Stream: Blue Creek

Executive Summary

Water Division: 4
Water District: 62
CDOW#: 38489
CWCB ID: 10/4/A-002

Segment: Confluence of Big Blue Creek and Little Blue Creek to Confluence with Morrow Point Reservoir

Upper Terminus: CONFLUNCE OF BIG BLUE CREEK AND LITTLE BLUE CREEK
(Latitude 38° 24’ 16.39”N) (Longitude 107° 24’ 28.17”W)

Lower Terminus: CONFLUENCE WITH MORROW POINT RESERVOIR
(Latitude 38° 26’ 58.62”N) (Longitude 107° 24’ 46.02”W)

Watershed: Upper Gunnison (HUC#: 14020002)
Counties: Gunnison
Length: 3.53 miles
USGS Quad(s): Curencanti Needle
Existing ISF: 4-84CW839, 7 cfs (January 1 – December 31)
Flow Recommendation (increase): 4.5 cfs (April 1 – July 31)

Staff Analysis and Recommendation

Summary

The information contained in this report and the associated instream flow file folder 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 Blue Creek to the CWCB for an increased water right under the Instream Flow Program. Blue 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.

Blue Creek is approximately 3.5 miles long. It begins at the confluence of Big Blue Creek and Little Blue Creek and terminates at the confluence with Morrow Point Reservoir. 100% of the land on the 3.53 mile segment addressed by this report is publicly owned. Blue Creek is located within Gunnison County and generally flows in a southerly direction.

The subject of this report is a segment of Blue Creek beginning at the confluence of Big Blue Creek and Little Blue Creek downstream to the confluence with Morrow Point Reservoir. The proposed segment is located approximately 5 miles southwest of Blue Mesa Dam. The staff has received only one recommendation for this segment, from the BLM. The recommendation for this segment is discussed below.

Justification for Instream Flow Increase

The Blue Creek channel is large, with riffles typically ranging from 30 to 40 feet in width. The channel is also characterized by medium to large size substrate, which tends to reduce water velocities. Substantial flow rates are required to maintain sufficient depth and velocity for salmonids in this type of environment. According to the data collected by BLM, the current instream flow water right is capable of meeting 2 of the 3 instream flow criteria during the winter. However, the current instream flow water right is not capable of meeting 3 of 3 instream flow criteria during summer, when the fish population requires more physical habitat for foraging, weight gain, and preparation for overwintering. If the current instream flow water right were to be experienced during snowmelt runoff, less than 2/3 of the active stream channel would be wetted. With this reduction in physical habitat, the creek would not be able to sustain the fish biomass it sustains today.

BLM believes that the reason that the creek supports a healthy and productive fishery is that the creek consistently experiences significantly more water than the current instream flow appropriation. During the warm weather period of May through October, spot flow measurements indicate flows that are approximately double the current instream flow water right.

Instream Flow Recommendation

The BLM recommended an increase of 4.5 cfs (April 1 to July 31), based on its data collection efforts. The modeling results from this survey effort are within the confidence interval produced by the R2Cross model.

Land Status Review

Upper Terminus	Lower Terminus	Total Length (miles)	Land Ownership	
			% Private	% Public
Confl. w/ Big Blue Creek & Little Blue Creek	Confl. w/ Morrow Point Reservoir	3.53	0%	100%

64% of the public lands are managed by the National Park Service and the remaining 36% are managed by the BLM.

Biological Data

This segment of Blue Creek is a moderate to high gradient stream, with moderate to large substrate size, punctuated by large boulders. The proposed reach is confined by a narrow canyon, and some portions of the creek are further confined by the construction and maintenance of U.S. Highway 50. The riparian community is in good condition and composed of willow, alder, and spruce. The creek provides a good mix of pools, riffles, and runs for fish habitat. The riparian community often provides good shading for the water column. Fishery surveys indicate that the creek supports a self-sustaining population of brook trout, rainbow trout, and speckled dace.

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 cooperating agencies 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. The CDOW 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, three 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 (240% 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. It is believed that 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: Data

Party	Date	Q	250%-40%	Summer (3/3)	Winter (2/3)
BLM	7/20/2007	15.69	39.2 – 6.3	8.65	Out of range
BLM	9/27/2007	13.26	33.2 – 5.3	10.03	Out of range
BLM	10/6/2008	14.58	36.4 – 5.8	15.99	Out of range

The summer flow, which meets 3 of 3 criteria and is within the accuracy range of the R2CROSS model is 11.5 cfs. This recommendation was derived by averaging the results of the three data sets. The recommended flow of 4.5 cfs, when added to the existing flow of 7.0 cfs is equal to 11.5 cfs.

