<u>Stream:</u> Kerber Creek (Lower Segment)

Executive Summary

Water Division: 3
Water District: 25
CDOW#: 40903
CWCB ID: 12/3/A-002

Segment: Confluence with Brewery Creek to Wells Kerber Ditch Headgate
Upper Terminus: CONFLUENCE WITH BREWERY CREEK
(Latitude 38° 16' 37.53"N) (Longitude 106° 08' 59.61"W)

Lower Terminus: WELLS KERBER DITCH HEADGATE
(Latitude 38° 13' 57.8"N) (Longitude 105° 59' 8.71"W)

Watershed: San Luis (HUC#: 13010003)
Counties: Saguache
Length: 13.1 miles
USGS Quad(s): Villa Grove, Graveyard Gulch, Klondike Mine, Bonanza
Flow Recommendation: 6.75 cfs (April 1 – July 31)
4.0 cfs (August 1 – November 15)
2.6 cfs (November 16 – March 31)

Staff Analysis and Recommendation

Summary

The information contained in this report and the associated supporting data and analyses (located on the included CD) 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 Kerber Creek to the CWCB for inclusion into the Instream Flow Program. Kerber Creek is being considered for inclusion into the Instream Flow Program because it has a natural environment that can be preserved to a reasonable degree with an instream flow water right.

Kerber Creek is approximately 22.0 miles long. Kerber Creek originates on the east flank of Sheep Mountain at an elevation of 11,650 feet and flows generally southeasterly through the Rio Grande National Forest as it drops to an elevation of 7,913 feet at its confluence with San Luis Creek. Approximately 97.5 percent of the land on the 13.1 mile segment addressed by this report is privately owned. Kerber Creek is located within Saguache County and the total drainage area of the creek is approximately 97.36 square miles.

The subject of this report is a segment of Kerber Creek beginning at the confluence with Brewery Creek and extending downstream to the Wells Kerber Ditch Headgate. The proposed segment is located approximately 1.5 miles west of Villa Grove. 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 6.75 cfs (April 1 – July 31), 4.0 cfs (August 1 – November 15) and 2.6 cfs (November 16 – March 31) based on its June 16, 2010 and October 7, 2010, data collection efforts and staff's water availability analyses.

Land Status Review

Upper Terminus	Lower Terminus	Total Length (miles)	Land Ownership	
			% Private	% Public
Confluence with Brewery Creek	Wells Kerber Ditch Headgate	13.1	97.5%	2.5%

100% of the public lands are managed by the BLM.

Biological Data

Kerber Creek is a moderate gradient stream, and historically had extensive functional floodplains and an abundance of point bars. The natural environment in Kerber Creek has been and continues to be affected by acid mine drainage from historical mining activities within the Kerber Creek watershed. The acid mine drainage significantly altered the vegetation regime along the creek, resulting in extensive changes in channel morphology.

Kerber Creek supports a naturally reproducing brook trout population, which is the trout species typically most tolerant of reduced Ph levels and some presence of heavy metals. Fish surveys have noted a full range of fish weights and ages. Macroinvertebrate surveys indicate that the creek has achieved a diversity of species that is typical of streams in the southern Rocky Mountains ecoregion. However, abundance and biomass of macroinvertebrates remains below average for streams in the southern Rocky Mountain ecoregion, which is to be expected in a stream with some continuing influence from acid mine drainage.

The riparian community is comprised primarily of willow and sedge species, with coyote willow as the most dominant shrub in the riparian community. The treatment of historic tailing deposition areas has resulted in a higher percentage of vegetation cover in the riparian zone, resulting in improved width-to-depth ratios, sinuosity, and bank stability. The brook trout population now has access to a wide range of physical habitats, including overhanging banks, pools, and velocity cover behind larger rocks in the stream channel.

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, four 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 meeting 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: Data

Party	Date	Q	250%-40%	Summer (3/3)	Winter (2/3)
BLM	6/16/2010	28.75	71.9 – 11.5	Out of Range	Out of Range
BLM	10/7/2010	3.18	8.0 – 1.3	3.67	Out of Range
BLM	6/16/2010	17.40	43.5 – 7.0	Out of Range	8.7
BLM	10/7/2010	2.26	5.6 – 0.9	2.84	4.77
			Averages	3.25	6.74

The summer flow recommendation, which meets 3 of 3 criteria and is within the accuracy range of the R2CROSS model, is 6.75 cfs. Due to water availability constraints the winter flow recommendation was lowered from 3.25 cfs to 2.6 cfs. This reduced flow rate should provide sufficient velocity and depth to prevent icing of critical pool habitats along the creek.

