	5/15/2012	0.78	0.3 – 1.9	1.49	1.65
			Averages	1.73	1.65

BLM's analysis of this data, coordinated with Colorado Parks and Wildlife, indicates that the following flows are needed to protect the fishery and natural environment to a reasonable degree.

1.65 cubic feet per second is recommended for the snowmelt runoff period from March 15 through June 30. This recommendation is driven by the average depth criteria. The goal of this recommendation is to provide as much spawning habitat as possible during snowmelt runoff, and meeting the depth criteria ensures that a sufficient amount of usable habitat is available.

0.25 cubic feet per second is recommended for the base flow period from July 1 to March 14. This flow rate should maintain pools and prevent icing, which is important for the fish that inhabit the creek on a year-round basis.

Hydrologic Data and Analysis

CWCB staff conducts hydrologic analyses for each recommended instream flow (ISF) appropriation to provide the Board with a basis for making the determination that water is available. 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 analyze 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 actual hydrology using the most efficient analysis technique.

The final product of the hydrologic analysis 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, mean-monthly streamflow values will be presented.

Background Information

The proposed instream flow on the upper reach of East Creek has a 118 square mile drainage basin. The average elevation of the basin is 7,560 ft and the average precipitation is 14.90 inches. There are a substantial number of water rights within the drainage basin, including approximately 29 surface-water diversions, 74 spring rights, and 37 reservoir or pond rights. Therefore, hydrology in this drainage basin does not represent natural flow conditions.

There is very little information available in the vicinity of this proposed instream flow. There are no streamflow gages on East Creek or any nearby creeks that would be representative. In general there is very little streamflow information for the entire Uncompaghre Plateau. StreamStats provides a possible source of streamflow information. There are also a number of spot measurements that have been collected by the BLM, USGS, and CWCB staff.

There is a diversion at the lower terminus of this reach (East Creek Ditch, WDID 4200515, 2.59 cfs) that can provide some indication of streamflow. The East Creek Ditch is among the more senior water rights on East Creek (09/18/1888 appropriation date, administration number 14141.0000) and has diversion records from 1975 through 2012. According to the Division Engineer and the Water Commissioner (Bob Hurford and Lynne Bixler) East Creek Ditch will often sweep the stream. However, while the diversion record provides some information about streamflow, it is not a perfect measure of streamflow because; 1) years in which water was available in the stream but not taken are treated as zero; 2) Prior to 2002 there are no Water Commissioner comments to clarify whether years with no flow resulted from water being unavailable or if the structure was not useable; 3) the diversion record only provides information during the irrigation season; and 4) there was a substantial change in use of the diversion structures in the late 1990's when roughly 40 of 80 acres of irrigable land associated with this diversion were converted to a gravel pit operation. Given limitations in the diversion record, analysis based on this method likely provides only a rough estimate of actual flow conditions.

Lynne Bixler, who has been the Water Commissioner in this district since 1995, indicated that runoff typically starts in late March or Early April and lasts until May 1st, and sometimes into June. The typical peak is 5-6 cfs near the East Creek ditch headgate. Lynne stated that the stream is often dry after mid-summer unless it rains.

Data Analysis

There are 45 spot discharge measurements on East Creek Creek spanning 1977 to 2013. These measurements were made within 3,000 feet of the lower terminus; however, they were not made on a consistent basis and there are more measurements in summer and early fall than in winter or spring. The measurements show that streamflow is quite variable. The highest measured flow was 84.3 cfs on 5/12/1984. Eight of the measurements recorded zero flow, 6 of which occurred in the dry years of 2012 and 2013. CWCB staff made a measurement of 0.25 cfs on 7/31/2013 upstream from the lower terminus. There was running water in portions of the creek, but the section near the East Creek Ditch headgate was dry at that time.

The East Creek Ditch diversion record was imported into TsTools which automatically fills the record for the non-irrigation period with zeros. The years 2006 through 2009 were filled with zeros manually based on the Water Commissioner comment, "Water available but not taken". The median and upper 95% confidence intervals for the diversion record were computed. Statistically there is 95% confidence that the true value of the median diversion is located within the confidence interval. These values represent the median of the diversion record, and may not reflect the amount of water actually available in the stream.

The hydrograph (see Figure 1) shows StreamStats results, the spot measurements, and the median and upper 95% confidence interval for the median of the diversion record. The proposed instream flow rate is below the StreamStats mean-monthly streamflow for all months. The proposed instream flow rate is below the median or upper confidence interval of the diversion record from late April to early July. The spot measurements are both above and below the proposed instream flow rate. While it is statistically difficult to estimate central tendency from the spot measurements; 66% of all measurements between July 1 and May 1(outside the normal irrigation season) are above the proposed the ISF rate of 0.25 cfs.