Hydrologic Data and Analysis

After receiving the cooperating agency's biologic recommendation, the CWCB staff conducted an evaluation of the stream hydrology to determine if water was physically available for an instream flow appropriation. This evaluation was done through a computation that is, in essence, a "water balance". In concept a "water balance" computation can be viewed as an accounting exercise. When done in its most rigorous form, the water balance parses precipitation into all the avenues water pursues after it is deposited as rain, snow, or ice. In other words, given a specified amount of water deposition (input), the balance tries to account for all water depletions (losses) until a selected end point is reached. Water losses include depletions due to evaporation and transpiration, deliveries into ground water storage, temporary surface storage, incorporations into plant and animal tissue and so forth. These losses are individually or collectively subtracted from the input to reveal the net amount of stream runoff as represented by the discharge measured by stream gages. Of course, the measured stream flow need not be the end point of interest; indeed, when looking at issues of water use to extinction stream flow measurements may only describe intermediate steps in the complex accounting process that is a water balance carried out to a net value of zero.

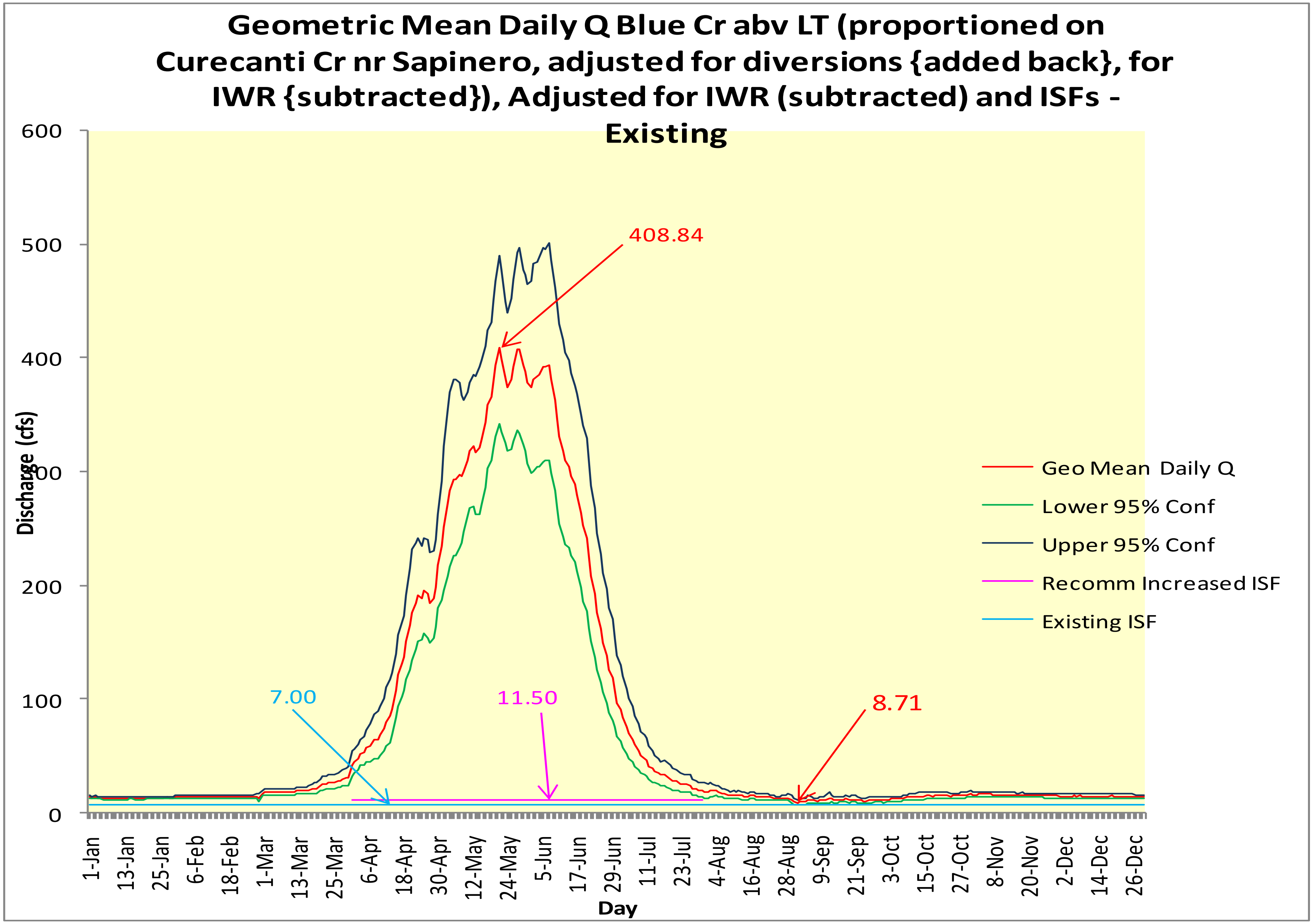
In its analysis, CWCB staff has attempted to use this idea of balancing inputs and losses to determine if water is available for the recommended Instream Flow Appropriation. Of course, this analysis must be a practical exercise rather than a lengthy, and costly, scientific investigation. As a result, staff has simplified the process by lumping together some variables and employing certain rational and scientifically supportable assumptions. The process may be described through the following description of the steps used to complete the evaluation for this particular stream.

