<u>Stream:</u> Hot Springs Creek

Executive Summary

Water Division: 4
Water District: 28
CPW#: 40737
CWCB ID: 14/4/A-005

Segment: OUTLET HOT SPRINGS RESERVOIR TO L.L. BUSH DITCH NO. 4 HEADGATE

Upper Terminus: OUTLET HOT SPRINGS RESERVOIR AT
UTM North: 4263872.08 UTM East: 365614.28

Lower Terminus: L.L. BUSH DITCH NO. 4 HEADGATE AT
UTM North: 4261332.33 UTM East: 361699.68

Watershed: Tomichi (HUC #: 14020003)
Counties: Gunnison
Length: 3.46 miles
USGS Quad(s): Doyleville, Pitkin
Existing ISF: 4-84CW374; 1.5 cfs (1/1-12/31)
Flow Recommendation (Increase): 2.4 cfs (5/1 – 7/21)

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

Hot Springs Creek is approximately 12.9 miles long and originates just east of Waunita Pass at an elevation of 10,440 feet. It flows in a southwesterly direction as it drops to an elevation of 8,020 feet where it joins Tomichi Creek. Fifty-two percent of the land on the 3.46 mile segment addressed by this report is publicly owned (see Table 1). Hot Springs Creek is located within Gunnison County and the total drainage area of the creek is approximately 45.1 square miles and is oriented north to south.

The subject of this report is a segment of Hot Springs Creek from the confluence with Spring Creek extending downstream to the L.L. Bush Ditch No. 4 headgate. The proposed segment is located approximately 22 miles east of the town of Gunnison. Staff has received one recommendation for this segment from the BLM, which is discussed below.

Instream Flow Recommendation

BLM recommended a flow increase of 2.4 cfs (5/1 – 7/21), based on its September 28, 2011 data collection efforts and staff's water availability analyses.

Justification for Instream Flow Increase

The CWCB holds an existing instream flow water right for 1.5 cfs year round, decreed in case number 84CW374. BLM's analysis of this data, coordinated with Colorado Parks and Wildlife, indicates that the increases are needed to protect the fishery and natural environment to a reasonable degree. 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 and early summer flows are available.

Land Status Review

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

Upper Terminus	Lower Terminus	Total Length (miles)	Land Ownership	
			% Private	% Public
Outlet Hot Springs Reservoir	L.L. Bush Ditch No. 4 headgate	3.46	48%	52%

Breakdown of public lands by managing entity: 43 % US Forest Service, 51 % BLM and 6% State Land Board.

Biological Data

Hot Springs Creek is a cold-water, moderate gradient stream. The reach that is the subject of this recommendation is generally within a moderate to narrow canyon, 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 during 2012 revealed self-sustaining populations of brown trout and longnose dace. Intensive macro-invertebrate surveys have not been conducted, but spot samples have revealed various species of mayfly, caddisfly, and stonefly.

The riparian community along Hot Springs Creek is recovering from historic grazing practices, providing improving cover and shading for the stream. Most of the creek now exhibits stable banks with established vegetation. The riparian community is comprised mainly of cottonwood, 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, 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 Hot Springs Creek.

Party	Date	Q (cfs)	Accuracy Range (cfs)	Winter (2/3) (cfs)	Summer (3/3) (cfs)
BLM	9/28/2011	4.20	1.7 – 10.5	Out of Range	2.30
BLM	9/28/2011	3.96	1.6 – 9.9	1.93	5.50
			Averages	1.93	3.90

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.

3.9 cubic feet per second is recommended for the snowmelt runoff and high temperature period from May 1 through July 21. Protecting this flow rate would require an increase of 2.4 cfs between May 1 through July 21. This recommendation is driven by the average velocity and average depth criteria.

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 Hot Springs Creek has a 39.5 square mile drainage basin. The average elevation of the basin is 9,600 ft and the average precipitation is 18.68 inches. There are 15 surface water diversions within the drainage basin with a total of 37.95 in decreed diversion rates. There are also 51 small spring water rights within the drainage basin. The upper terminus is the outlet of Hot Springs Creek Reservoir which stores spring runoff for release in the summer. This reservoir is the primary control on hydrology in the proposed ISF reach. Therefore, between diversions and the reservoir, this reach does not represent natural flow conditions.

