<u>Stream:</u> Granite Creek

Executive Summary

Water Division: 4
Water District: 63
CPW#: 21979
CWCB ID: 13/4/A-001

Segment: CONFLUENCE TWO UNNAMED TRIBUTARIES TO COLORADO-UTAH STATELINE

Upper Terminus: CONFLUENCE TWO UNNAMED TRIBUTARIES AT
UTM North: 4307514.83 UTM East: 156138.33

Lower Terminus: COLORADO-UTAH STATELINE AT
UTM North: 4305756.66 UTM East: 147902.58

Watershed: Lower Dolores (HUC #: 14030004)
Counties: Mesa
Length: 5.79 miles
USGS Quad(s): Steamboat Mesa, Two V Basin
Flow Recommendation: 2.7 cfs (4/1 – 6/30)
0.5 cfs (7/1 – 3/31)

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) forms 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 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 Granite Creek to the CWCB for a water right under the Instream Flow Program. Granite Creek is being considered because it has a natural environment that can be preserved to a reasonable degree with an instream flow water right.

Granite Creek is approximately 9 miles long and originates on Sand Mountain at an elevation of 9,000 feet. It flows in a southwesterly direction as it drops to an elevation of 6,250 feet where it crosses the Colorado Utah border. Ninety-six percent of the land on the 5.79 mile segment addressed by this report is publicly owned (see Table 1). Granite Creek is located within Mesa County and the total drainage area of the creek (in Colorado) is approximately 19.8 square miles.

The subject of this report is a segment of Granite Creek from the confluence of two unnamed tributaries extending downstream to the Colorado-Utah Stateline. The proposed segment is located approximately 9 miles north of the town of Gateway. Staff has received one recommendation for this segment, from the BLM, which is discussed below.

Instream Flow Recommendation

BLM recommended flows of 2.7 cfs (4/1 – 6/30), and 0.5 cfs (7/1 – 3/31), based on its June 15, 2005 and July 7, 2011 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 Granite Creek.

Upper Terminus	Lower Terminus	Total Length (miles)	Land Ownership	
			% Private	% Public
Confluence Two Unnamed Tributaries	Colorado-Utah Stateline	5.79	4%	96%

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

Biological Data

Granite Creek is a cold-water, high gradient stream in a narrow canyon. The stream is confined by bedrock and generally has large substrate. The stream has a good mix of riffle, run, and deep pool habitats to support a salmonid fishery.

Fishery surveys revealed an abundant and self-sustaining brook trout fishery. Even though Granite Creek is a small stream, the fish population survived the 2002-2003 drought, indicating that base flows are sufficient to support the trout fishery through all types of climate conditions. Intensive macro-invertebrate surveys have not been conducted, but spot samples have revealed various species of mayfly, caddisfly, and stonefly.

The riparian community along Granite Creek is very robust, providing dense cover and shading for the stream. The riparian community is comprised mainly of alder and willow species.

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, three 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 required.

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

Party	Date	Q (cfs)	Accuracy Range (cfs)	Winter (2/3) (cfs)	Summer(3/3) (cfs)
BLM	6/15/2005	2.93	1.2 – 7.3	Out of Range	3.51
BLM	6/15/2005	3.18	1.3 – 8.0	Out of Range	2.22
BLM	7/7/2011	1.08	0.4 – 2.7	1.64	2.45
			Averages	1.64	2.73

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.

2.7 cubic feet per second is recommended for the snowmelt runoff period, from April 1 through June 30. This recommendation is driven by the average velocity and wetted perimeter criteria. This creek experiences consistently low flows during late summer and fall, so it is important to protect as much physical habitat as possible during the limited time when snowmelt runoff flows are available.

0.5 cubic feet per second is recommended for the fall and winter period from July 1 to March 31. This recommendation is driven by limited water availability. This flow rate comes very close to meeting the wetted perimeter and average depth criteria. It should provide sufficient flow to prevent pools from freezing and protect overwintering fish.