The first step required in determining water availability is a determination of the hydrologic regime at the Lower Terminus (LT) of the recommended ISF reach. In the best case this means looking at the data from a gage at the LT. Further, this data, in the best case, has been collected for a long period of time (the longer the better) including wet and dry periods. In the case of **Blue Creek** no such gage is available at the LT. In fact, there is no gage on Blue Creek. It is thus necessary to describe the normal flow regime at Blue Creek above the LT through a "representative" gage station. The gage station selected for this purpose was CURECANTI CREEK NEAR SAPINERO, CO. (USGS 09125000), a gage with a 27 year period of record (POR) collected between 1945 and 1972. The gage is at an elevation of 7,867.43 ft above mean sea level (amsl) and has a drainage area of 35.0 mi^2. The hydrograph (plot of discharge over time) produced from this gage includes the consumptive use of upstream diversions. However, the existence of these diversions is not a major limitation upon the use of the data from the gage. To make the measured data transferable to Blue Creek above the LT, the consumptive portions of these diversions were added back to the measured hydrograph. The resulting "adjusted" hydrograph could then be used on Blue Creek above the LT by multiplying the "adjusted" gage discharge values by an area ratio; specifically, the area of Blue Creek above the LT (97.76 mi^2) to Curecanti Creek near Sapinero, CO (35.0 mi^2). Next, the resulting proportioned "adjusted" hydrograph was itself "adjusted" (decreased) to reflect the few existing consumptive irrigation depletions on Blue Creek upstream of the LT. The final hydrograph thus represents a distribution of flow over time that has been reduced to reflect existing human uses.

{The Following discussion is based upon the US Geological Survey's *Techniques of Water-Resources Investigations* Series, *Book 4: Hydrologic Analysis and Interpretation, Chapter A3: Statistical Methods in Water Resources* (Chapter 3: Describing Uncertainty) by D.R. Helsel and R. M. Hirsch. This technical reference provides the scientific background and guidance important to the systematic interpretation of hydrologic data. The document is available online and is a valuable aid to understanding and interpreting the analyses described here.}

The next step in producing a representation of the discharge at Blue Creek above the LT was to compute the Geometric Mean of the area-prorated data values from the Curecanti Creek near Sapinero, CO Hydrograph. This step is of value because of the inherent statistical weaknesses found in any collection of data intended to measure natural stream discharge. Without getting into the details of statistical theory, it is worth noting that a set of discharge measurements is inherently inaccurate, no matter how well collected, due to the difficulties attendant to data collection, especially hydrologic data. In this particular case, the short period of record lends even greater merit to the use of this statistical tool. To give deference to this fact and to increase the value of the hydrograph product of this analysis, the Geometric Means of the data were computed and plotted along with the 95% Confidence Intervals about the data. The resultant hydrograph, including recommended Instream Flow values, is displayed in Figure 1 with the data displayed in Table 2.

Figure 1



Geometric Mean Daily Q Blue Cr abv LT (proportioned on Curecanti Cr nr Sapinero, adjusted for diversions {added back}, for IWR {subtracted}), Adjusted for IWR (subtracted) and ISFs - Existing
Discharge (cfs)
600
500
400
300
200
100
0
408.84
7.00
11.50
8.71
Geo Mean Daily Q
Lower 95% Conf
Upper 95% Conf
Recomm Increased ISF
Existing ISF
1-Jan
13-Jan
25-Jan
6-Feb
18-Feb
1-Mar
13-Mar
25-Mar
6-Apr
18-Apr
30-Apr
12-May
24-May
5-Jun
17-Jun
29-Jun
11-Jul
23-Jul
4-Aug
16-Aug
28-Aug
9-Sep
21-Sep
3-Oct
15-Oct
27-Oct
8-Nov
20-Nov
2-Dec
14-Dec
26-Dec
Day