Hydrologic Data and Analysis

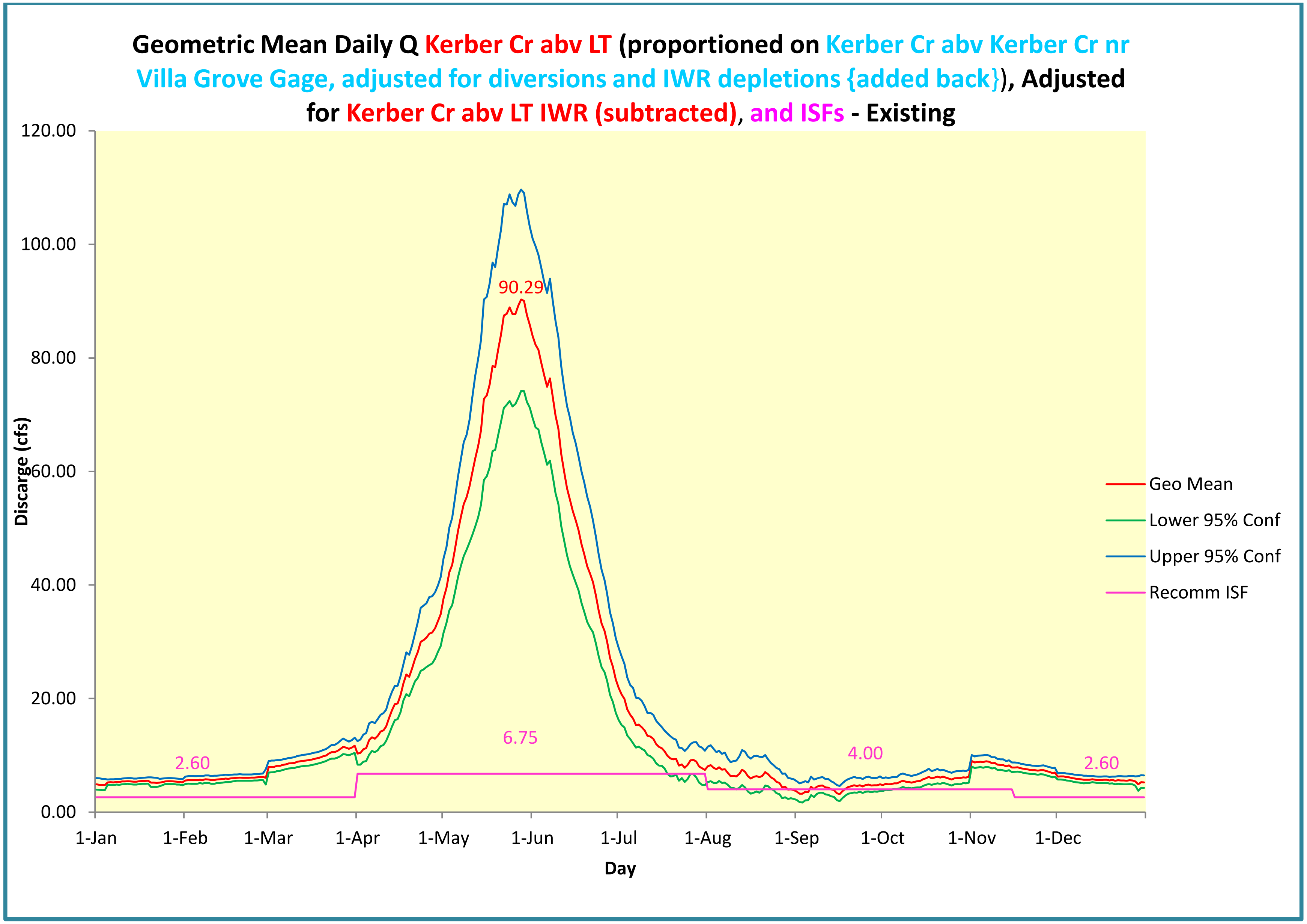
After receiving the BLM's biologic evaluation and recommended flow regime, the CWCB staff conducted an evaluation of the stream hydrology to determine if water was physically available for an instream flow appropriation in the amounts recommended. This evaluation was done through a computation that is, in essence, an accounting exercise referred to as a water balance. 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), water depletions (losses) are accounted until inputs and losses balance one with the other. The water losses that can be tracked include depletions due to evaporation and transpiration, deliveries into ground water storage, temporary surface storage, incorporations into plant and animal tissue and so forth. When these losses are individually or collectively subtracted from the input any of the original input not balanced by loss is anticipated to be found in stream runoff as represented by the discharge measured at intercepting stream gages.

In its analysis, CWCB staff has used this approach 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 following describes the steps used to complete the evaluation for this particular stream.

The first step required to determine 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, again in the best case, has been collected for a long period of time (the longer the better), including wet and dry periods. For the subject reach of Kerber Creek, there is a USGS and DWR gage record of discharge on the creek. However, the gaging station is upstream of the LT. The gage is KERBER CR ABV LITTLE KERBER CR NR VILLA GROVE, CO (USGS 08224500/DWR KERVILCO); it has a period of record (POR) of 61 year period of record (POR) collected between 1923 and 2010. The gage is at an elevation of 8,640 ft above mean sea level (amsl) and has a drainage area of 45.4 mi^2. The hydrograph (plot of discharge over time) produced from this gage includes the consumptive uses of several diversions in the basin above the gage. 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 Kerber 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 Kerber Creek above the LT by multiplying the "adjusted" hydrograph by an area ratio; specifically, the area of Kerber Creek above the LT (97.36 mi^2 above the LT) to Kerber Creek above the gage (41.21 mi^2 above the gage). Next, the resulting proportioned "adjusted" hydrograph would itself be "adjusted" (decreased) to reflect the existing depletions on Kerber Creek above the LT resulting from upstream consumptive irrigation uses. The final hydrograph would thus represent 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 Kerber Cr above the LT is to compute the Geometric Mean of the area-prorated "adjusted" data values from the Kerber Cr above Little Kerber Cr nr Villa Grove, 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.