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 Granite Creek has a 19.8 square mile drainage basin. The average elevation of the basin is 7,820 ft and the average precipitation is 21.43 inches. There is one surface water diversion in the headwaters upstream from the proposed instream flow reach. The Gordon Granite Creek Diversion Ditch (appropriation date 1948, 2 cfs) exports water out of District 63 and into District 73. The only diversion record for this diversion is from 2012 when between 0.25 and 0.5 cfs was diverted in April. This diversion appears to be located very high in the drainage basin, which means it would likely impact a small fraction of the total basin. Therefore, flow conditions in the basin are not entirely natural, but are not likely to be heavily impacted.

There is very little information available in the vicinity of this proposed instream flow. There are no streamflow gages on Granite Creek or any nearby creek that would be representative. In general there is very little streamflow information for the entire Uncompaghre Plateau. There are also no diversions near the lower terminus to indicate possible streamflow conditions. StreamStats is one other possible source of streamflow information. Due to the lack of information, the BLM installed a temporary gage at the downstream terminus and developed a rating curve. The BLM measured streamflow starting in June of 2011 through the present. There are also a number of spot measurements that have been collected by the BLM and CWCB staff.

Data Analysis

The BLM pressure transducer data was collected during 3 fairly extreme years. The nearest climate station with a long period of record is at the Colorado National Monument (USC00051772) located approximately 22 miles away. This station recorded precipitation from 1940 to the present. 2011 had the 16th highest precipitation in the 73 year period of record. 2012 had the 4th lowest precipitation on record. The record is not complete for 2013, but it had just 30% of average as of June (statistics based on calendar year not water year). Therefore, two of the years of streamflow data were recorded during very low precipitation and likely represent extremely low streamflow.

Despite the variability in the years with measurements, some conclusions can be drawn. The BLM pressure transducer data indicate that peak streamflow is substantially higher than the proposed instream flow summer rate. However, timing of snowmelt runoff is quite variable with high flows occurring as early as the end of March and as late as July. Monsoon events provide additional streamflow in late summer, but these are also quite variable in magnitude and timing. The measured pressure transducer data indicates that winter base flows are approximately 0.5 cfs.

The hydrograph (Figure 1) shows all three years of BLM pressure transducer data, spot measurements, and the StreamStats results. The temporary gage data collected by the BLM indicates that water is available for the majority of the year. Nine of twelve spot measurements (75%) are above 2.7 cfs during the summer flow rate. Five of thirteen spot measurements are above 0.5 cfs during the winter flow rate. It should be noted that the majority of the spot measurements were taken during the drought years of 2012 and 2013. The proposed instream flow rate is below the StreamStats mean-monthly streamflow for all months. The available data suggests that water is available for appropriation on Granite 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.