Table 2. Geometric Mean Discharge and Recommended Instream Flows			
Date	Recommended ISF	Existing ISF	Proportioned Adjusted GM (abv gage) Adj (-) for Irr & OoB in Blue Cr abv LT
1-Jan		7.0	13.15
2-Jan		7.0	13.09
3-Jan		7.0	13.12
4-Jan		7.0	13.06
5-Jan		7.0	13.03
6-Jan		7.0	12.90
7-Jan		7.0	12.79
8-Jan		7.0	12.77
9-Jan		7.0	12.87
10-Jan		7.0	12.99
11-Jan		7.0	13.01
12-Jan		7.0	12.90
13-Jan		7.0	12.96
14-Jan		7.0	12.97
15-Jan		7.0	13.00
16-Jan		7.0	13.00
17-Jan		7.0	12.96
18-Jan		7.0	12.92
19-Jan		7.0	12.92
20-Jan		7.0	12.97
21-Jan		7.0	13.05
22-Jan		7.0	13.03
23-Jan		7.0	13.01
24-Jan		7.0	12.98
25-Jan		7.0	13.03
26-Jan		7.0	13.00
27-Jan		7.0	13.07
28-Jan		7.0	13.12
29-Jan		7.0	13.09
30-Jan		7.0	13.12
31-Jan		7.0	13.26
1-Feb		7.0	13.76
2-Feb		7.0	13.79
3-Feb		7.0	13.73
4-Feb		7.0	13.74
5-Feb		7.0	13.64
6-Feb		7.0	13.60
7-Feb		7.0	13.62
8-Feb		7.0	13.69
9-Feb		7.0	13.67
10-Feb		7.0	13.76

11-Feb	7.0	13.57
12-Feb	7.0	13.66
13-Feb	7.0	13.69
14-Feb	7.0	13.70
15-Feb	7.0	13.65
16-Feb	7.0	13.61
17-Feb	7.0	13.56
18-Feb	7.0	13.58
19-Feb	7.0	13.58
20-Feb	7.0	13.65
21-Feb	7.0	13.72
22-Feb	7.0	13.77
23-Feb	7.0	13.80
24-Feb	7.0	13.87
25-Feb	7.0	13.95
26-Feb	7.0	13.93
27-Feb	7.0	14.03
28-Feb	7.0	14.13
29-Feb	7.0	12.46
1-Mar	7.0	17.19
2-Mar	7.0	17.53
3-Mar	7.0	17.42
4-Mar	7.0	17.48
5-Mar	7.0	17.52
6-Mar	7.0	17.54
7-Mar	7.0	17.62
8-Mar	7.0	17.75
9-Mar	7.0	17.88
10-Mar	7.0	17.80
11-Mar	7.0	18.01
12-Mar	7.0	18.26
13-Mar	7.0	18.91
14-Mar	7.0	19.01
15-Mar	7.0	18.90
16-Mar	7.0	19.48
17-Mar	7.0	19.93
18-Mar	7.0	20.70
19-Mar	7.0	21.24
20-Mar	7.0	21.24
21-Mar	7.0	23.69
22-Mar	7.0	24.89
23-Mar	7.0	25.66
24-Mar	7.0	26.54
25-Mar	7.0	26.41
26-Mar	7.0	26.60
27-Mar	7.0	27.94
28-Mar	7.0	28.47
29-Mar	7.0	29.80
30-Mar	7.0	30.56

31-Mar		7.0	31.13
1-Apr	11.5	7.0	41.97
2-Apr	11.5	7.0	44.02
3-Apr	11.5	7.0	47.38
4-Apr	11.5	7.0	51.80
5-Apr	11.5	7.0	53.36
6-Apr	11.5	7.0	56.58
7-Apr	11.5	7.0	58.74
8-Apr	11.5	7.0	61.30
9-Apr	11.5	7.0	63.87
10-Apr	11.5	7.0	64.74
11-Apr	11.5	7.0	67.77
12-Apr	11.5	7.0	73.57
13-Apr	11.5	7.0	80.12
14-Apr	11.5	7.0	84.79
15-Apr	11.5	7.0	91.25
16-Apr	11.5	7.0	107.37
17-Apr	11.5	7.0	120.87
18-Apr	11.5	7.0	131.02
19-Apr	11.5	7.0	136.20
20-Apr	11.5	7.0	150.00
21-Apr	11.5	7.0	164.01
22-Apr	11.5	7.0	175.87
23-Apr	11.5	7.0	184.55
24-Apr	11.5	7.0	191.06
25-Apr	11.5	7.0	188.60
26-Apr	11.5	7.0	195.08
27-Apr	11.5	7.0	192.04
28-Apr	11.5	7.0	184.52
29-Apr	11.5	7.0	188.30
30-Apr	11.5	7.0	198.04
1-May	11.5	7.0	217.13
2-May	11.5	7.0	233.77
3-May	11.5	7.0	251.63
4-May	11.5	7.0	272.00
5-May	11.5	7.0	283.24
6-May	11.5	7.0	292.90
7-May	11.5	7.0	293.52
8-May	11.5	7.0	296.93
9-May	11.5	7.0	295.21
10-May	11.5	7.0	299.54
11-May	11.5	7.0	310.30
12-May	11.5	7.0	318.39
13-May	11.5	7.0	322.73
14-May	11.5	7.0	316.92
15-May	11.5	7.0	320.32
16-May	11.5	7.0	328.17
17-May	11.5	7.0	342.69
18-May	11.5	7.0	358.52