Geometric Mean Daily Q Kerber Cr abv LT (proportioned on Kerber Cr abv Kerber Cr nr Villa Grove Gage, adjusted for diversions and IWR depletions {added back}), Adjusted for Kerber Cr abv LT IWR (subtracted), and ISFs - Existing
120.00
100.00
80.00
60.00
40.00
20.00
0.00
Discarge (cfs)
90.29
6.75
2.60
4.00
2.60
1-Jan
1-Feb
1-Mar
1-Apr
1-May
1-Jun
1-Jul
1-Aug
1-Sep
1-Oct
1-Nov
1-Dec
Day
Geo Mean
Lower 95% Conf
Upper 95% Conf
Recomm ISF

Figure 1

Geometric Mean Existing Cond (IWR or div subtracted) Kerber Cr abv LT Prop on Kerber Cr abv Gage Baseline Cond (with Beaver Cr IWR abv Gage consumption added back)				
	GM (abv LT) Prorated by 214.45%	**Lower 95% Conf Prorated by 214.45%**	**Upper 95% Conf Prorated by 214.45%**	**Recommended ISFs**
1-Jan	4.87	3.97	5.99	2.60
2-Jan	4.82	3.91	5.93	2.60
3-Jan	4.77	3.88	5.86	2.60
4-Jan	4.74	3.86	5.82	2.60
5-Jan	5.24	4.79	5.75	2.60
6-Jan	5.25	4.78	5.77	2.60
7-Jan	5.24	4.76	5.76	2.60
8-Jan	5.31	4.83	5.83	2.60
9-Jan	5.29	4.82	5.82	2.60
10-Jan	5.37	4.90	5.89	2.60
11-Jan	5.40	4.93	5.92	2.60
12-Jan	5.44	4.95	5.97	2.60
13-Jan	5.40	4.90	5.96	2.60
14-Jan	5.36	4.86	5.92	2.60
15-Jan	5.36	4.86	5.92	2.60
16-Jan	5.43	4.91	6.00	2.60
17-Jan	5.46	4.95	6.02	2.60
18-Jan	5.48	4.97	6.05	2.60
19-Jan	5.54	5.03	6.11	2.60
20-Jan	5.20	4.41	6.13	2.60
21-Jan	5.18	4.42	6.08	2.60
22-Jan	5.14	4.41	6.01	2.60
23-Jan	5.17	4.55	5.87	2.60
24-Jan	5.29	4.73	5.90	2.60
25-Jan	5.40	4.92	5.93	2.60
26-Jan	5.43	4.93	5.99	2.60
27-Jan	5.42	4.91	5.98	2.60
28-Jan	5.41	4.91	5.96	2.60
29-Jan	5.35	4.85	5.90	2.60
30-Jan	5.32	4.82	5.87	2.60
31-Jan	5.23	4.72	5.79	2.60
1-Feb	5.55	4.93	6.25	2.60
2-Feb	5.62	4.99	6.32	2.60
3-Feb	5.62	4.96	6.35	2.60
4-Feb	5.60	4.96	6.32	2.60
5-Feb	5.62	4.98	6.34	2.60
6-Feb	5.69	5.08	6.37	2.60
7-Feb	5.66	5.03	6.38	2.60
8-Feb	5.76	5.14	6.45	2.60
9-Feb	5.74	5.13	6.43	2.60
10-Feb	5.64	4.99	6.37	2.60
11-Feb	5.65	4.98	6.40	2.60
12-Feb	5.72	5.10	6.42	2.60
13-Feb	5.76	5.15	6.46	2.60
14-Feb	5.80	5.20	6.47	2.60
15-Feb	5.88	5.27	6.57	2.60
16-Feb	5.87	5.26	6.54	2.60
17-Feb	5.95	5.37	6.59	2.60
18-Feb	5.99	5.43	6.61	2.60
19-Feb	6.04	5.50	6.63	2.60