There is not a gage at or near the lower terminus on Hot Springs Creek Creek, nor anywhere within the drainage basin. If a representative gage existed on a nearby drainage, scaling the hydrology would not account for the operation of Hot Springs Creek Reservoir. StreamStats would also not account for operation of Hot Springs Creek Reservoir.

In some cases, diversion records can be used to provide an indication of water availability in a stream reach. There are several diversions at or near the lower terminus. These include LL Bush Ditch No. 4 (WDID 2800616, 1.87 cfs), LL Bush Ditch No. 1 (WDID 2800613, 1.74 cfs and LL Bush Ditch 2 (WDID 2800613, 1.65 cfs). However, based on discussions with the Water Commissioner, Bonnie Irby, using the diversion records would potentially over-estimate the amount of water available in the proposed ISF reach. There are records for the Hot Springs Creek Reservoir (WDID 2803590); however, there are only records in 1988 and 2012, and the Water Commissioner recommended using the 2012 record.

Data Analysis

Due to limited available data, staff relied on information obtained from the Water Commissioner, Bonnie Irby, and the reservoir operator, Ryan Pringle. The following is our understanding of reservoir operations based on discussions with Ryan Pringle. Mr. Pringle releases 1.5 to 2 cfs during the winter. He continues to release that amount while storing spring runoff which starts in late April to mid May and lasts 2 to 3 weeks. At that point, the reservoir is full and all additional streamflow that enters the reservoir is bypassed. Irrigation typically starts May 1st, and irrigators are able to meet their needs with what is released through the reservoir as well as inflow from downstream tributaries. Starting on June

1st he releases about 5 cfs per day to meet irrigation needs downstream. These releases typically end the third week in July.

The hydrograph (Figure 1) shows the release record for Hot Springs Creek Reservoir in 2012. Mr. Pringle said that he experimented with turning the reservoir releases off for 3 days out of 7 in 2012, but that it did not work well and he does not plan to do that in the future. There is one diversion located between the reservoir and the lower terminus of the proposed ISF reach. LL Bush Ditch No 6 (WDID 2801185, 0.7 cfs). Based on Mr. Pringle's stated release rate, there should be sufficient flow to satisfy this senior diversion and the proposed ISF. Based on the available information, staff concludes that water is available for appropriation of the proposed summer increase on Hot Springs 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.