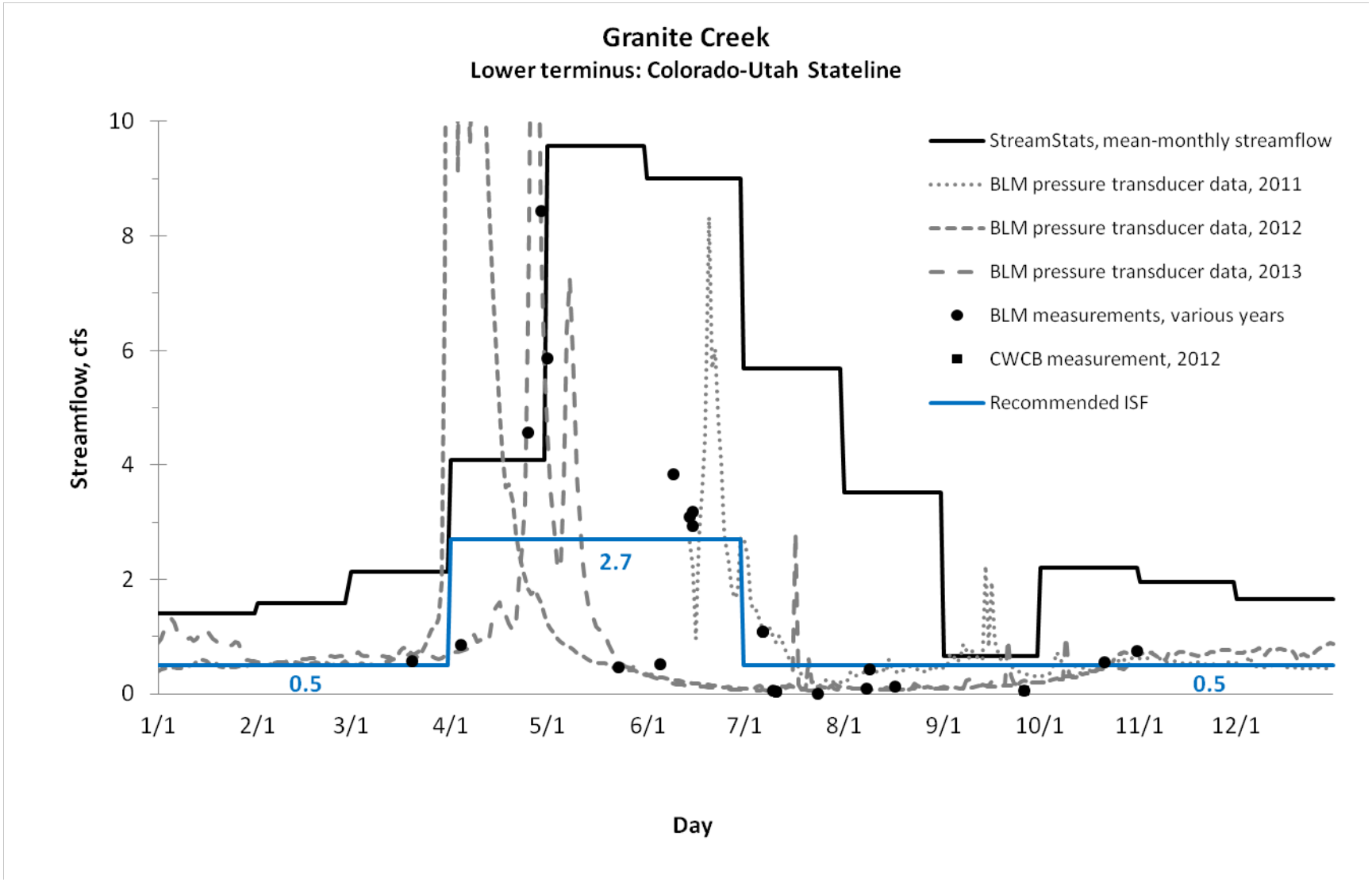


Figure 1. Hydrograph showing streamflow data and the proposed ISF rate on Granite Creek.

Existing Water Rights

Staff has analyzed the water rights tabulation and determined that there are no decreed absolute surface diversions within this reach of stream. Staff has concluded that a new junior appropriation of water rights on Granite 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 TWO UNNAMED TRIBUTARIES TO COLORADO-UTAH STATELINE

Upper Terminus: CONFLUENCE TWO UNNAMED TRIBUTARIES AT
UTM North: 4307514.83 UTM East: 156138.33
(Latitude 38° 50' 57.39"N) (Longitude 108° 57' 43.18"W)
NW SE Section 12, Township 14 South, Range 104 West 6th PM
1,480' West of the East Section Line; 1,384' North of the South Section Line

Lower Terminus: COLORADO-UTAH STATELINE AT
UTM North: 4305756.66 UTM East: 147902.58
(Latitude 38° 49' 48.77"N) (Longitude 109° 03' 20.77"W)
NE NE Section 19, Township 14 South, Range 104 West 6th PM
780' West of the East Section Line; 375' South of the North Section Line

Watershed: Lower Dolores (HUC #: 14030004)
Counties: Mesa
Length: 5.79 miles
USGS Quad(s): Steamboat Mesa, Two V Basin
Flow Recommendation: 2.7 cfs (4/1 – 6/30)
0.5 cfs (7/1 – 3/3)