20-Feb	6.06	5.51	6.66	2.60
21-Feb	6.03	5.50	6.60	2.60
22-Feb	6.04	5.52	6.60	2.60
23-Feb	6.05	5.52	6.62	2.60
24-Feb	6.05	5.53	6.62	2.60
25-Feb	6.09	5.56	6.67	2.60
26-Feb	6.09	5.56	6.68	2.60
27-Feb	6.15	5.62	6.73	2.60
28-Feb	6.19	5.66	6.77	2.60
29-Feb	6.04	4.83	7.55	2.60
1-Mar	7.91	6.96	8.99	2.60
2-Mar	7.96	6.99	9.06	2.60
3-Mar	7.99	7.04	9.06	2.60
4-Mar	8.14	7.23	9.16	2.60
5-Mar	8.16	7.27	9.15	2.60
6-Mar	8.31	7.43	9.29	2.60
7-Mar	8.41	7.54	9.38	2.60
8-Mar	8.55	7.68	9.53	2.60
9-Mar	8.59	7.70	9.59	2.60
10-Mar	8.66	7.76	9.66	2.60
11-Mar	8.84	7.93	9.85	2.60
12-Mar	8.93	8.01	9.95	2.60
13-Mar	9.03	8.10	10.07	2.60
14-Mar	9.09	8.14	10.15	2.60
15-Mar	9.15	8.20	10.22	2.60
16-Mar	9.24	8.27	10.32	2.60
17-Mar	9.36	8.39	10.45	2.60
18-Mar	9.49	8.52	10.56	2.60
19-Mar	9.63	8.65	10.72	2.60
20-Mar	9.82	8.83	10.91	2.60
21-Mar	9.98	8.97	11.10	2.60
22-Mar	10.28	9.22	11.45	2.60
23-Mar	10.53	9.40	11.80	2.60
24-Mar	10.56	9.42	11.84	2.60
25-Mar	10.77	9.57	12.12	2.60
26-Mar	11.11	9.85	12.52	2.60
27-Mar	11.49	10.20	12.94	2.60
28-Mar	11.33	10.14	12.67	2.60
29-Mar	11.15	10.01	12.42	2.60
30-Mar	11.37	10.20	12.68	2.60
31-Mar	11.68	10.43	13.08	2.60
1-Apr	10.28	8.36	12.50	6.75
2-Apr	10.40	8.36	12.77	6.75
3-Apr	11.06	8.84	13.65	6.75
4-Apr	11.26	8.96	13.93	6.75
5-Apr	12.65	10.10	15.63	6.75
6-Apr	13.16	10.77	15.93	6.75
7-Apr	12.92	10.56	15.65	6.75
8-Apr	13.42	10.87	16.39	6.75
9-Apr	14.17	11.60	17.15	6.75
10-Apr	14.41	11.80	17.43	6.75
11-Apr	15.09	12.52	18.05	6.75
12-Apr	16.54	13.73	19.79	6.75
13-Apr	17.88	15.04	21.15	6.75
14-Apr	18.99	16.16	22.21	6.75

15-Apr	19.14	16.38	22.27	6.75
16-Apr	20.59	17.62	23.96	6.75
17-Apr	22.69	19.68	26.07	6.75
18-Apr	24.23	20.79	28.15	6.75
19-Apr	23.82	20.40	27.71	6.75
20-Apr	25.29	21.71	29.37	6.75
21-Apr	26.93	23.01	31.42	6.75
22-Apr	28.21	23.65	33.49	6.75
23-Apr	29.99	24.89	35.98	6.75
24-Apr	30.30	25.13	36.35	6.75
25-Apr	30.75	25.56	36.81	6.75
26-Apr	31.40	25.88	37.90	6.75
27-Apr	31.62	26.16	38.02	6.75
28-Apr	32.42	27.02	38.72	6.75
29-Apr	33.65	28.24	39.94	6.75
30-Apr	34.86	29.24	41.40	6.75
1-May	37.63	31.60	44.67	6.75
2-May	39.45	33.27	46.65	6.75
3-May	42.26	35.54	50.11	6.75
4-May	43.54	36.46	51.84	6.75
5-May	46.45	38.81	55.42	6.75
6-May	49.47	41.33	59.04	6.75
7-May	51.96	43.34	62.11	6.75
8-May	54.26	45.05	65.16	6.75
9-May	55.49	46.20	66.45	6.75
10-May	57.35	47.50	69.04	6.75
11-May	59.86	48.81	73.15	6.75
12-May	62.30	50.29	76.89	6.75
13-May	64.48	51.92	79.80	6.75
14-May	67.24	54.16	83.19	6.75
15-May	72.79	58.50	90.28	6.75
16-May	73.39	59.14	90.76	6.75
17-May	75.32	60.71	93.14	6.75
18-May	78.58	63.58	96.81	6.75
19-May	78.38	63.81	95.99	6.75
20-May	81.35	66.34	99.47	6.75
21-May	84.07	68.72	102.56	6.75
22-May	87.44	71.19	107.11	6.75
23-May	87.74	71.74	107.02	6.75
24-May	88.90	72.43	108.81	6.75
25-May	87.73	71.46	107.40	6.75
26-May	87.71	71.87	106.76	6.75
27-May	89.20	72.93	108.79	6.75
28-May	90.29	74.18	109.63	6.75
29-May	90.04	74.15	109.06	6.75
30-May	87.56	72.25	105.83	6.75
31-May	85.81	71.24	103.10	6.75
1-Jun	83.81	69.38	100.98	6.75
2-Jun	82.31	67.77	99.68	6.75
3-Jun	81.43	67.38	98.13	6.75
4-Jun	79.10	65.10	95.82	6.75
5-Jun	76.93	63.21	93.34	6.75
6-Jun	74.92	61.19	91.41	6.75
7-Jun	76.38	61.87	93.96	6.75
8-Jun	73.29	59.32	90.23	6.75

