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

Executive Summary

Water Division: 4
Water District: 42
CPW#: 46498
CWCB ID: 14/4/A-007

Segment: EAST CREEK DITCH HDGT TO CONFLUENCE GUNNISON RIVER

Upper Terminus: EAST CREEK DITCH HDGT AT
UTM North: 4319600.30 UTM East: 200178.68

Lower Terminus: CONFLUENCE GUNNISON RIVER AT
UTM North: 4319826.16 UTM East: 200746.26

Watershed: Lower Gunnison (HUC #: 14020005)
Counties: Mesa
Length: 0.37 miles
USGS Quad(s): Whitewater
Flow Recommendation: 1.6 cfs (3/15 – 5/31)

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. One hundred percent of the land on the 0.37 mile segment addressed by this report is privately owned. 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 East Creek Ditch downstream to the confluence with the Gunnison River. The proposed segment is located approximately 20 miles south of Grand Junction. Staff has received one recommendation for this segment, from the BLM. The recommendation for this segment is discussed below.

Instream Flow Recommendation

BLM recommended flows of 1.6 cfs (3/15 – 5/31), 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
East Creek Ditch Headgate	Confluence Gunnison River	0.37	100%	0%

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.

1.6 cubic feet per second is recommended for the snowmelt runoff period from from March 15 through May 31. 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.

No recommendation is made for the remainder of the year in this stream reach, because it appears that there is insufficient water availability to support an instream flow recommendation.

The BLM believes that cross sections collected above the headgate of the East Creek Ditch are applicable to this portion of the creek for the following reasons:

- The size (cross-sectional area) of East Creek channel is largely driven by peak flow at snowmelt runoff. The section of the stream below East Creek Ditch should see approximately the same flows as above the ditch, even with the diversions that occur during snowmelt runoff. Accordingly, the cross sectional area of the channel above and below the ditch should be roughly equivalent.

- There is the possibility that the stream below the ditch is wider and shallower than above the ditch, because the lowest portion of the creek is on the alluvial plain of the Gunnison River. In this part of the creek, there isn't extensive bedrock to constrain the lateral extension of the channel. If that is the case, then R2Cross measurements taken above the ditch in the confined section of the creek would provide conservative instream flow recommendations for the lower part of creek. A flow that meets the depth criteria in the upper, confined part of the creek may not meet the depth criteria in the lower, less confined part of the creek where the channel may be wider. However, the recommended flow rates would still allow for passage of native fishes during the snowmelt runoff season.

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 lower reach of East Creek has a 118 square mile drainage basin. The average elevation of the basin is 7,550 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 is a diversion at the upper 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; therefore, streamflow in the lower East Creek reach is likely reduced by this diversion particularly in

late summer. Although the diversion record is not a good source of information for the lower reach, its analysis is included for comparison.

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

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 (Figure 1) shows StreamStats results, and the median and confidence interval for the median of the diversion record. The proposed instream flow rate is below the StreamStats mean-monthly streamflow for all months. However, StreamStats is likely significantly over-estimating streamflow below the East Creek Ditch. In this case the best information we have is the Water Commissioner's comments about the typical magnitude and timing of runoff. If peak flows are typically 5 to 6 cfs, and the East Creek Ditch takes its decreed 2.93 cfs, then 2.07 to 3.07 cfs would be available in the proposed ISF reach during runoff. Staff has determined that water is available for the recommended seasonal ISF rate on this reach of East Creek.

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.