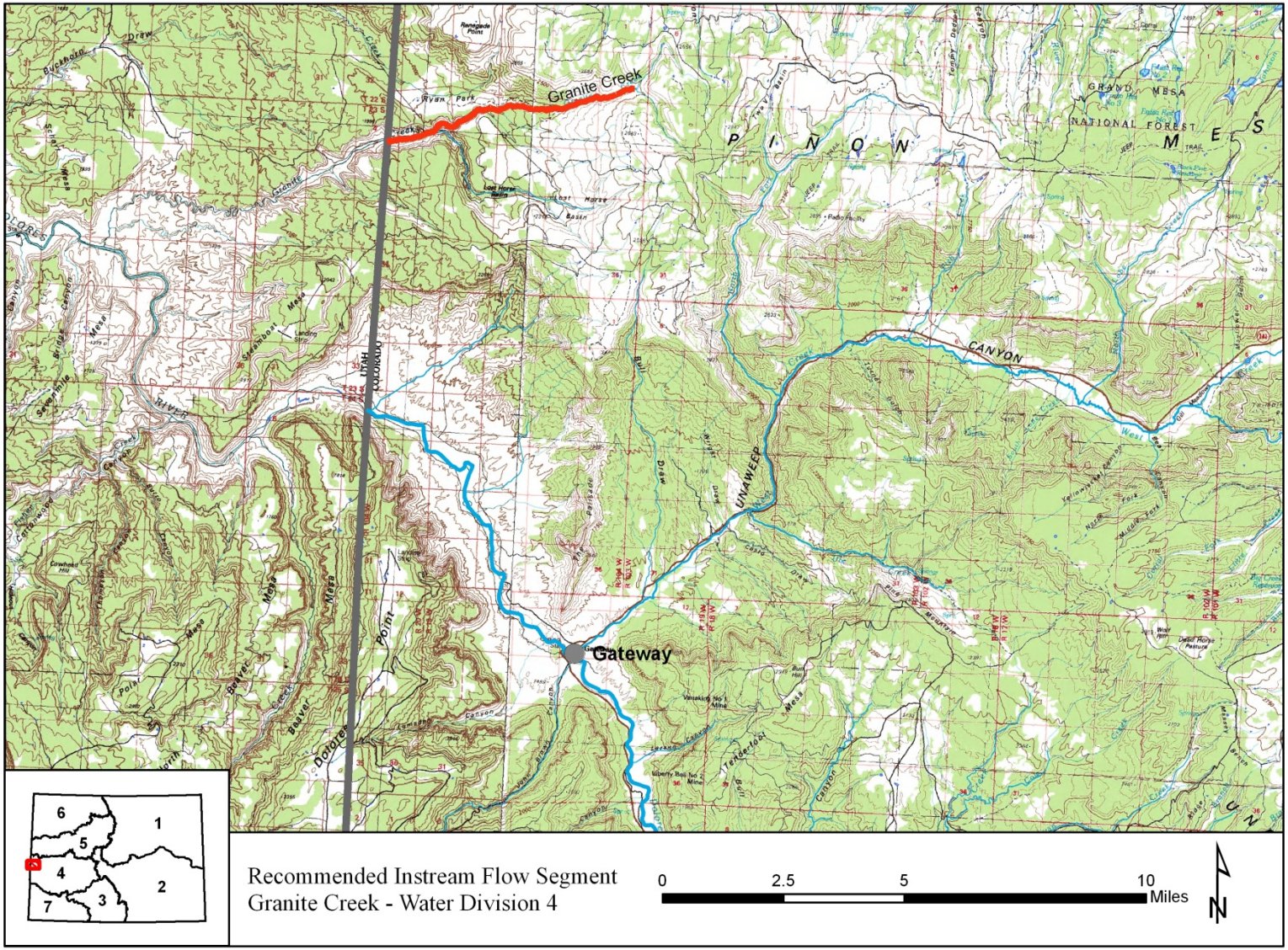
Metadata Descriptions:

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).