19-May	11.5	7.0	365.91
20-May	11.5	7.0	380.31
21-May	11.5	7.0	393.50
22-May	11.5	7.0	408.84
23-May	11.5	7.0	399.85
24-May	11.5	7.0	381.83
25-May	11.5	7.0	374.14
26-May	11.5	7.0	380.49
27-May	11.5	7.0	391.63
28-May	11.5	7.0	407.17
29-May	11.5	7.0	407.22
30-May	11.5	7.0	393.26
31-May	11.5	7.0	387.94
1-Jun	11.5	7.0	377.53
2-Jun	11.5	7.0	373.84
3-Jun	11.5	7.0	380.49
4-Jun	11.5	7.0	384.32
5-Jun	11.5	7.0	385.72
6-Jun	11.5	7.0	391.67
7-Jun	11.5	7.0	392.43
8-Jun	11.5	7.0	393.93
9-Jun	11.5	7.0	381.56
10-Jun	11.5	7.0	362.29
11-Jun	11.5	7.0	345.90
12-Jun	11.5	7.0	330.60
13-Jun	11.5	7.0	317.89
14-Jun	11.5	7.0	309.47
15-Jun	11.5	7.0	304.54
16-Jun	11.5	7.0	295.58
17-Jun	11.5	7.0	288.54
18-Jun	11.5	7.0	279.55
19-Jun	11.5	7.0	263.58
20-Jun	11.5	7.0	252.15
21-Jun	11.5	7.0	241.78
22-Jun	11.5	7.0	224.14
23-Jun	11.5	7.0	207.99
24-Jun	11.5	7.0	192.10
25-Jun	11.5	7.0	175.90
26-Jun	11.5	7.0	161.75
27-Jun	11.5	7.0	149.79
28-Jun	11.5	7.0	138.05
29-Jun	11.5	7.0	125.82
30-Jun	11.5	7.0	117.90
1-Jul	11.5	7.0	107.66
2-Jul	11.5	7.0	96.04
3-Jul	11.5	7.0	90.17
4-Jul	11.5	7.0	83.53
5-Jul	11.5	7.0	74.86
6-Jul	11.5	7.0	69.14

7-Jul	11.5	7.0	64.62
8-Jul	11.5	7.0	59.26
9-Jul	11.5	7.0	53.91
10-Jul	11.5	7.0	49.70
11-Jul	11.5	7.0	47.89
12-Jul	11.5	7.0	45.71
13-Jul	11.5	7.0	40.97
14-Jul	11.5	7.0	38.35
15-Jul	11.5	7.0	36.20
16-Jul	11.5	7.0	34.09
17-Jul	11.5	7.0	32.89
18-Jul	11.5	7.0	32.92
19-Jul	11.5	7.0	31.51
20-Jul	11.5	7.0	29.78
21-Jul	11.5	7.0	27.81
22-Jul	11.5	7.0	27.29
23-Jul	11.5	7.0	26.36
24-Jul	11.5	7.0	25.40
25-Jul	11.5	7.0	25.05
26-Jul	11.5	7.0	24.46
27-Jul	11.5	7.0	24.10
28-Jul	11.5	7.0	21.38
29-Jul	11.5	7.0	20.82
30-Jul	11.5	7.0	18.85
31-Jul	11.5	7.0	19.61
1-Aug		7.0	18.46
2-Aug		7.0	18.27
3-Aug		7.0	19.61
4-Aug		7.0	18.84
5-Aug		7.0	19.01
6-Aug		7.0	18.14
7-Aug		7.0	16.90
8-Aug		7.0	15.98
9-Aug		7.0	15.13
10-Aug		7.0	14.84
11-Aug		7.0	14.96
12-Aug		7.0	14.91
13-Aug		7.0	15.49
14-Aug		7.0	14.67
15-Aug		7.0	14.09
16-Aug		7.0	13.95
17-Aug		7.0	14.61
18-Aug		7.0	14.70
19-Aug		7.0	13.92
20-Aug		7.0	13.66
21-Aug		7.0	13.80
22-Aug		7.0	13.23
23-Aug		7.0	13.39
24-Aug		7.0	13.17