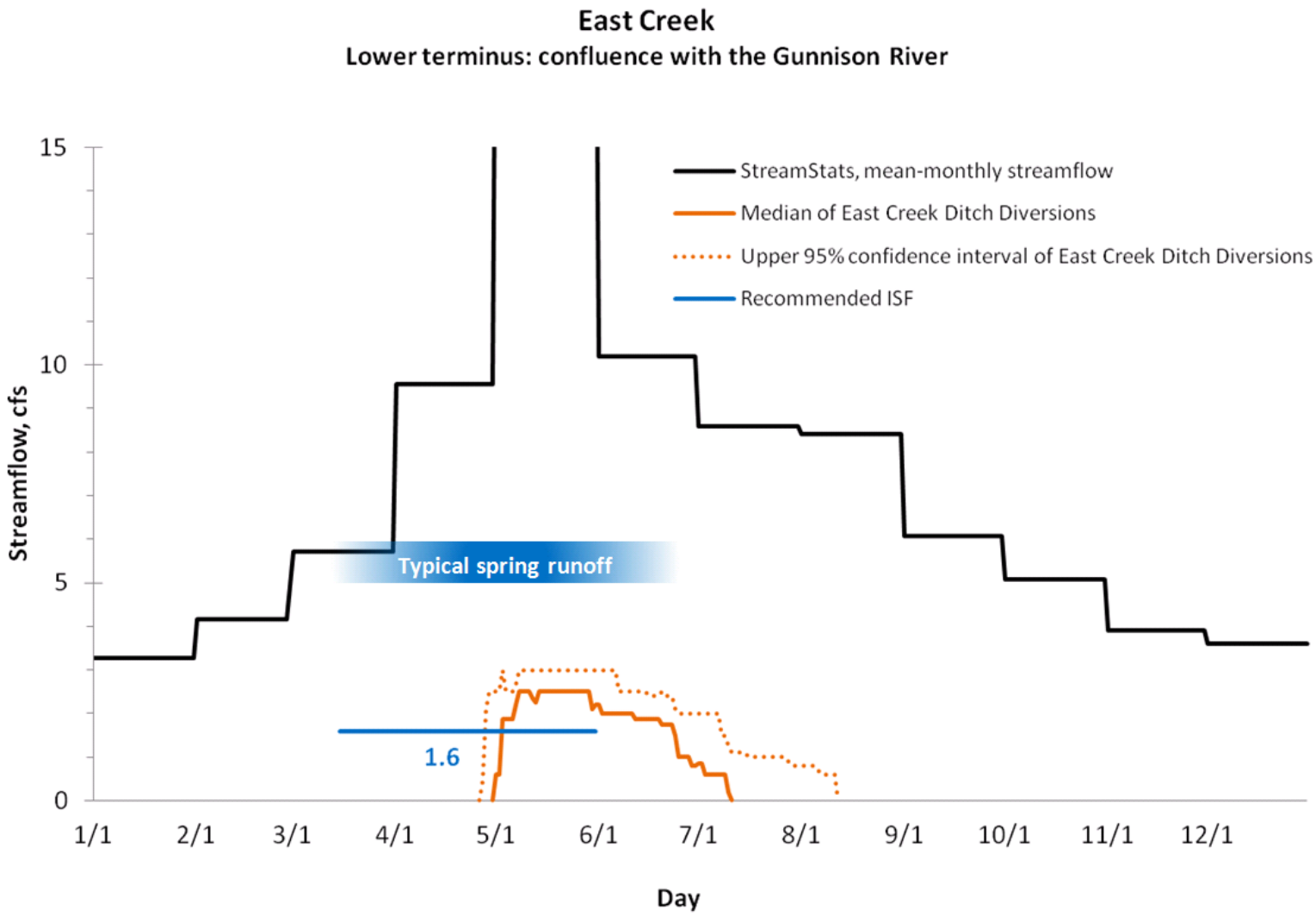


Figure 1. Hydrograph showing streamflow data and the proposed ISF flow rate on lower East Creek.

Existing Water Rights

Staff has analyzed the water rights tabulation and determined that there are two decreed absolute surface diversions within this reach of stream: East Creek Ditch, case # CA0273 and CA5812 for 2.59 cfs with 9/18/1888, 7/26/1914 and 11/1/1939 appropriation dates; and Wadlow Pumping Plant, case # CA8303 for 3 cfs with a 1/1/1940 appropriation date. 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: EAST CREEK DITCH HDGT TO CONFLUENCE GUNNISON RIVER

Upper 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

Lower Terminus: CONFLUENCE GUNNISON RIVER AT
UTM North: 4319826.16 UTM East: 200746.26
(Latitude 38° 58' 34.73"N) (Longitude 108° 27' 15.56"W)
SE SE Section 28, Township 12 South, Range 99 West 6th PM
48' West of the East Section Line; 734' North of the South Section Line