Staff has determined that water is available for the summer recommendation based on the East Creek Ditch diversion record and water commissioner's comments. In addition, staff has determined that water is available for the winter recommendation based on spot measurements made near the lower terminus.

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.

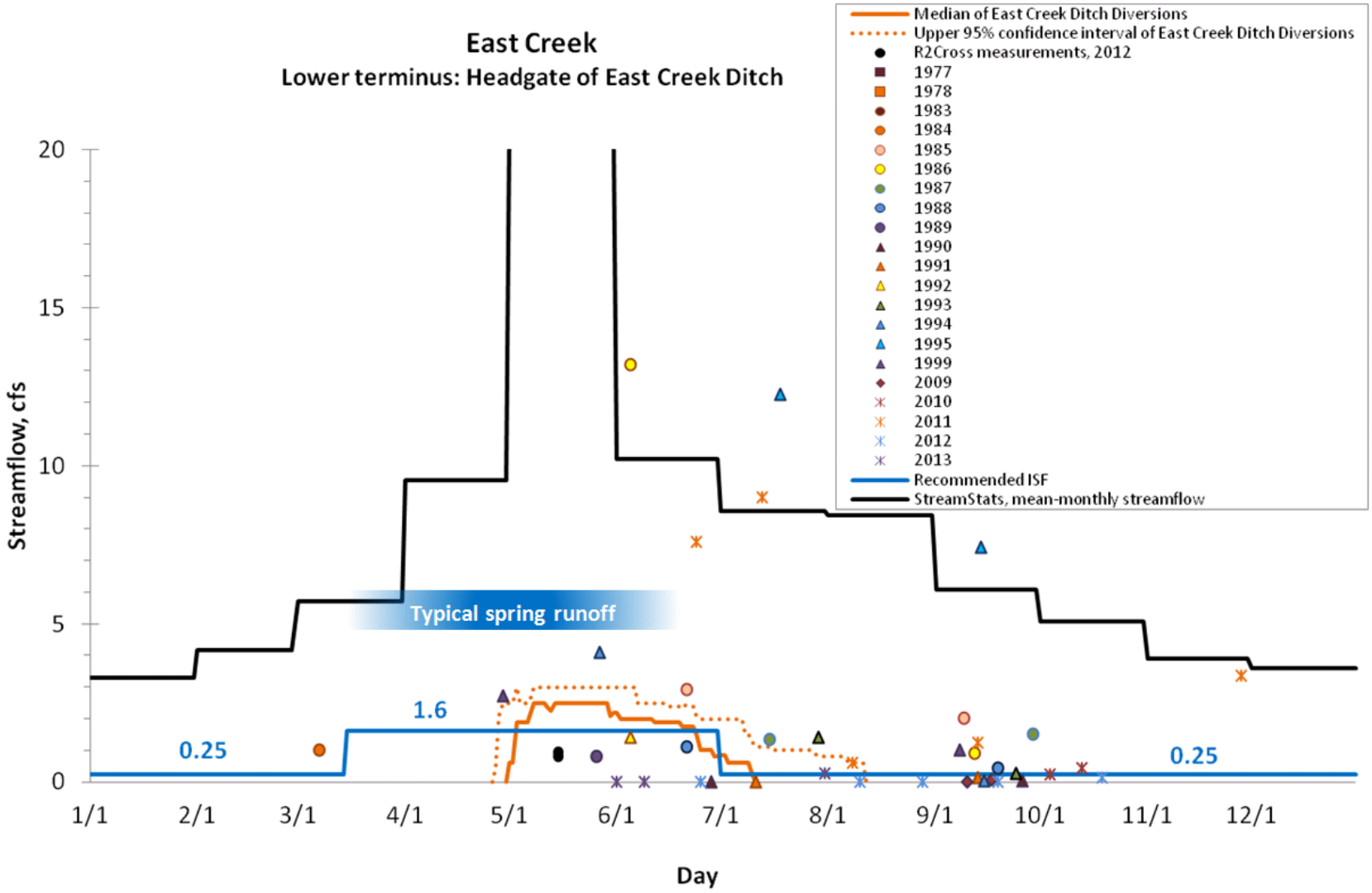


Figure 1. Hydrograph showing streamflow data and the proposed ISF rate on upper East Creek.

Figure 1

Existing Water Rights

Staff has analyzed the water rights tabulation and determined that there are no decreed surface diversions within this reach of stream. Staff has concluded that a new junior appropriation of water rights on East Creek can exist to preserve the natural environment to a reasonable degree without limiting or foreclosing the exercise of valid existing water rights.