25-Aug	7.0	13.06
26-Aug	7.0	12.16
27-Aug	7.0	12.49
28-Aug	7.0	12.40
29-Aug	7.0	12.52
30-Aug	7.0	13.07
31-Aug	7.0	11.60
1-Sep	7.0	9.31
2-Sep	7.0	8.71
3-Sep	7.0	9.30
4-Sep	7.0	9.18
5-Sep	7.0	9.28
6-Sep	7.0	11.30
7-Sep	7.0	10.74
8-Sep	7.0	10.47
9-Sep	7.0	10.30
10-Sep	7.0	11.07
11-Sep	7.0	10.93
12-Sep	7.0	11.71
13-Sep	7.0	12.40
14-Sep	7.0	11.89
15-Sep	7.0	11.14
16-Sep	7.0	10.97
17-Sep	7.0	11.05
18-Sep	7.0	11.03
19-Sep	7.0	11.92
20-Sep	7.0	10.83
21-Sep	7.0	11.57
22-Sep	7.0	11.64
23-Sep	7.0	10.72
24-Sep	7.0	10.40
25-Sep	7.0	10.27
26-Sep	7.0	10.13
27-Sep	7.0	10.83
28-Sep	7.0	10.76
29-Sep	7.0	11.40
30-Sep	7.0	11.61
1-Oct	7.0	11.03
2-Oct	7.0	10.74
3-Oct	7.0	11.41
4-Oct	7.0	11.61
5-Oct	7.0	11.77
6-Oct	7.0	12.03
7-Oct	7.0	12.02
8-Oct	7.0	12.17
9-Oct	7.0	12.83
10-Oct	7.0	13.31
11-Oct	7.0	13.35
12-Oct	7.0	14.18

13-Oct	7.0	14.00
14-Oct	7.0	14.14
15-Oct	7.0	14.03
16-Oct	7.0	14.38
17-Oct	7.0	14.85
18-Oct	7.0	14.57
19-Oct	7.0	14.45
20-Oct	7.0	14.68
21-Oct	7.0	14.81
22-Oct	7.0	14.85
23-Oct	7.0	14.86
24-Oct	7.0	14.70
25-Oct	7.0	14.28
26-Oct	7.0	14.67
27-Oct	7.0	14.66
28-Oct	7.0	14.56
29-Oct	7.0	14.77
30-Oct	7.0	14.99
31-Oct	7.0	15.67
1-Nov	7.0	16.40
2-Nov	7.0	15.86
3-Nov	7.0	15.79
4-Nov	7.0	16.12
5-Nov	7.0	16.24
6-Nov	7.0	16.04
7-Nov	7.0	16.20
8-Nov	7.0	15.98
9-Nov	7.0	15.82
10-Nov	7.0	15.41
11-Nov	7.0	15.27
12-Nov	7.0	15.44
13-Nov	7.0	15.57
14-Nov	7.0	15.60
15-Nov	7.0	15.66
16-Nov	7.0	15.60
17-Nov	7.0	15.22
18-Nov	7.0	14.98
19-Nov	7.0	15.19
20-Nov	7.0	14.98
21-Nov	7.0	15.18
22-Nov	7.0	15.18
23-Nov	7.0	15.19
24-Nov	7.0	15.04
25-Nov	7.0	15.02
26-Nov	7.0	15.03
27-Nov	7.0	14.80
28-Nov	7.0	14.61
29-Nov	7.0	14.76
30-Nov	7.0	14.75

1-Dec	7.0	14.52
2-Dec	7.0	14.35
3-Dec	7.0	14.31
4-Dec	7.0	14.50
5-Dec	7.0	14.39
6-Dec	7.0	14.35
7-Dec	7.0	14.75
8-Dec	7.0	14.51
9-Dec	7.0	14.53
10-Dec	7.0	14.41
11-Dec	7.0	14.45
12-Dec	7.0	14.48
13-Dec	7.0	14.41
14-Dec	7.0	14.36
15-Dec	7.0	14.35
16-Dec	7.0	14.39
17-Dec	7.0	14.40
18-Dec	7.0	14.41
19-Dec	7.0	14.50
20-Dec	7.0	14.56
21-Dec	7.0	14.44
22-Dec	7.0	14.20
23-Dec	7.0	14.23
24-Dec	7.0	14.26
25-Dec	7.0	14.40
26-Dec	7.0	14.40
27-Dec	7.0	14.34
28-Dec	7.0	14.23
29-Dec	7.0	14.17
30-Dec	7.0	14.14
31-Dec	7.0	14.30

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 no decreed surface diversions within this reach of stream. Staff has determined that water is available for appropriation on Blue Creek, between the confluence with big Blue Creek and Little Blue Creek to the confluence with Morrow Point Reservoir, 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:

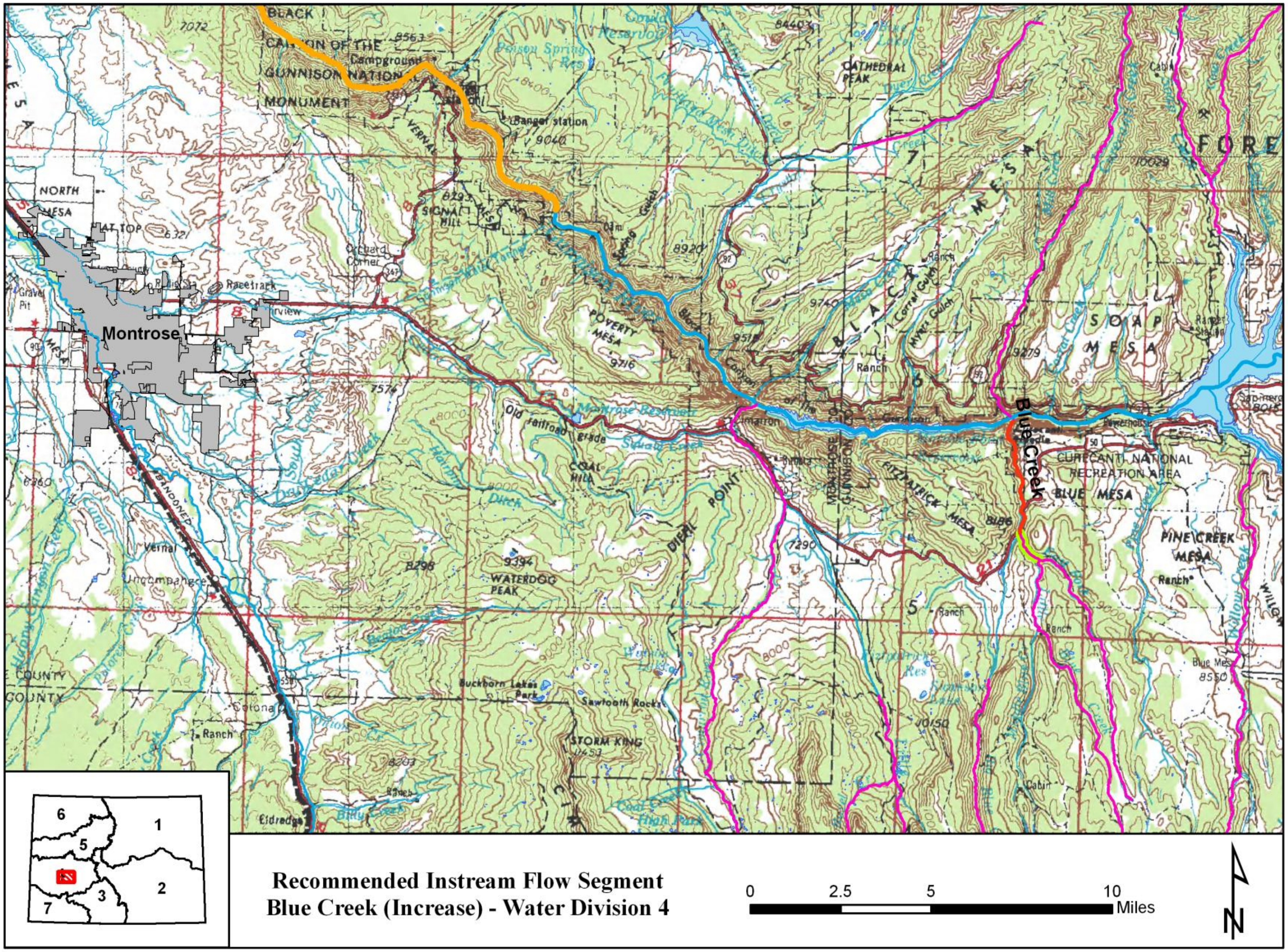
Segment: Confluence of Big Blue Creek and Little Blue Creek to Confluence with Morrow Point Reservoir

Upper Terminus: CONFLUNCE OF BIG BLUE CREEK AND LITTLE BLUE CREEK
(Latitude 38° 24' 16.39"N) (Longitude 107° 24' 28.17"W)
UTM North: 4253447.95 UTM East: 289751.74
NW NW S23 T48N R5W NMPM
1130' East of the West Section Line; 620' South of the North Section Line