Watershed: Lower Gunnison (HUC #: 14020005)
Counties: Mesa
Length: 0.37 miles
USGS Quad(s): Whitewater
Flow Recommendation: 1.6 cfs (3/15 – 5/31)

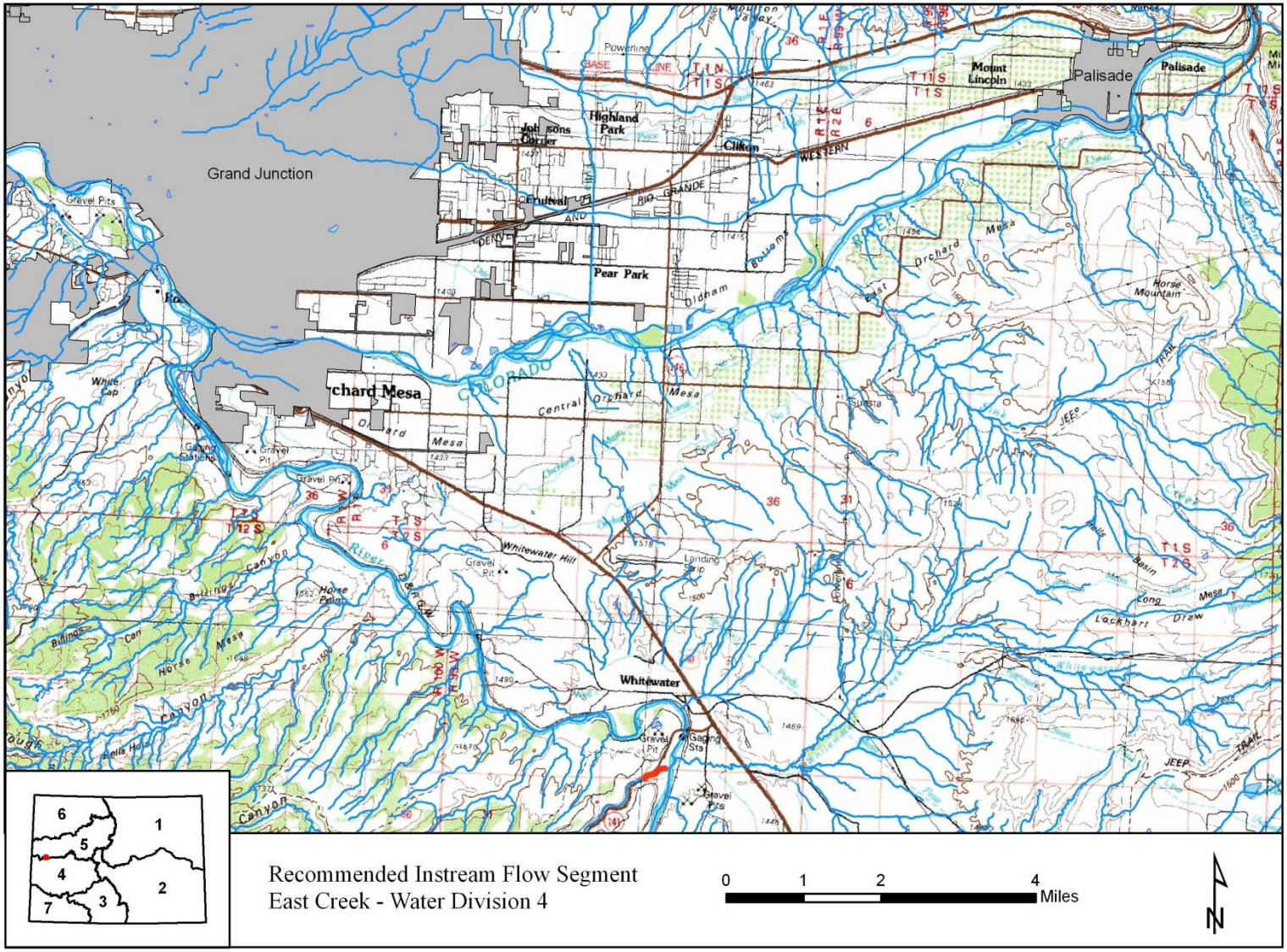
Metadata Descriptions:

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).