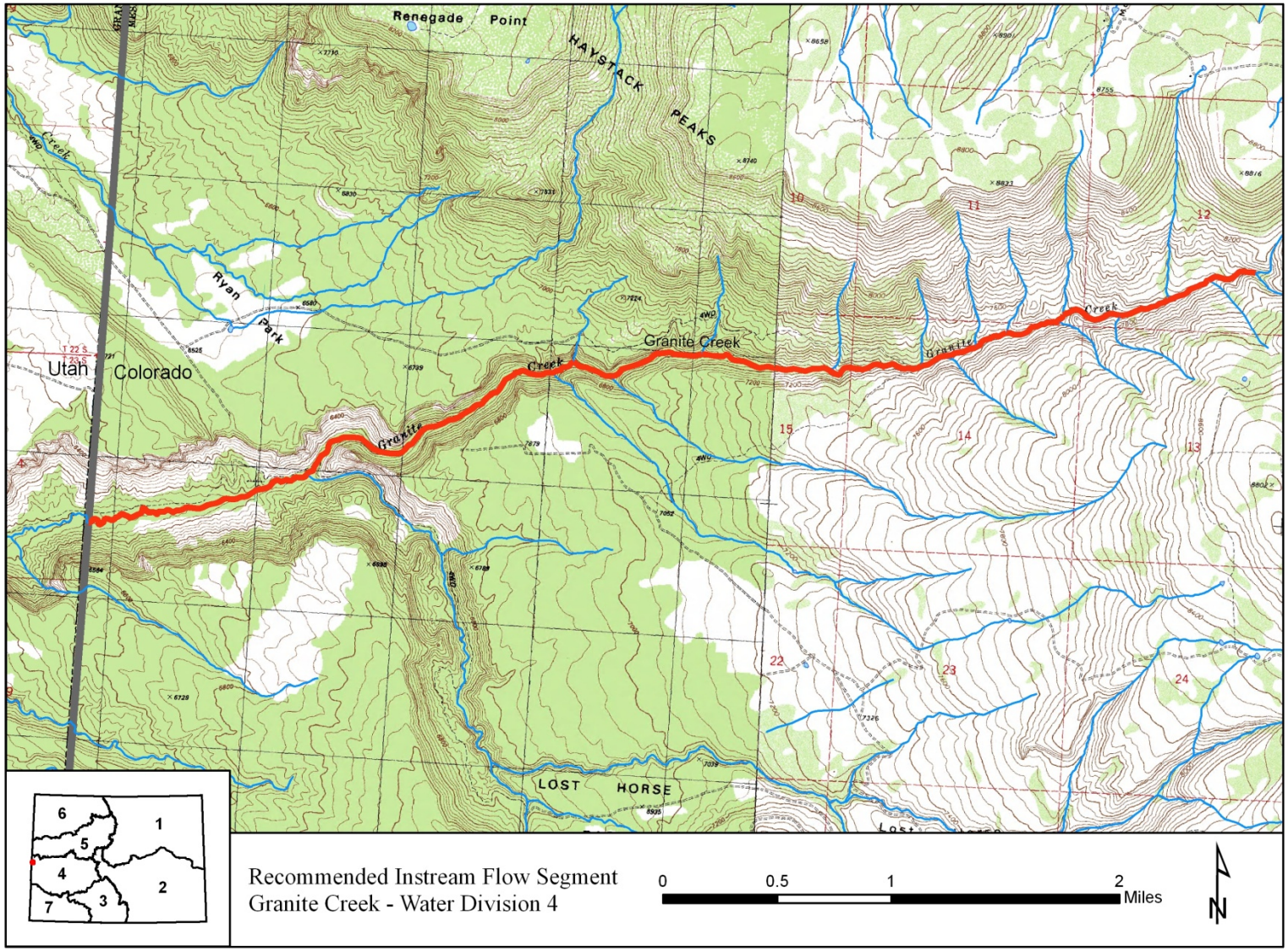
b) The PLSS locations were derived from CWCB GIS using 2005 PLSS data from the U.S. Bureau of Land Management's Geographic Coordinate Database