9-Jun	69.86	56.18	86.51	6.75
10-Jun	67.52	54.25	83.67	6.75
11-Jun	63.04	50.37	78.51	6.75
12-Jun	59.93	47.81	74.74	6.75
13-Jun	57.04	45.23	71.51	6.75
14-Jun	55.04	43.31	69.52	6.75
15-Jun	53.03	41.82	66.80	6.75
16-Jun	51.42	40.41	64.99	6.75
17-Jun	49.62	39.05	62.63	6.75
18-Jun	47.22	36.88	60.03	6.75
19-Jun	45.38	35.22	58.01	6.75
20-Jun	43.32	33.50	55.53	6.75
21-Jun	41.97	32.48	53.77	6.75
22-Jun	40.50	31.67	51.35	6.75
23-Jun	38.17	29.75	48.53	6.75
24-Jun	35.43	27.42	45.31	6.75
25-Jun	33.18	25.50	42.67	6.75
26-Jun	31.93	24.65	40.89	6.75
27-Jun	29.98	23.09	38.44	6.75
28-Jun	27.16	20.65	35.19	6.75
29-Jun	25.60	19.40	33.24	6.75
30-Jun	23.36	17.48	30.63	6.75
1-Jul	21.88	16.22	28.92	6.75
2-Jul	20.74	15.33	27.45	6.75
3-Jul	19.92	14.89	26.11	6.75
4-Jul	18.07	13.47	23.71	6.75
5-Jul	17.15	12.86	22.36	6.75
6-Jul	16.48	12.09	21.88	6.75
7-Jul	15.34	11.37	20.13	6.75
8-Jul	15.39	11.52	20.06	6.75
9-Jul	14.96	11.14	19.60	6.75
10-Jul	14.38	10.83	18.66	6.75
11-Jul	13.41	10.05	17.44	6.75
12-Jul	13.28	9.82	17.47	6.75
13-Jul	12.89	9.42	17.13	6.75
14-Jul	11.98	8.62	16.09	6.75
15-Jul	11.46	8.18	15.47	6.75
16-Jul	11.23	8.16	14.94	6.75
17-Jul	10.70	7.67	14.36	6.75
18-Jul	9.91	6.73	13.85	6.75
19-Jul	9.43	6.27	13.38	6.75
20-Jul	9.28	6.31	12.96	6.75
21-Jul	9.37	6.60	12.74	6.75
22-Jul	8.16	5.54	11.35	6.75
23-Jul	8.38	5.96	11.27	6.75
24-Jul	7.78	5.33	10.75	6.75
25-Jul	8.30	5.83	11.28	6.75
26-Jul	9.12	6.70	12.00	6.75
27-Jul	9.22	6.68	12.27	6.75
28-Jul	8.89	6.12	12.30	6.75
29-Jul	8.02	5.19	11.56	6.75
30-Jul	7.70	4.81	11.37	6.75
31-Jul	7.43	4.74	10.81	6.75
1-Aug	8.04	5.27	11.51	4.00
2-Aug	8.25	5.44	11.79	4.00

3-Aug	7.82	5.15	11.15	4.00
4-Aug	7.56	5.12	10.56	4.00
5-Aug	7.87	5.46	10.82	4.00
6-Aug	7.45	5.15	10.25	4.00
7-Aug	7.55	5.18	10.45	4.00
8-Aug	6.91	4.78	9.46	4.00
9-Aug	6.32	4.29	8.78	4.00
10-Aug	6.38	4.24	9.00	4.00
11-Aug	6.27	4.01	9.07	4.00
12-Aug	6.71	4.27	9.77	4.00
13-Aug	7.48	4.77	10.93	4.00
14-Aug	7.10	4.35	10.65	4.00
15-Aug	6.30	3.62	9.81	4.00
16-Aug	5.90	3.24	9.39	4.00
17-Aug	6.18	3.41	9.85	4.00
18-Aug	6.34	3.62	9.91	4.00
19-Aug	6.16	3.42	9.76	4.00
20-Aug	6.35	3.78	9.64	4.00
21-Aug	7.06	4.69	10.03	4.00
22-Aug	6.68	4.55	9.28	4.00
23-Aug	6.13	4.06	8.66	4.00
24-Aug	5.80	3.81	8.24	4.00
25-Aug	5.30	3.31	7.75	4.00
26-Aug	5.12	3.16	7.54	4.00
27-Aug	4.35	2.42	6.75	4.00
28-Aug	4.45	2.59	6.78	4.00
29-Aug	3.97	2.30	6.02	4.00
30-Aug	4.00	2.42	5.89	4.00
31-Aug	3.87	2.32	5.75	4.00
1-Sep	3.63	2.13	5.45	4.00
2-Sep	3.24	1.77	5.03	4.00
3-Sep	3.24	1.65	5.22	4.00
4-Sep	3.57	2.06	5.42	4.00
5-Sep	3.51	2.09	5.23	4.00
6-Sep	4.46	2.98	6.26	4.00
7-Sep	4.04	2.63	5.74	4.00
8-Sep	4.45	3.20	5.91	4.00
9-Sep	4.64	3.41	6.08	4.00
10-Sep	4.67	3.40	6.14	4.00
11-Sep	4.34	3.10	5.80	4.00
12-Sep	4.31	3.05	5.80	4.00
13-Sep	4.00	2.76	5.45	4.00
14-Sep	3.85	2.70	5.19	4.00
15-Sep	3.31	2.08	4.77	4.00
16-Sep	3.16	1.93	4.60	4.00
17-Sep	3.69	2.50	5.09	4.00
18-Sep	4.10	2.91	5.50	4.00
19-Sep	4.43	3.25	5.80	4.00
20-Sep	4.56	3.34	5.99	4.00
21-Sep	4.70	3.44	6.18	4.00
22-Sep	4.60	3.39	6.03	4.00
23-Sep	4.70	3.57	6.02	4.00
24-Sep	4.51	3.37	5.82	4.00
25-Sep	4.76	3.59	6.11	4.00
26-Sep	4.82	3.62	6.23	4.00