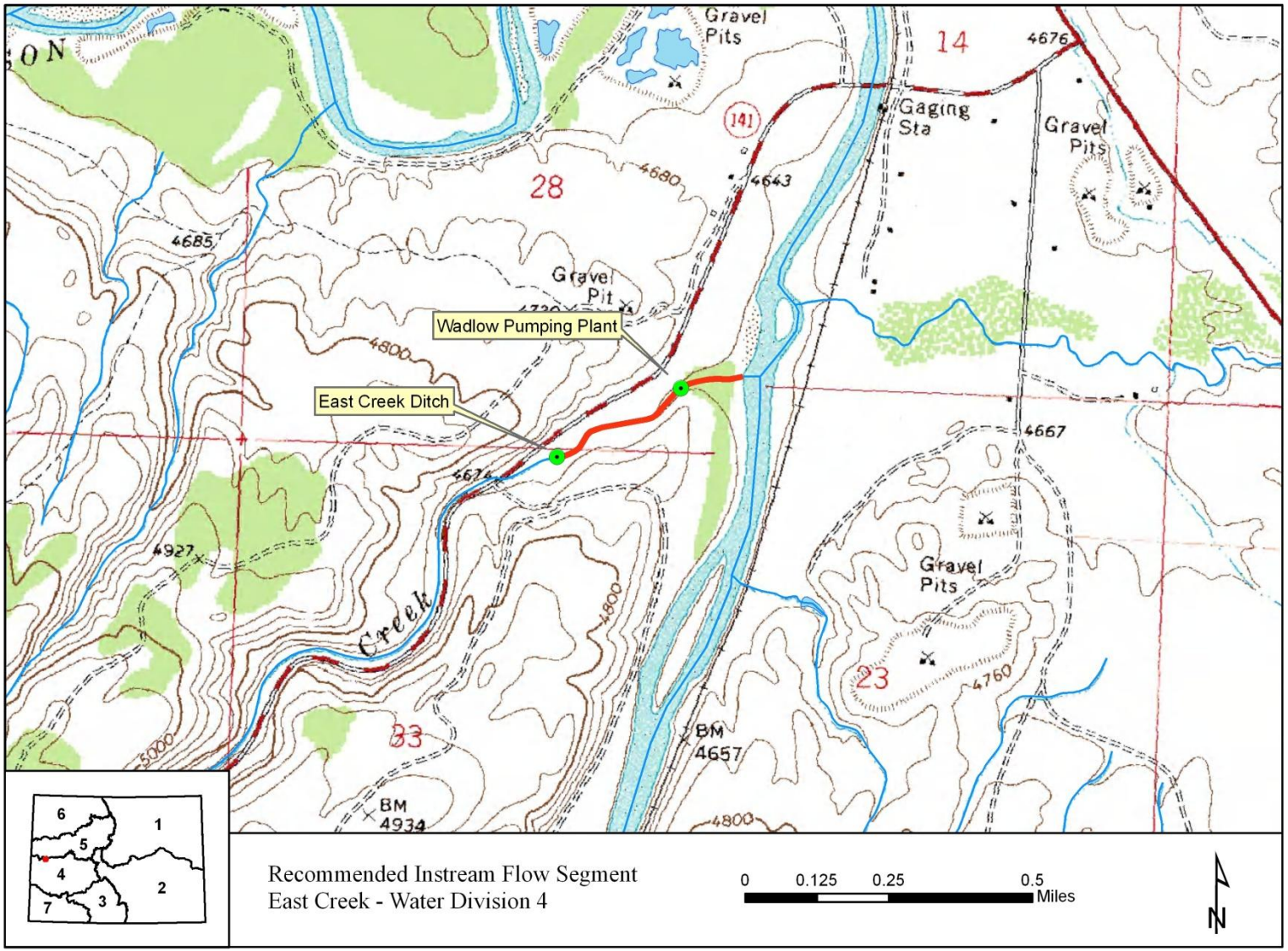
b) The PLSS locations were derived from CWCB GIS using 2005 PLSS data from the U.S. Bureau of Land Management's Geographic Coordinate Database

