<u>Stream:</u> Government Creek

Executive Summary

Water Division: 6
Water District: 47
CDOW#: 11041
CWCB ID: 13/6/A-001

Segment: HEADWATERS TO THE HEADGATE OF THE GOVERNMENT DITCH NO. 2
Upper Terminus: HEADWATERS IN THE VICINITY OF
UTM North: 4527002.57 UTM East: 402519.24

Lower Terminus: HEADGATE OF THE GOVERNMENT DITCH NO. 2
UTM North: 4526731.68 UTM East: 395567.14

Watershed: North Platte Headwaters (HUC#: 10180001)
Counties: Jackson
Length: 5.03 miles
USGS Quad(s): Kings Canyon
Flow Recommendation: 3.6 cfs (May 1 – July 31)
1.0 cfs (August 1 – September 30)
0.5 cfs (October 1 – April 30)

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/2013ProposedInstreamFlowAppropriations.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 in 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 Government Creek to the CWCB for a water right under the Instream Flow Program. Government Creek is being considered because it has a natural environment that can be preserved to a reasonable degree with an instream flow water right.

Government Creek is approximately 9 miles long and originates in the Medicine Bow Range at an elevation of 9,600 feet. It flows in a westerly direction as it drops to an elevation of 7,980 feet where it joins the Canadian River. Eighty-four percent of the land on the 5.0 mile segment addressed by this report is publicly owned. Government Creek is located within Jackson County and the total drainage area of the creek is approximately 14.9 square miles.

The subject of this report is a segment of Government Creek beginning at the headwaters and extending downstream to the headgate of the Government Ditch No. 2. The proposed segment is located approximately 11 miles northeast of Walden. Staff has received one recommendation for this segment, from the BLM. The recommendation for this segment is discussed below.

Instream Flow Recommendation

The BLM recommended a flow of 3.6 cfs (May 1 – July 31), 1.0 cfs (August 1 – September 30) and 0.5 cfs (October 1 – April 30) based on its July 12, 2011 data collection efforts and staff's water availability analyses.

Land Status Review

Upper Terminus	Lower Terminus	Total Length (miles)	Land Ownership	
			% Private	% Public
Headwaters	Headgate Government Ditch No. 2	5.0	16%	84%

76 % of the public land is managed by the State Land Board, 20% by the BLM, and 4 % by the USFS.

Biological Data

Government Creek is a cold-water, moderate gradient stream in a narrow canyon. In the upper portion of the recommended reach, the stream is confined by bedrock and generally has large substrate. In the lower part of the recommended reach, the stream is less confined by bedrock, flows through areas with sand and gravel soils, and has smaller 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 Government 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 health of the riparian community along Government Creek is on upward trend, providing increasing amounts of cover and shading for the stream. The riparian community is comprised mainly of alder, willow, sedges, and rushes, but the creek does have some problems with weedy species in the riparian zone.

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, aquatic habitat in pools and runs will also be maintained 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 1 below. Table 1 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 1: R2Cross Results

Party	Date	Q (cfs)	Accuracy Range (cfs)	Winter (2/3) (cfs)	Summer(3/3) (cfs)
BLM	7/12/2011	2.66	1.06 – 6.65	1.13	3.18
BLM	7/12/2011	2.90	1.16 – 7.25	1.23	3.99
			Average	**1.18**	**3.59**

3.6 cubic feet per second is recommended for the snowmelt runoff period, from May 1 through July 31. This recommendation is driven by the average velocity 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.

1.0 cubic feet per second is recommended for the late-summer period, from August 1 to September 30. This recommendation is driven by a combination of more limited water availability and the average depth criteria. This flow rate is capable of preventing excessively high water temperatures during late summer.