CWCB Staff's Instream Flow Recommendation

Staff recommends that the Board form its intent to appropriate on the following stream reach:

Segment: CONFLUENCE NORTH EAST CREEK TO EAST CREEK DITCH HDGT AT

Upper Terminus: CONFLUENCE NORTH EAST CREEK AT
UTM North: 4313551.60 UTM East: 196614.12
(Latitude 38° 55' 6.44"N) (Longitude 108° 29' 56.97"W)
SW SE Section 18, Township 13 South, Range 99 West 6th PM
2,570' West of the East Section Line; 750' North of the South Section Line

Lower Terminus: EAST CREEK DITCH HDGT AT
UTM North: 4319600.29 UTM East: 200178.68
(Latitude 38° 58' 26.72"N) (Longitude 108° 27' 38.75"W)
SW SE Section 28, Township 12 South, Range 99 West 6th PM
2,858' East of the West Section Line; 20' North of the South Section Line

Watershed: Lower Gunnison (HUC #: 14020005)
Counties: Mesa
Length: 4.94 miles
USGS Quad(s): Whitewater
Flow Recommendation: 1.6 cfs (3/15 – 6/30)
0.25 cfs (7/1 – 3/14)

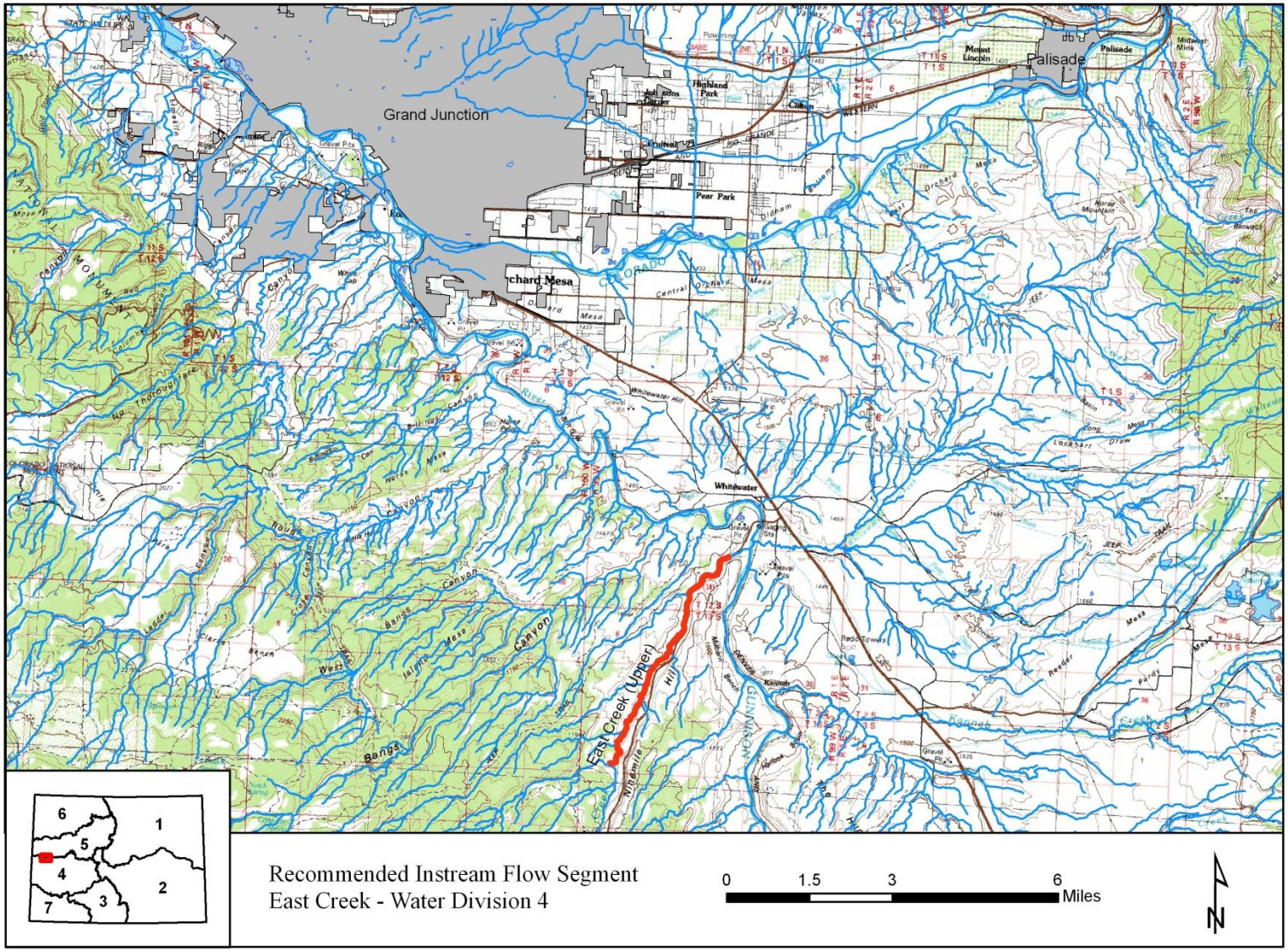
Metadata Descriptions:

a) The UTM, PLSS and Lat/Long locations for the upstream and downstream termini were derived from CWCB GIS using the National Hydrography Dataset (NHD).

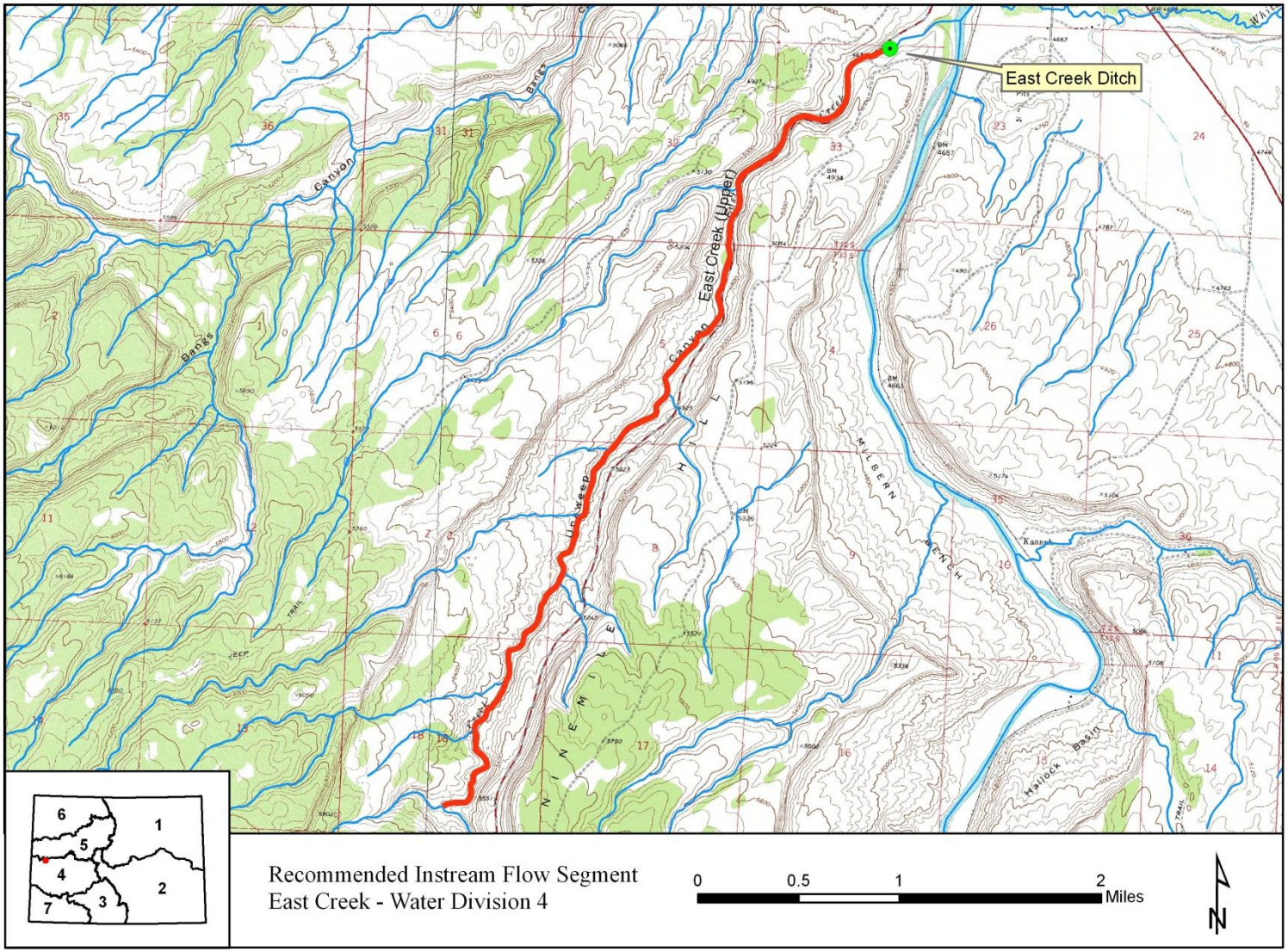
b) The PLSS locations were derived from CWCB GIS using 2005 PLSS data from the U.S. Bureau of Land Management's Geographic Coordinate Database