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

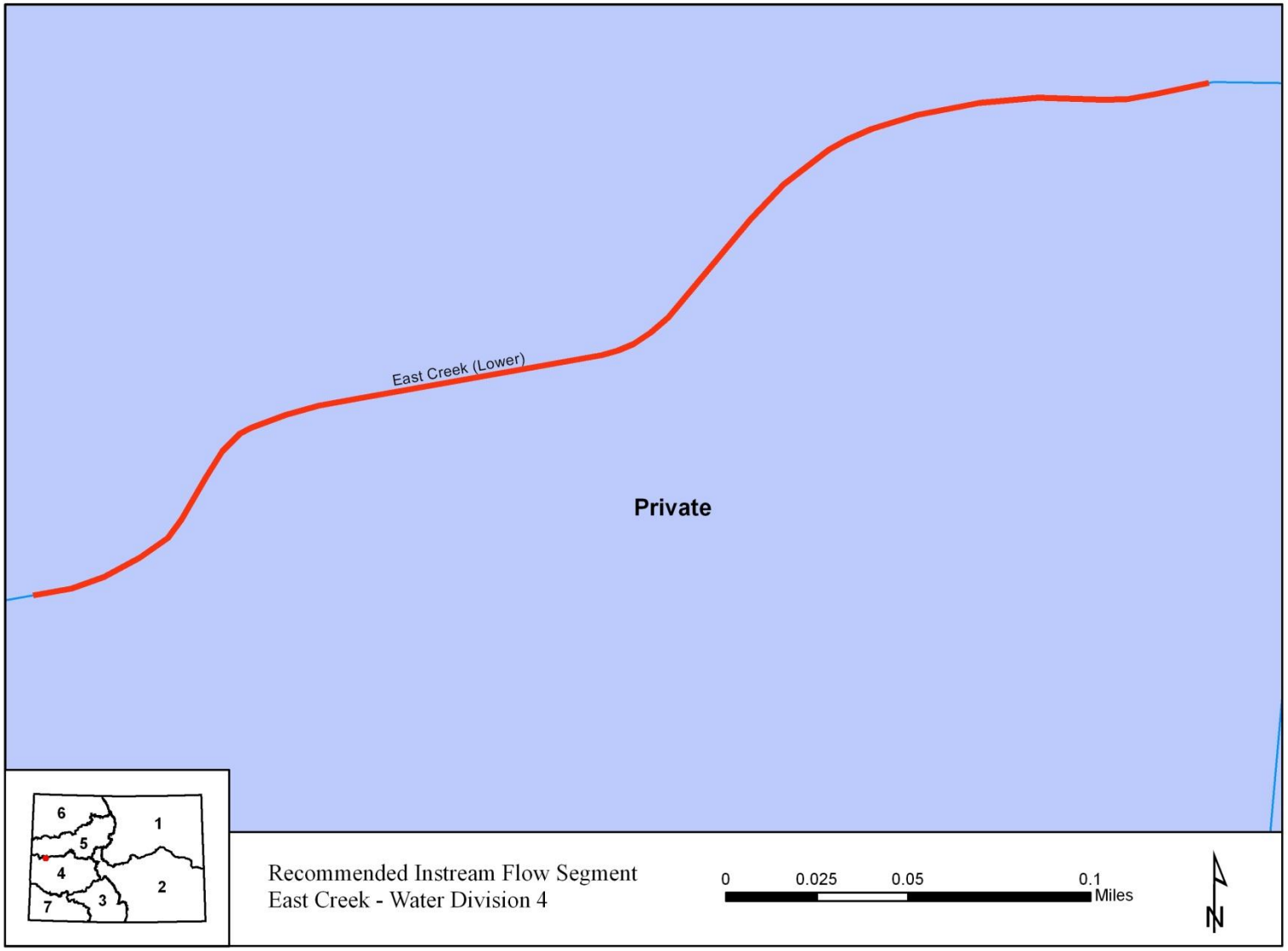
Vicinity Map



Water Rights Map



Land Use Map


East Creek (Lower)
Private
6
1
5
4
2
7
3
Recommended Instream Flow Segment
East Creek - Water Division 4
0
0.025
0.05
0.1
Miles
N