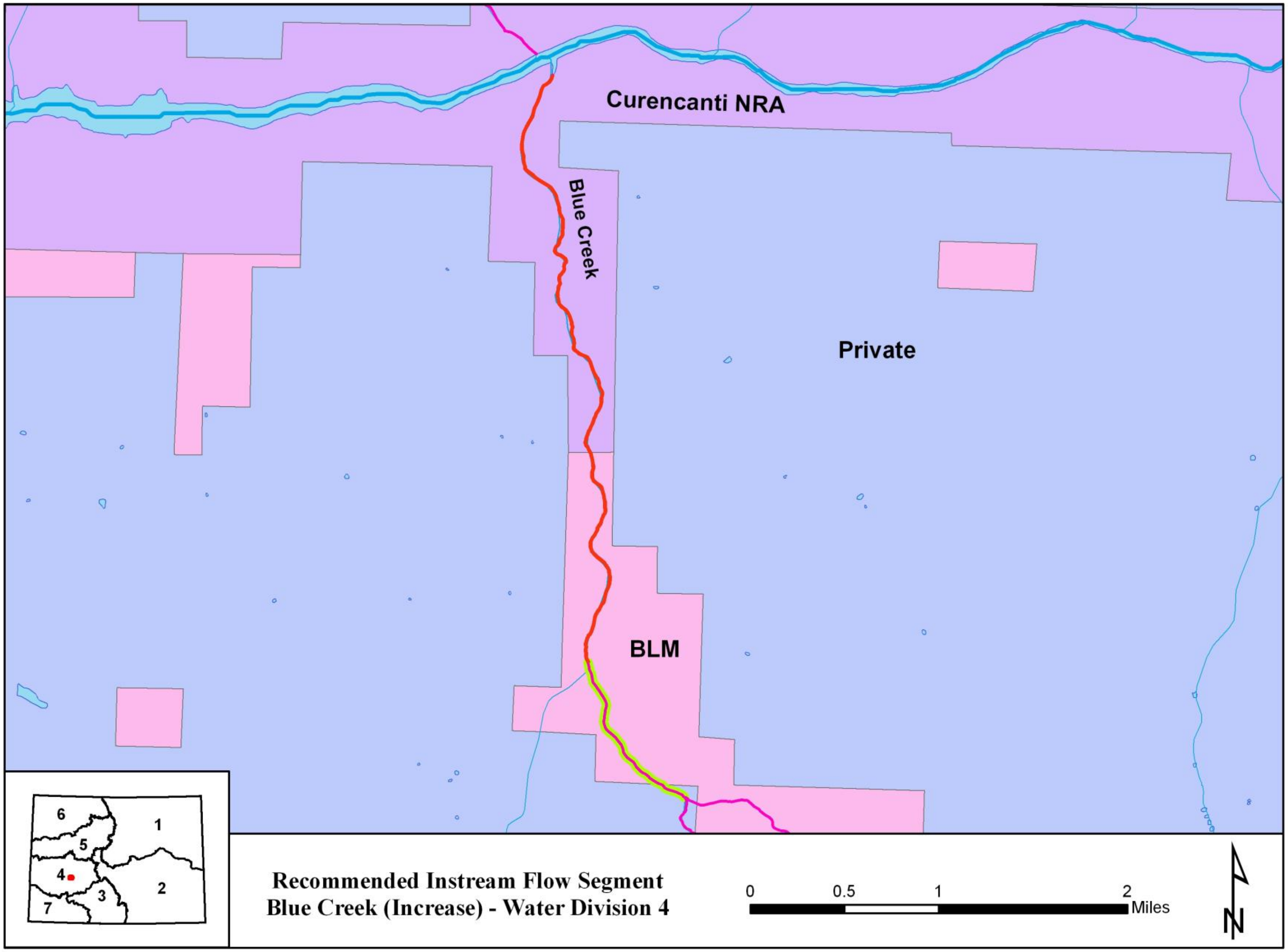
Lower Terminus: CONFLUENCE WITH MORROW POINT RESERVOIR
(Latitude 38° 26' 58.62"N) (Longitude 107° 24' 46.02"W)
UTM North: 4258460.48 UTM East: 289449.78
NE NE S3 T48N R 5W NMPM
270' West of the East Section Line; 2175' South of the North Section Line

Watershed: Upper Gunnison (HUC#: 14020002)
Counties: Gunnison
Length: 3.53 miles
USGS Quad(s): Curencanti Needle
Existing ISF: 4-84CW839, 7 cfs (January 1 – December 31)
Flow Recommendation (increase): 4.5 cfs (April 1 – July 31)

Vicinity Map



Land Use Map


Curencanti NRA
Blue Creek
Private
BLM
6
5
1
4
2
7
3
Recommended Instream Flow Segment
Blue Creek (Increase) - Water Division 4
0
0.5
1
2
Miles
N

Topographic & Water Rights Map