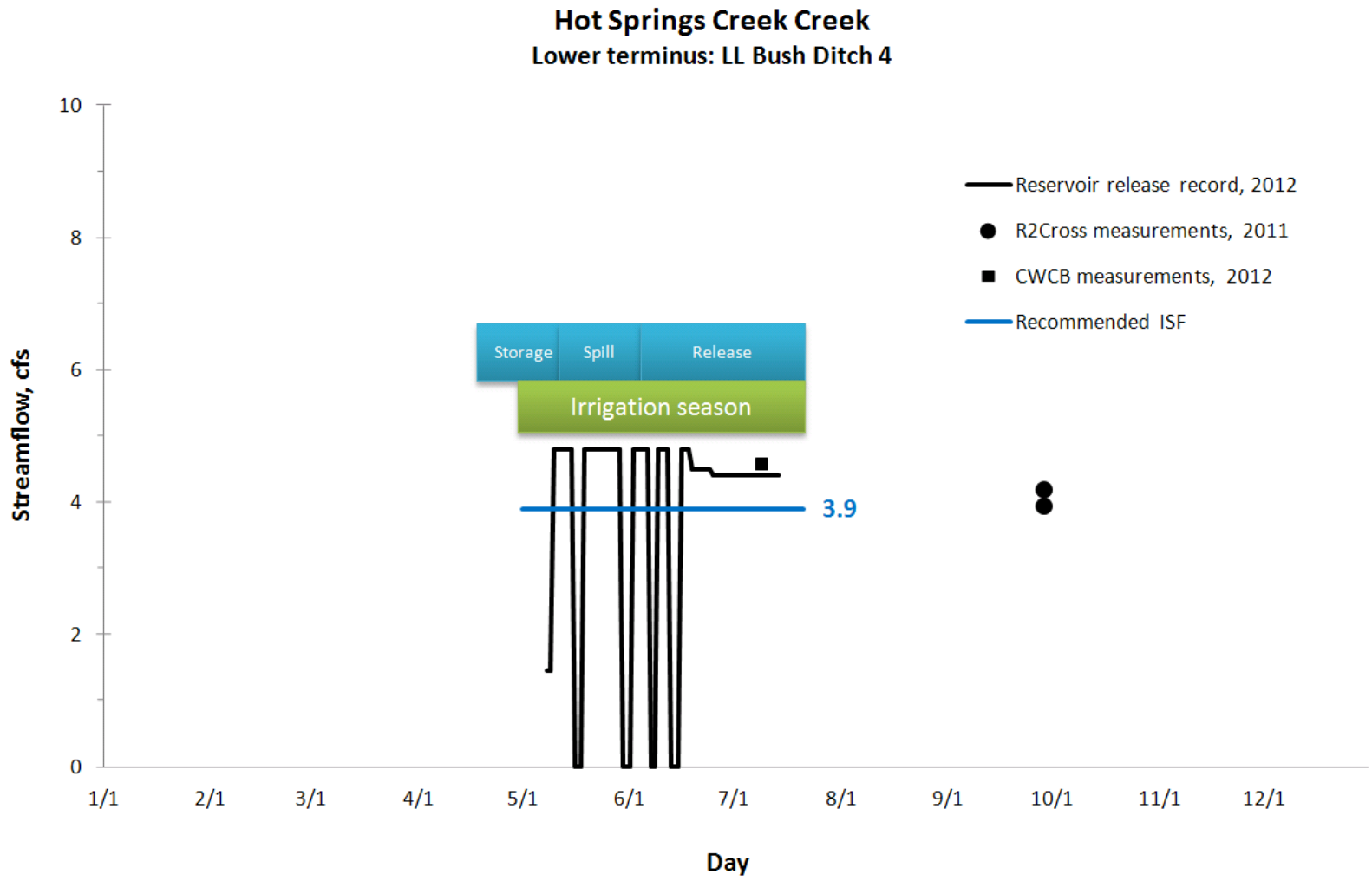


Figure 1. Hydrograph showing streamflow data and the proposed ISF rate on Hot Springs Creek.

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 is one decreed absolute surface diversion within this reach of stream: L.L. Bush Ditch No. 6 decreed in case no. 90CW072 for 0.7 cfs with a 3/31/1960 appropriation date. Staff has determined that water is available for appropriation on Hot Springs Creek from the outlet of Hot Springs Reservoir extending downstream to the L.L. Bush Ditch No. 4 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 that the Board form its intent to appropriate on the following stream reach:

Segment: OUTLET HOT SPRINGS RESERVOIR TO L.L. BUSH DITCH NO. 4 HEADGATE

Upper Terminus: OUTLET HOT SPRINGS RESERVOIR AT
UTM North: 4263872.08 UTM East: 365614.28
(Latitude 38° 30' 47.14"N) (Longitude 106° 32' 29.02"W)
NW NW Section 16, Township 49 North, Range 4 East NM PM
1,138' East of the West Section Line; 169' South of the North Section Line

Lower Terminus: L.L. BUSH DITCH NO. 4 HEADGATE AT
UTM North: 4261332.33 UTM East: 361699.68
(Latitude 38° 29' 22.61"N) (Longitude 106° 35' 8.8"W)
SE SE Section 24, Township 49 North, Range 3 East NM PM
943' West of the East Section Line; 830' North of the South Section Line

Watershed: Tomichi (HUC #: 14020003)
Counties: Gunnison
Length: 5.78 miles
USGS Quad(s): Doyleville, Pitkin
Existing ISF: 4-84CW374; 1.5 cfs (1/1-12/31)
Flow Recommendation (Increase): 2.4 cfs (5/1 – 7/21)