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

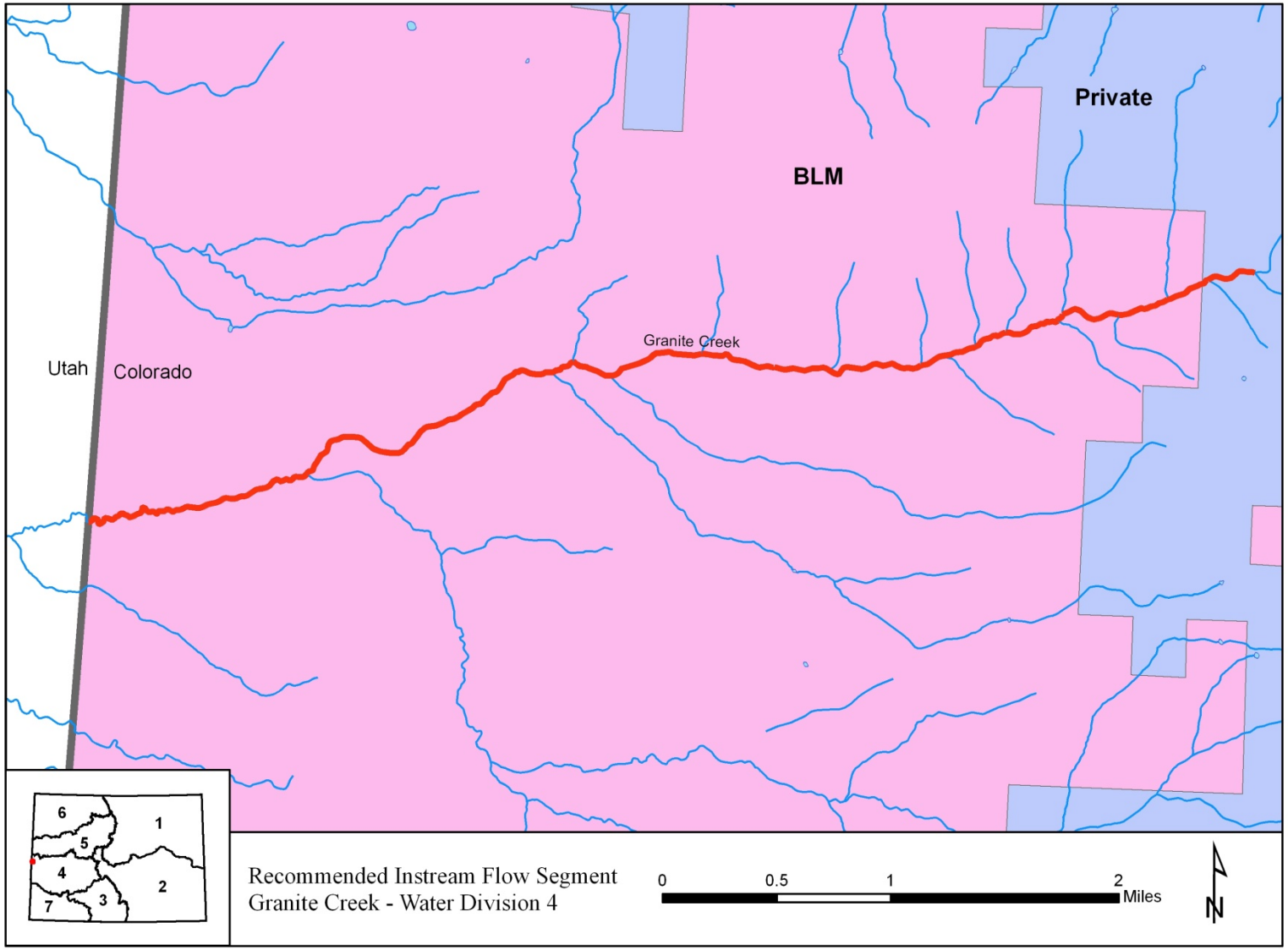
Vicinity Map



Water Rights Map



Land Use Map


Private
BLM
Granite Creek
Utah
Colorado
6
1
5
4
2
7
3
Recommended Instream Flow Segment
Granite Creek - Water Division 4
0
0.5
1
2
Miles
N