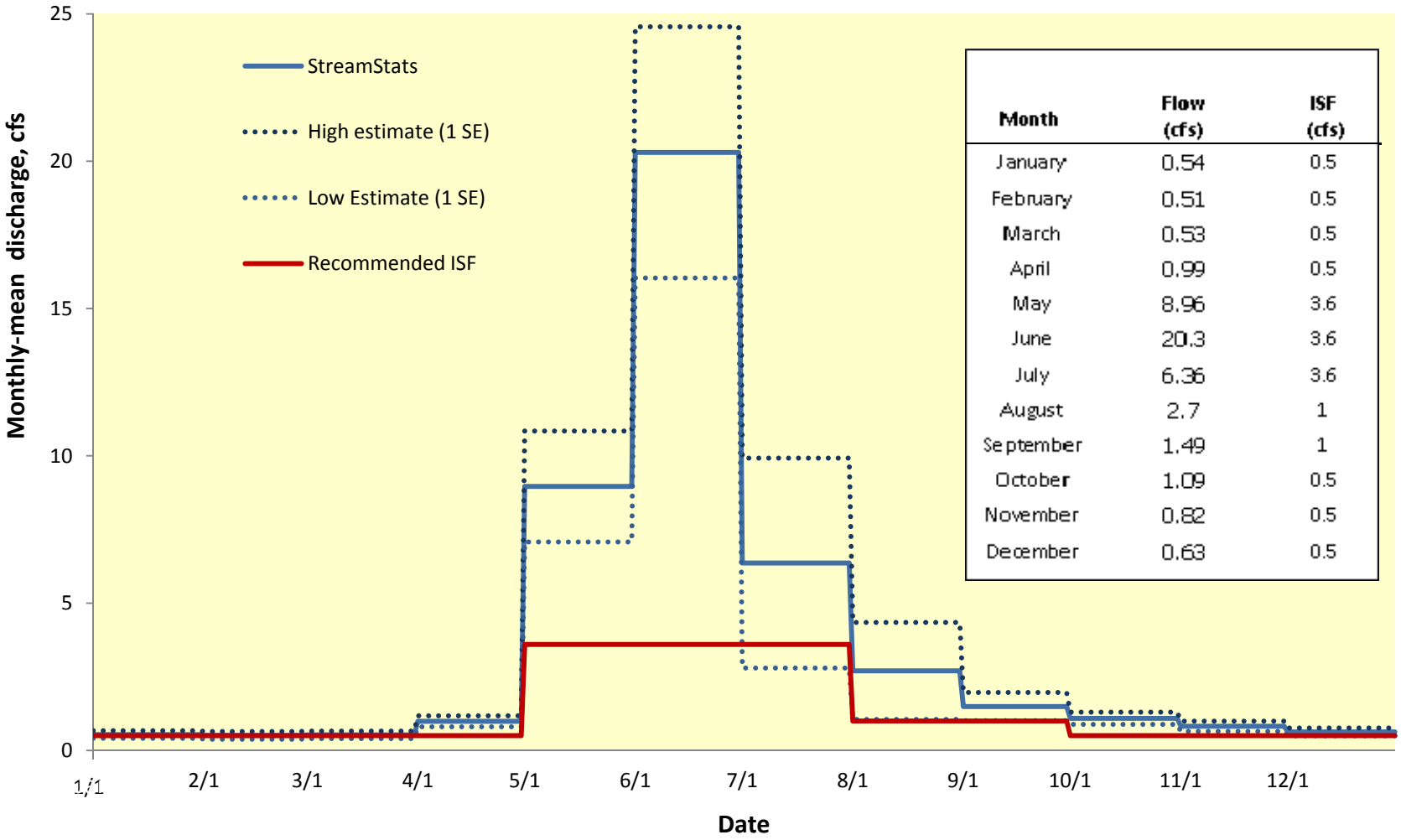
0.5 cubic feet per second is recommended for the fall/winter period from October 1 to April 30. This recommendation is driven by limited water availability. This flow rate meets the wetted perimeter criteria and provides an average depth of approximately 0.14 feet. It should provide sufficient flow to prevent pools from freezing and protect overwintering fish.

Hydrologic Data and Analysis

Staff evaluated the hydrology of Government Creek to determine if water is physically available for an instream flow appropriation. Government creek does not have a gage at or near the lower terminus or anywhere within the drainage basin. Two gages were identified within about 26 miles of Government Creek with similar average elevation, precipitation, and orientation to the Government Creek drainage basin. Of these, the Canadian River gage (USGS Gage 06619400) had a very short record, 1978 to 1983, that was not deemed sufficient for further analysis. The North Fork of the Michigan River (USGS Gage 0661600) had a longer historical record, 1950 to 1982, but the gage is located downstream from North Michigan Creek Reservoir which alters the stream hydrology making it inappropriate for comparison to Government Creek. Given the lack of suitable

gage data, regional flow equations developed to estimate natural stream flow were the most efficient option. These equations, developed by the USGS (Regional Regression Equations for Estimation of Natural Streamflow statistics in Colorado, 2009), estimate monthly-mean flow based on drainage basin area, average drainage basin elevation, and average drainage basin precipitation. Figure 1 shows that water is available based on the recommending agencies revised flow recommendations.