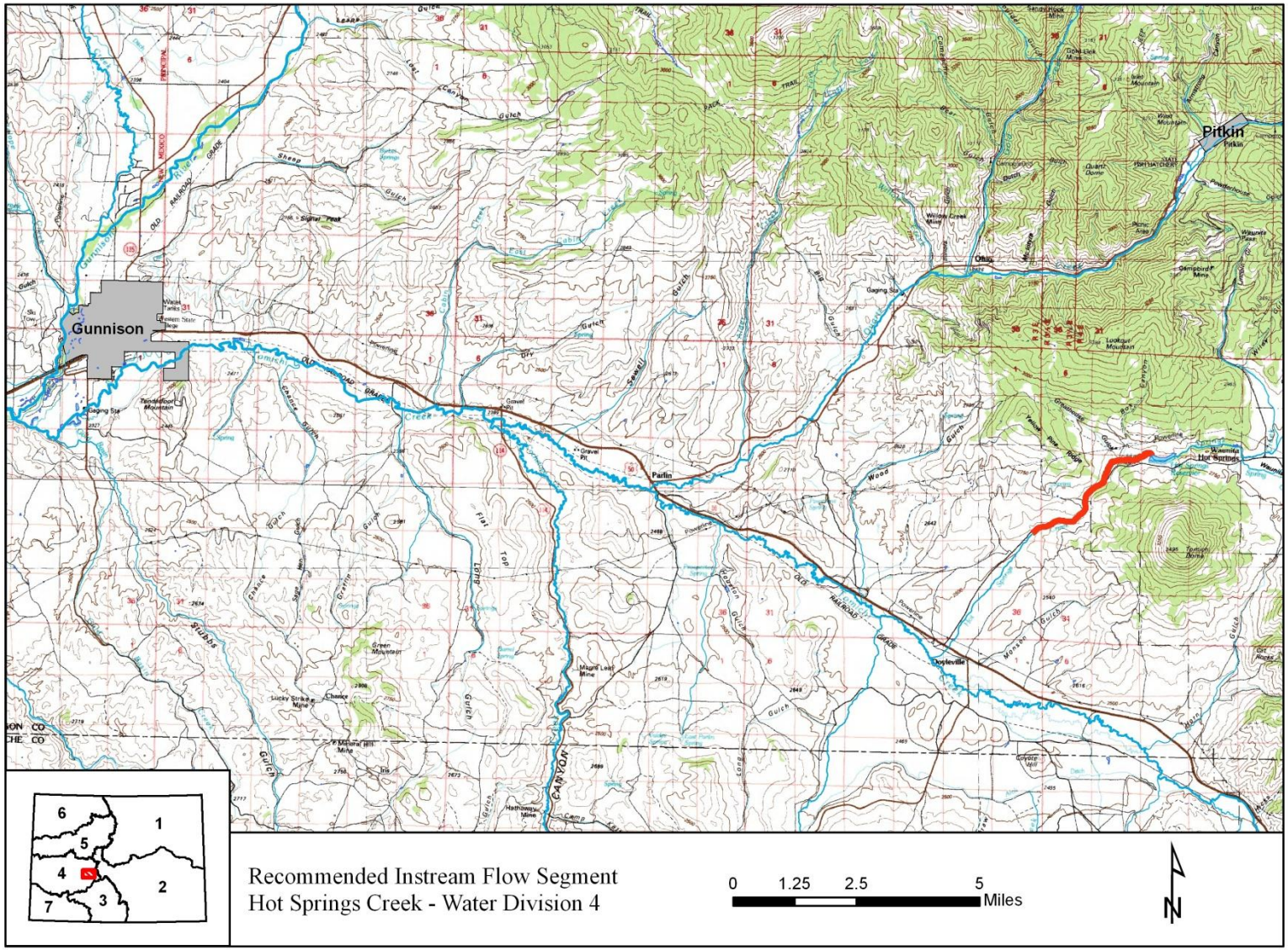
Metadata Descriptions:

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).