27-Sep	4.66	3.50	6.02	4.00
28-Sep	4.70	3.60	5.97	4.00
29-Sep	4.70	3.57	6.03	4.00
30-Sep	4.88	3.69	6.27	4.00
1-Oct	4.74	3.69	5.94	4.00
2-Oct	4.96	3.93	6.13	4.00
3-Oct	4.86	3.88	5.99	4.00
4-Oct	4.95	3.93	6.11	4.00
5-Oct	5.05	4.08	6.15	4.00
6-Oct	5.06	4.06	6.20	4.00
7-Oct	5.30	4.17	6.60	4.00
8-Oct	5.52	4.42	6.77	4.00
9-Oct	5.37	4.27	6.62	4.00
10-Oct	5.32	4.27	6.51	4.00
11-Oct	5.19	4.17	6.35	4.00
12-Oct	5.32	4.29	6.51	4.00
13-Oct	5.41	4.35	6.63	4.00
14-Oct	5.48	4.33	6.82	4.00
15-Oct	5.75	4.59	7.09	4.00
16-Oct	5.95	4.78	7.30	4.00
17-Oct	6.18	4.92	7.65	4.00
18-Oct	5.92	4.78	7.23	4.00
19-Oct	6.05	4.91	7.37	4.00
20-Oct	6.22	5.04	7.57	4.00
21-Oct	6.08	4.96	7.34	4.00
22-Oct	6.22	5.15	7.44	4.00
23-Oct	6.07	5.02	7.25	4.00
24-Oct	5.90	4.86	7.08	4.00
25-Oct	5.73	4.69	6.90	4.00
26-Oct	5.93	4.88	7.11	4.00
27-Oct	6.00	4.93	7.22	4.00
28-Oct	5.99	4.90	7.23	4.00
29-Oct	6.12	5.08	7.29	4.00
30-Oct	6.06	5.04	7.20	4.00
31-Oct	6.25	5.18	7.44	4.00
1-Nov	8.98	8.03	10.03	4.00
2-Nov	8.72	7.78	9.78	4.00
3-Nov	8.82	7.85	9.92	4.00
4-Nov	8.88	7.91	9.96	4.00
5-Nov	8.83	7.79	10.01	4.00
6-Nov	8.96	7.96	10.08	4.00
7-Nov	8.85	7.89	9.94	4.00
8-Nov	8.61	7.66	9.67	4.00
9-Nov	8.67	7.76	9.68	4.00
10-Nov	8.33	7.41	9.37	4.00
11-Nov	8.32	7.47	9.28	4.00
12-Nov	8.25	7.36	9.26	4.00
13-Nov	8.05	7.23	8.97	4.00
14-Nov	8.20	7.38	9.12	4.00
15-Nov	7.83	7.04	8.72	4.00
16-Nov	7.86	7.08	8.73	2.60
17-Nov	7.87	7.14	8.68	2.60
18-Nov	7.73	7.02	8.50	2.60
19-Nov	7.63	6.91	8.42	2.60
20-Nov	7.55	6.85	8.33	2.60

21-Nov	7.47	6.75	8.27	2.60
22-Nov	7.40	6.69	8.18	2.60
23-Nov	7.37	6.68	8.14	2.60
24-Nov	7.30	6.59	8.10	2.60
25-Nov	7.40	6.68	8.20	2.60
26-Nov	7.36	6.60	8.21	2.60
27-Nov	7.20	6.44	8.04	2.60
28-Nov	7.08	6.33	7.91	2.60
29-Nov	6.88	6.10	7.77	2.60
30-Nov	6.96	6.20	7.82	2.60
1-Dec	6.25	5.71	6.85	2.60
2-Dec	6.28	5.74	6.87	2.60
3-Dec	6.27	5.70	6.89	2.60
4-Dec	6.15	5.57	6.78	2.60
5-Dec	6.10	5.51	6.75	2.60
6-Dec	5.98	5.37	6.66	2.60
7-Dec	5.88	5.25	6.59	2.60
8-Dec	5.82	5.21	6.52	2.60
9-Dec	5.77	5.14	6.48	2.60
10-Dec	5.70	5.07	6.40	2.60
11-Dec	5.70	5.08	6.39	2.60
12-Dec	5.68	5.12	6.30	2.60
13-Dec	5.79	5.25	6.38	2.60
14-Dec	5.70	5.17	6.28	2.60
15-Dec	5.65	5.11	6.24	2.60
16-Dec	5.64	5.11	6.24	2.60
17-Dec	5.69	5.15	6.29	2.60
18-Dec	5.67	5.13	6.27	2.60
19-Dec	5.56	5.00	6.18	2.60
20-Dec	5.63	5.07	6.25	2.60
21-Dec	5.53	4.91	6.24	2.60
22-Dec	5.61	4.96	6.34	2.60
23-Dec	5.58	4.92	6.33	2.60
24-Dec	5.54	4.88	6.30	2.60
25-Dec	5.54	4.88	6.29	2.60
26-Dec	5.59	4.93	6.35	2.60
27-Dec	5.58	4.88	6.37	2.60
28-Dec	5.39	4.64	6.28	2.60
29-Dec	4.87	3.75	6.33	2.60
30-Dec	5.26	4.27	6.48	2.60
31-Dec	5.23	4.24	6.44	2.60