Government Creek
Lower Terminus: Government Ditch No. 2



Month	Flow (cfs)	ISF (cfs)
January	0.54	0.5
February	0.51	0.5
March	0.53	0.5
April	0.99	0.5
May	8.96	3.6
June	20.3	3.6
July	6.36	3.6
August	2.7	1
September	1.49	1
October	1.09	0.5
November	0.82	0.5
December	0.63	0.5

Figure 1. Water availability analysis

Existing Water Right Information

Staff has analyzed the water rights tabulation and contacted the Division Engineer Office (DEO) to identify any potential water availability problems. There are two decreed surface diversions at the proposed lower terminus of this recommended reach: Livingstone Ditch (1 cfs, 1892 appropriation) and Government Ditch No. 2 (8 cfs, 1892 appropriation). Staff has determined that water is available for appropriation on Government Creek from the headwaters to the Government Ditch No. 2 headgate, 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 the Board form its intent to appropriate on the following stream reach:

Segment: HEADWATERS TO THE HEADGATE OF THE GOVERNMENT DITCH NO. 2
Upper Terminus: HEADWATERS IN THE VICINITY OF
UTM North: 4527002.57 UTM East: 402519.24
(Latitude 40° 53' 17.9"N) (Longitude 106° 09' 25.64"W)
SW SW Section 28, Township 11 North, Range 78 West 6th PM
932' East of the West Section Line; 394' North of the South Section Line

Lower Terminus: HEADGATE OF THE GOVERNMENT DITCH NO. 2
UTM North: 4526731.68 UTM East: 395567.14
(Latitude 40° 53' 6.04"N) (Longitude 106° 14' 22.49"W)
SE NE Section 34, Township 11 North, Range 79 West 6th PM
782' West of the East Section Line; 1,576' South of the North Section Line

Watershed: North Platte Headwaters (HUC#: 10180001)
Counties: Jackson
Length: 5.03 miles
USGS Quad(s): Kings Canyon
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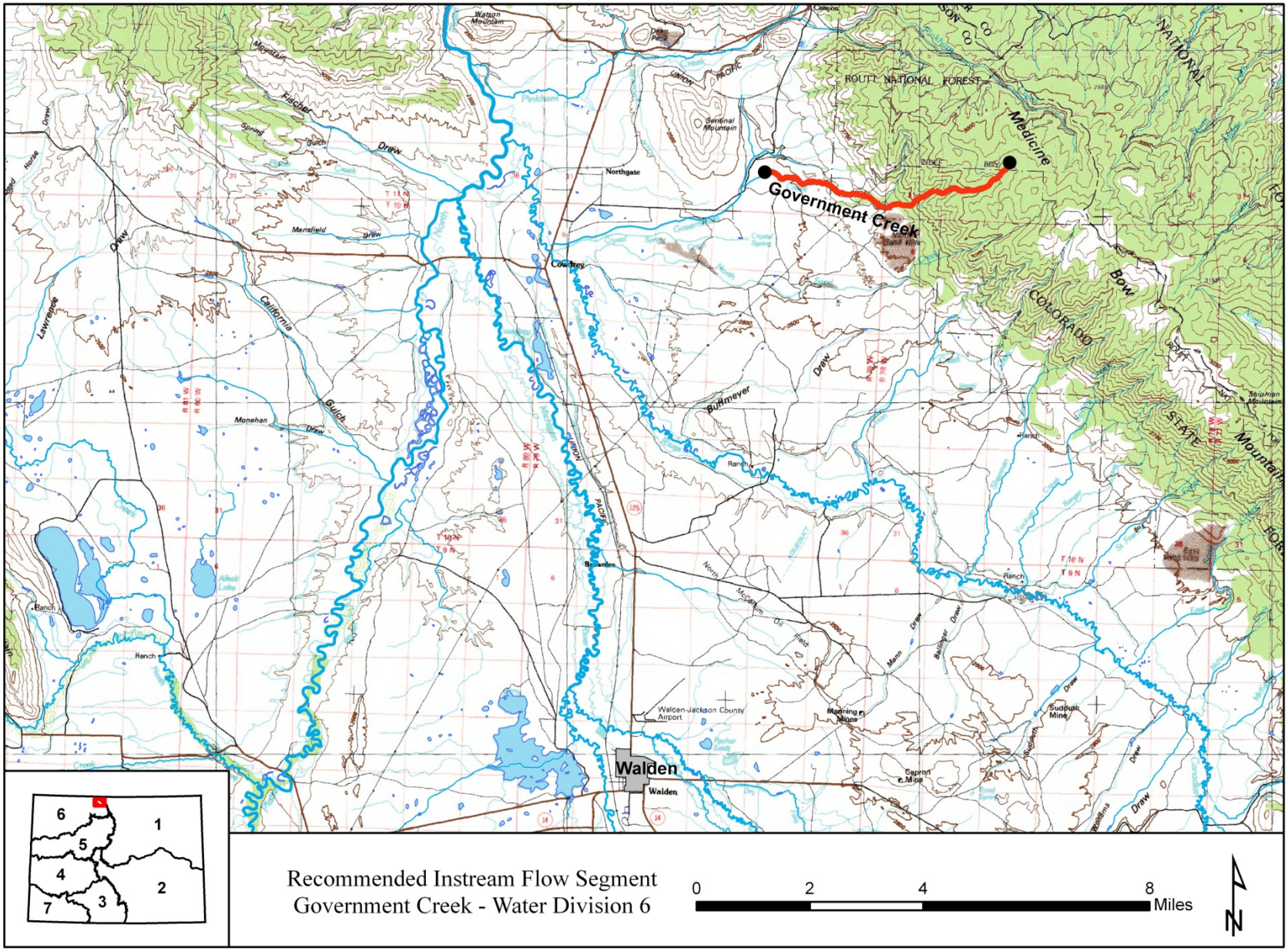
Metadata Descriptions:

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).

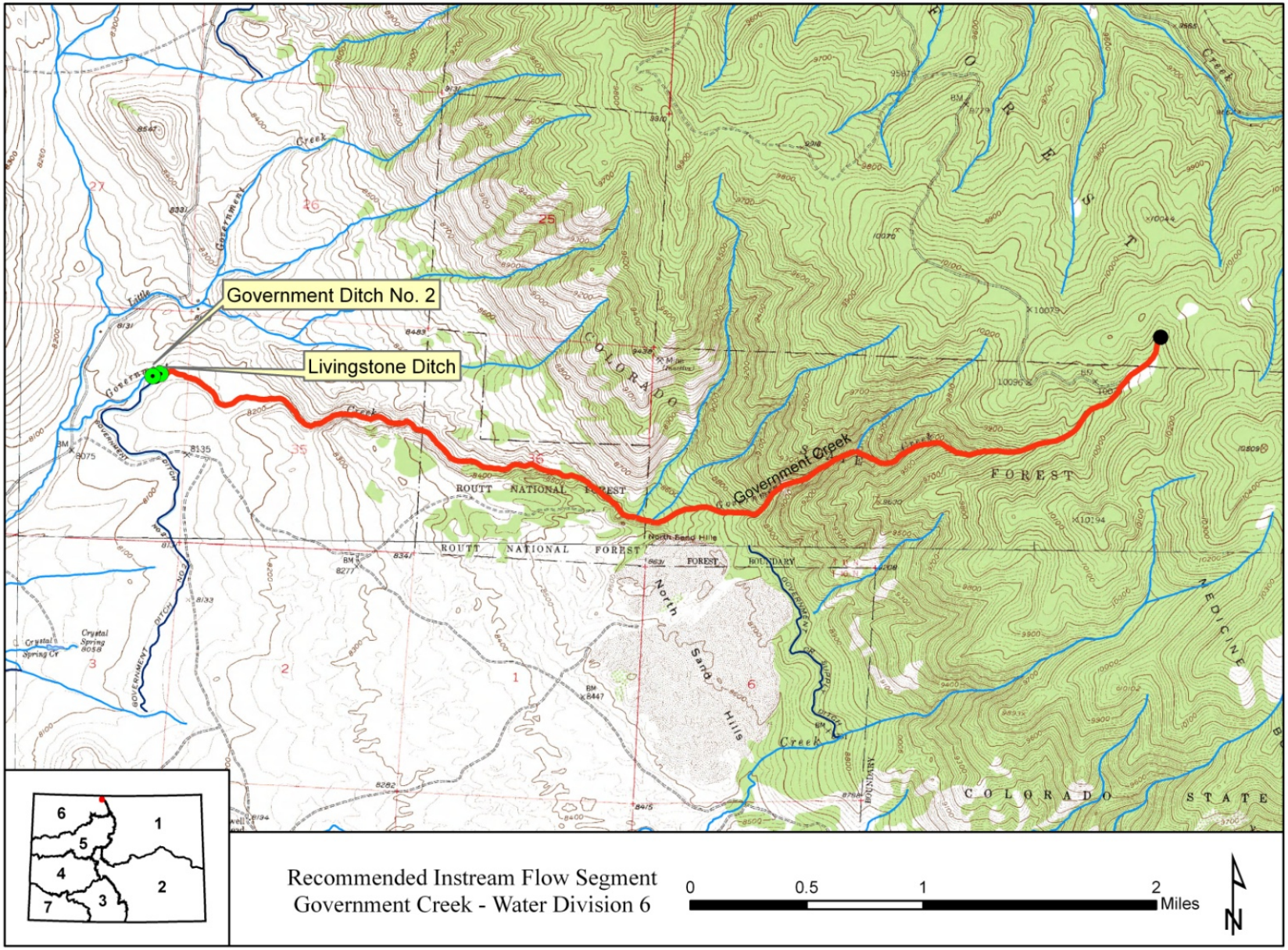
b) The PLSS locations were derived from CWCB GIS using 2005 PLSS data from the U.S. Bureau of Land Management's Geographic Coordinate Database