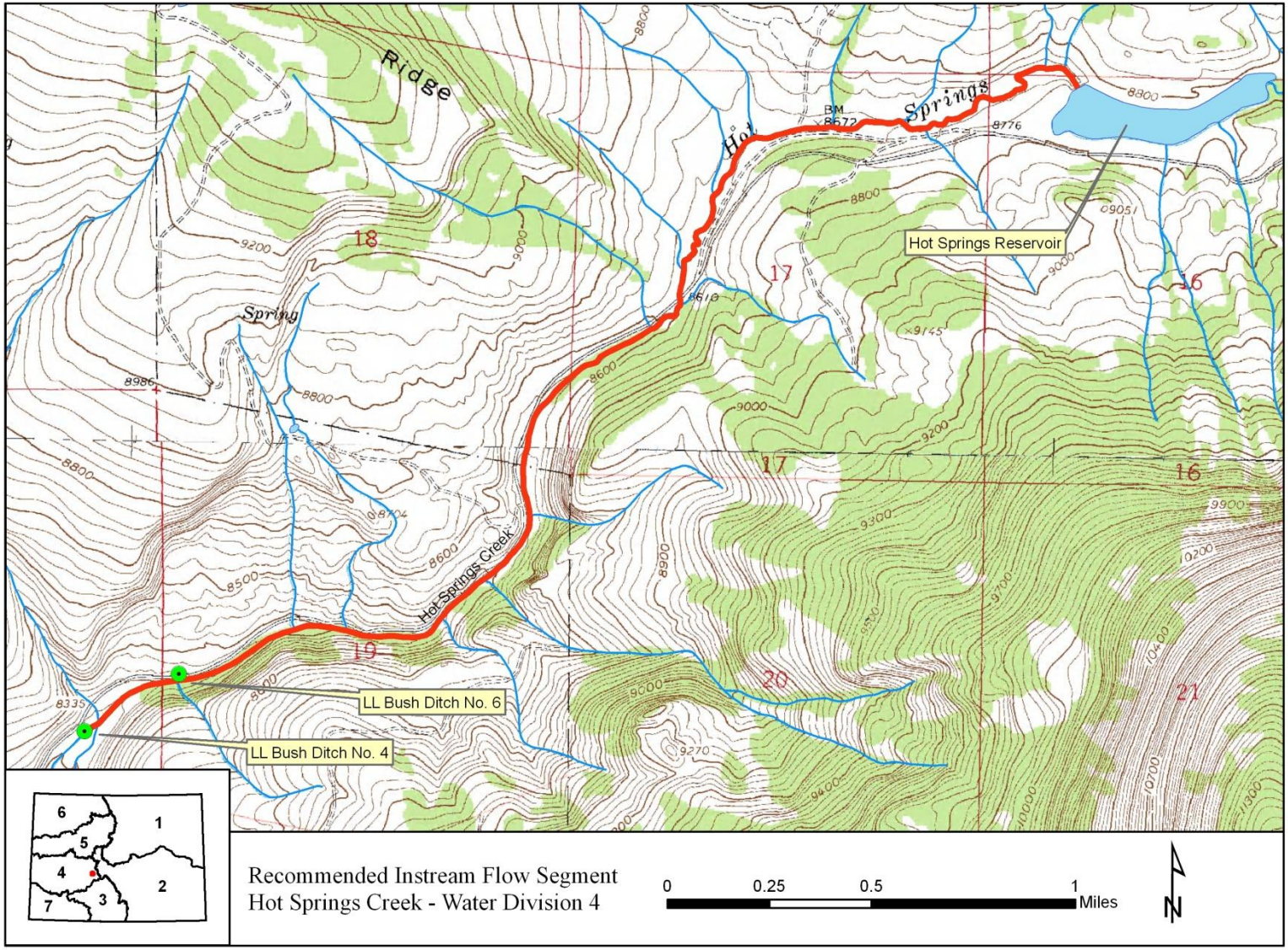
b) The PLSS locations were derived from CWCB GIS using 2005 PLSS data from the U.S. Bureau of Land Management's Geographic Coordinate Database