c) Projected Coordinate System: NAD 1983 UTM Zone 13N

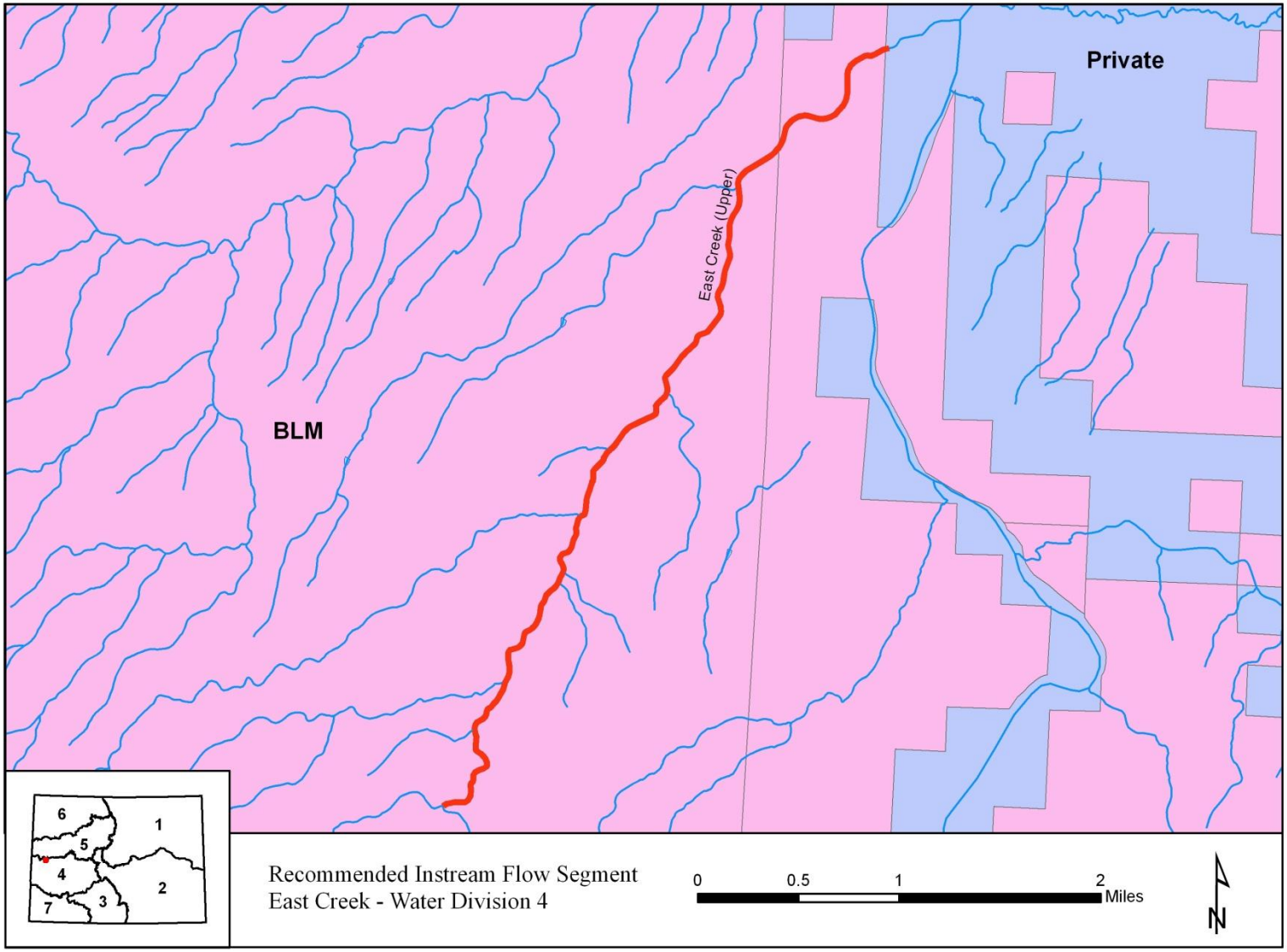
Vicinity Map



Water Rights Map



Land Use Map


Private
East Creek (Upper)
BLM
6
1
5
4
2
7
3
Recommended Instream Flow Segment
East Creek - Water Division 4
0
0.5
1
2
Miles
N