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

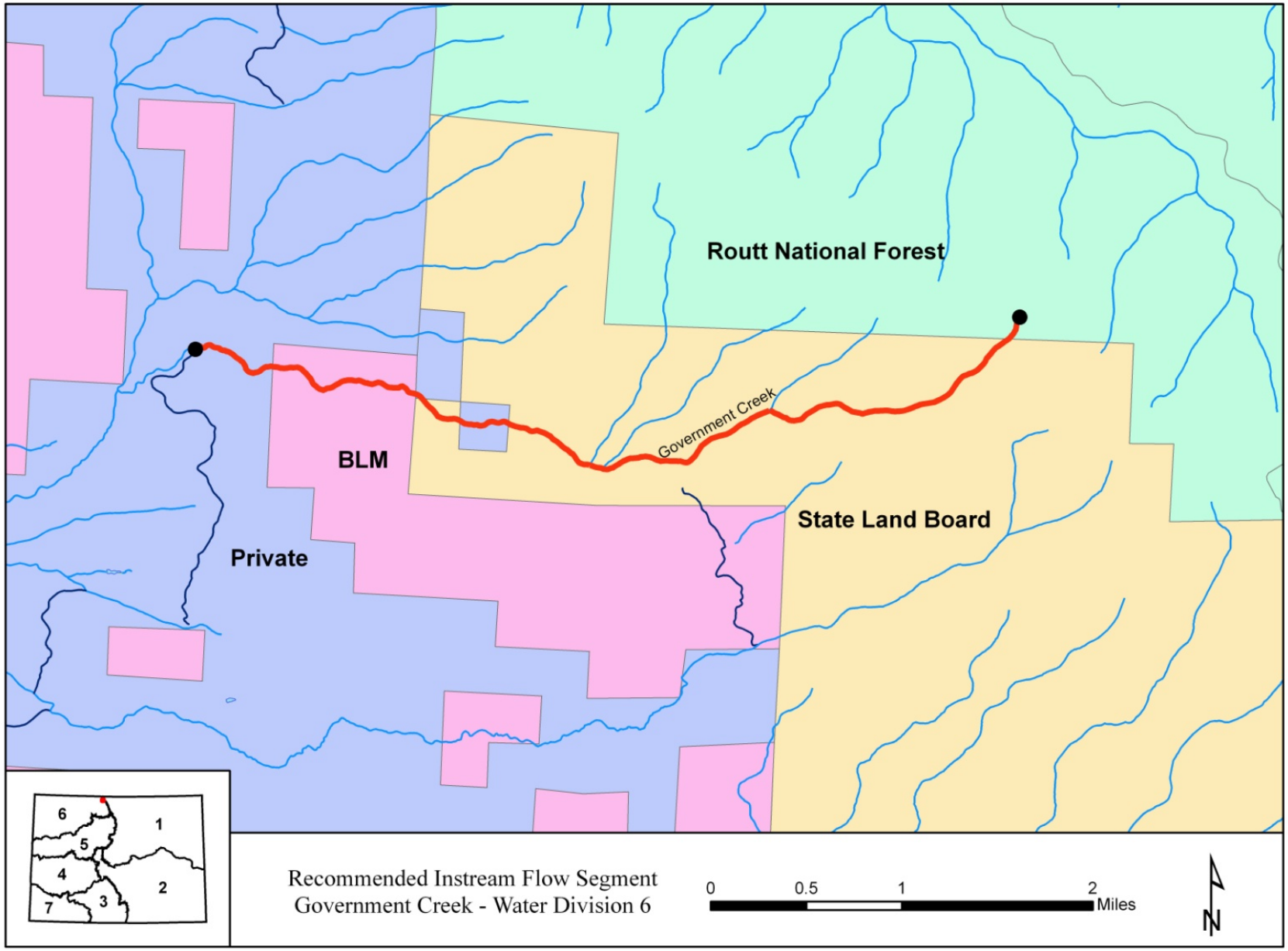
Vicinity Map



Water Rights Map



Land Use Map


Routt National Forest
Government Creek
BLM
State Land Board
Private
6
1
5
4
2
7
3
Recommended Instream Flow Segment
Government Creek - Water Division 6
0
0.5
1
2
Miles
N