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

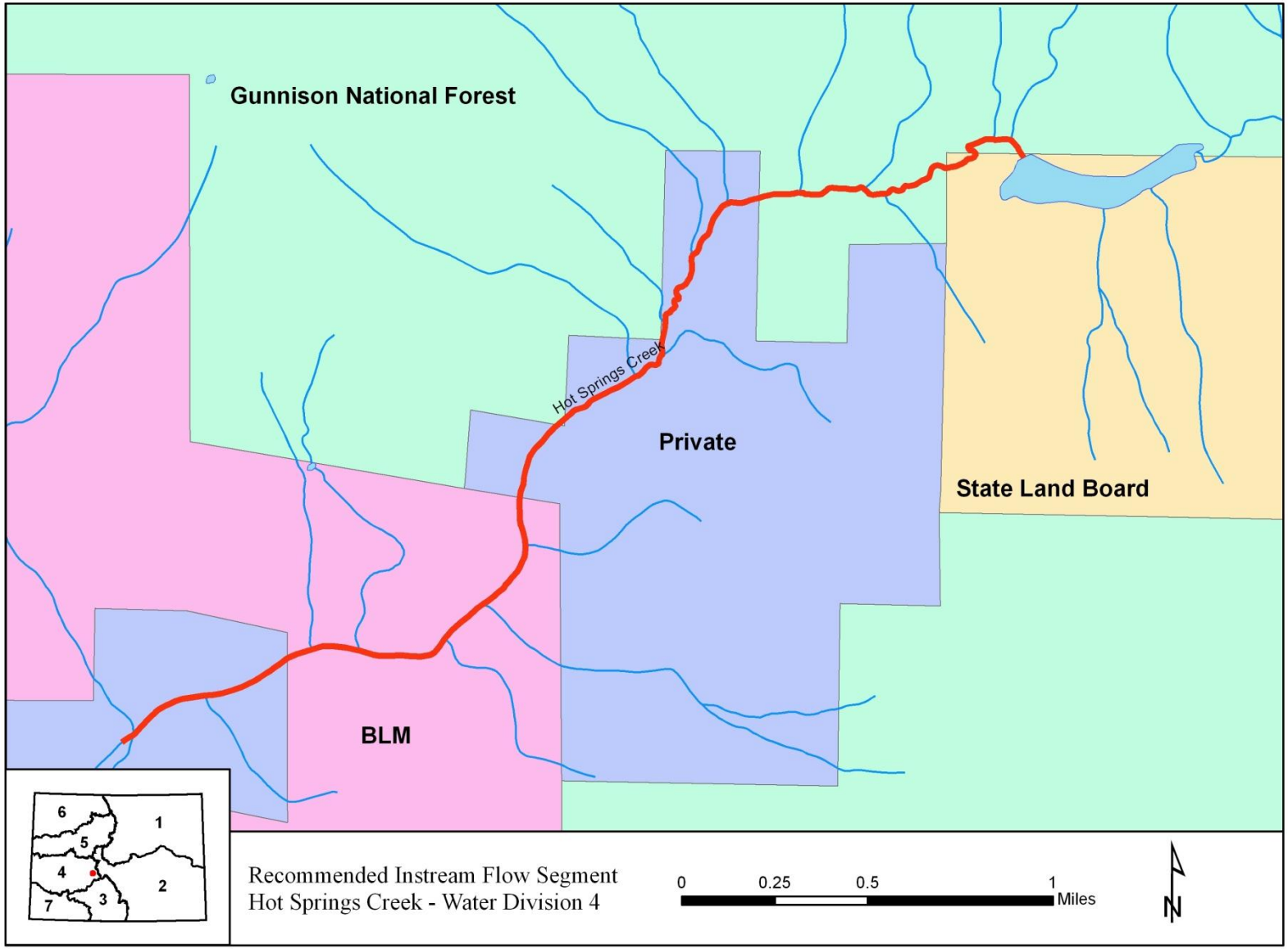
Vicinity Map



Water Rights Map



Land Use Map


Gunnison National Forest
Hot Springs Creek
Private
State Land Board
BLM
6
1
5
4
2
7
3
Recommended Instream Flow Segment
Hot Springs Creek - Water Division 4
0
0.25
0.5
1
Miles
N