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 18 decreed surface diversions within this reach of stream: Turner Ditch (1.2 cfs, 1881 appropriation), Henry White Ditch (1.0 cfs, 1881 appropriation), /LD Ditch No. 1 (3.0 cfs, 1969 appropriation), Little Kerber Ditch 1 (3.0 cfs, 1969 appropriation), White Ditch (0.4 cfs, 1883 appropriation), /LD Ditch No. 2 (3.0 cfs, 1969 appropriation), Clayton Old Channel Ditch (2.7 cfs (1873 & 1888 appropriations), Cody Ditch (1.0 cfs, 1872 appropriation), Wagner Ditch (3.0 cfs, 1989 appropriation), Wagner Ditch No. 3 (3.0 cfs, 1986 appropriation), Clayton Ditch D (3.4 cfs, 1872 appropriation), Clayton Ditch E (4.0 cfs, 1872 appropriation), Wagner Ditch No. 1 (2.5 cfs, 1995 appropriation), Wagner Ditch No. 2 (2.1 cfs, 1995 appropriation), Amer Ditch No. 1 (2.0 cfs, 1939 appropriation), Amer Ditch No. 2 (2.0 cfs, 1940 appropriation), Morning Star Haven Ditch (1.5 cfs, 1995 appropriation), Clayton Ditch ABC (10 cfs, 1874 & 1884 appropriations). Staff has determined that water is available for appropriation on Kerber Creek, between the confluence with Brewery Creek and the Wells Kerber Ditch 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

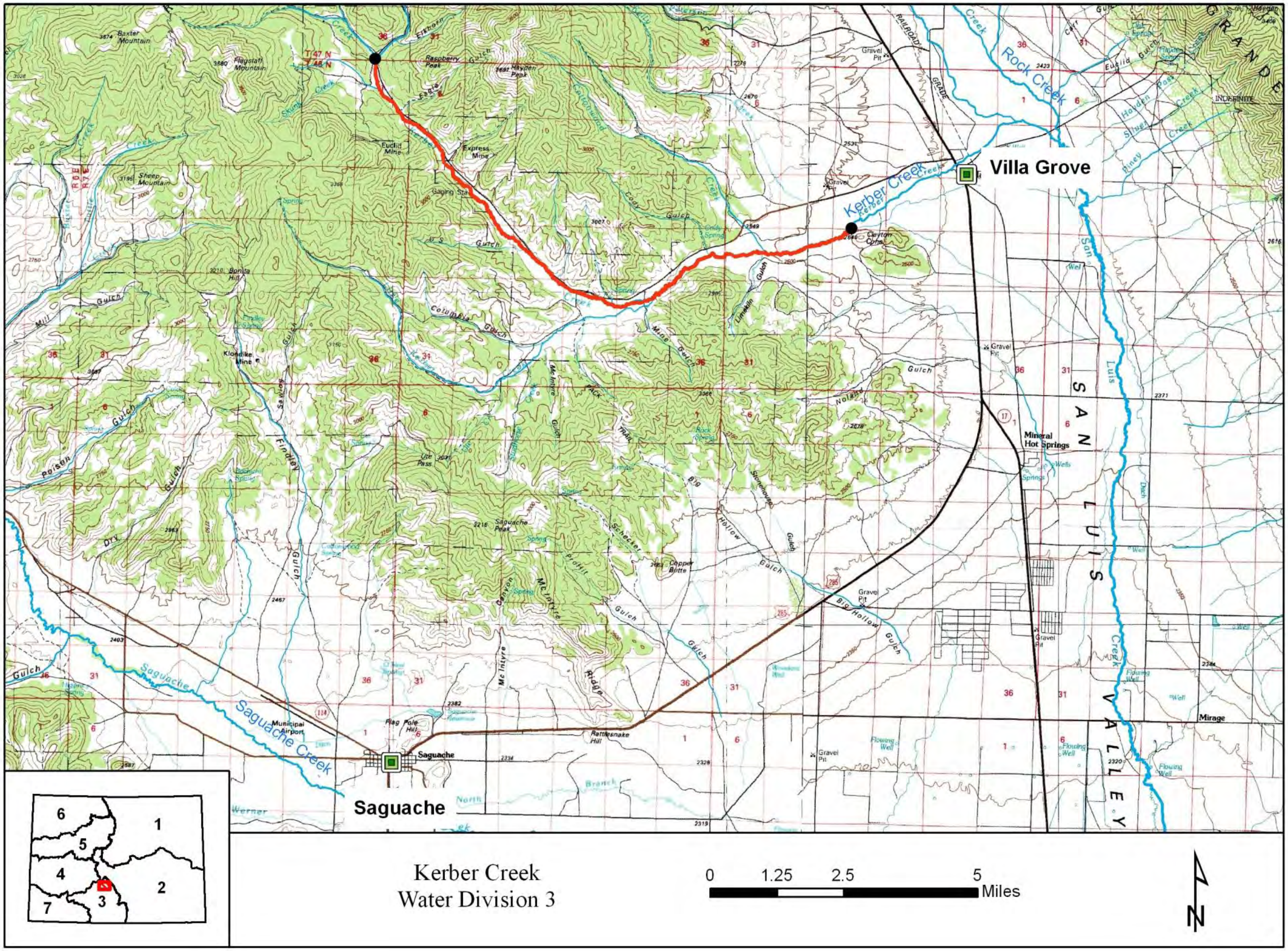
Staff recommends the Board form its intent to appropriate on the following stream reach:

Segment: Confluence with Brewery Creek to Wells Kerber Ditch Headgate
Upper Terminus: CONFLUENCE WITH BREWERY CREEK
(Latitude 38° 16' 37.53"N) (Longitude 106° 08' 59.61"W)
UTM North: 4237184.91 UTM East: 399422.13
SE SW Section 36, Township 47 North, Range 7 East NMPM
1851' East of the West Section Line; 85' North of the South Section Line

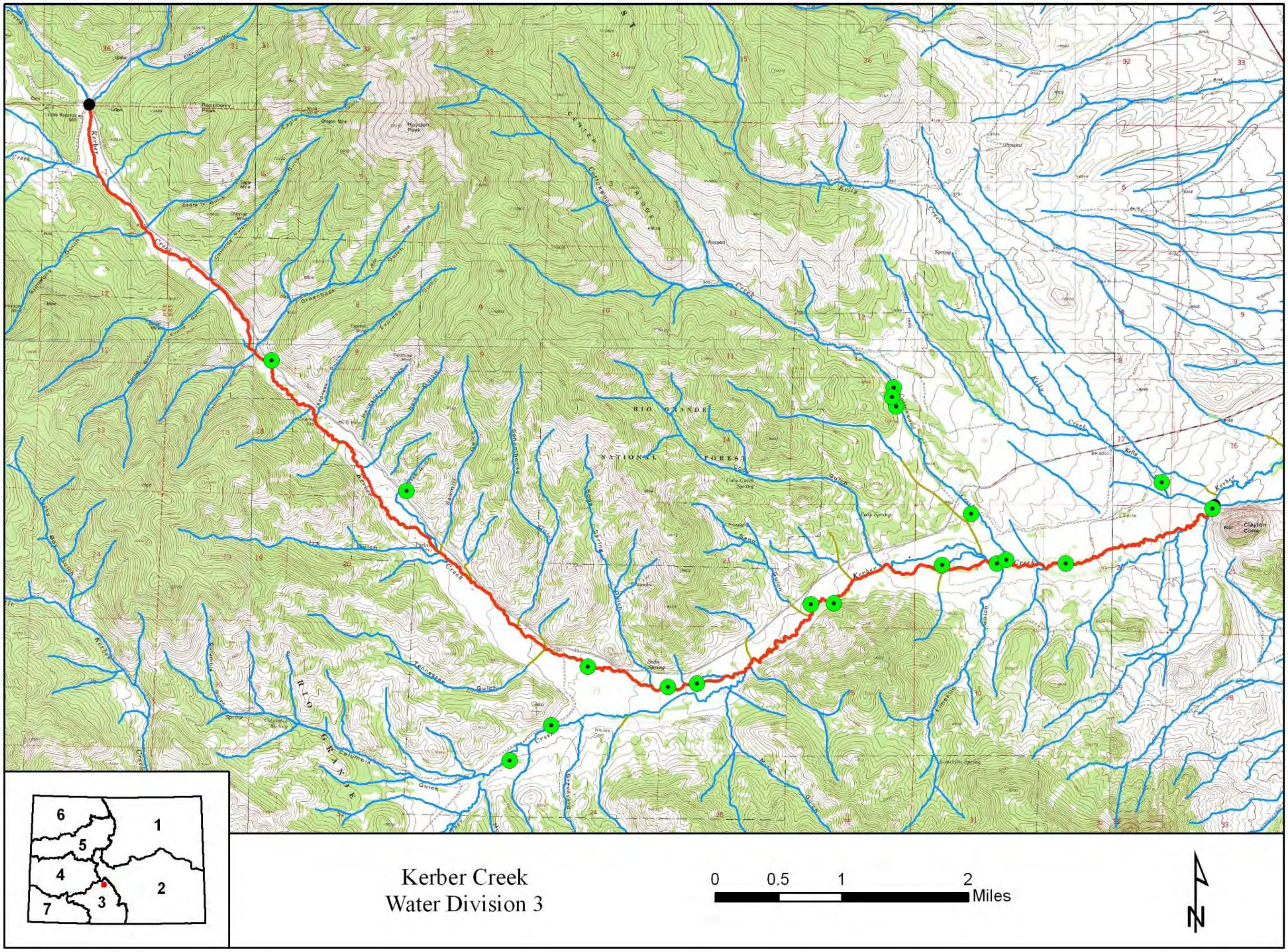
Lower Terminus: WELLS KERBER DITCH HEADGATE
(Latitude 38° 13' 57.8"N) (Longitude 105° 59' 8.71"W)
UTM North: 4232095.90 UTM East: 413726.70
SE SW Section 16, Township 46 North, Range 9 East NMPM
1827' East of the West Section Line; 116' North of the South Section Line

Watershed: San Luis (HUC#: 13010003)
Counties: Saguache
Length: 13.1 miles
USGS Quad(s): Villa Grove, Graveyard Gulch, Klondike Mine, Bonanza
Flow Recommendation: 6.75 cfs (April 1 – July 31)
4.0 cfs (August 1 – November 15)
2.6 cfs (November 16 – March 31)

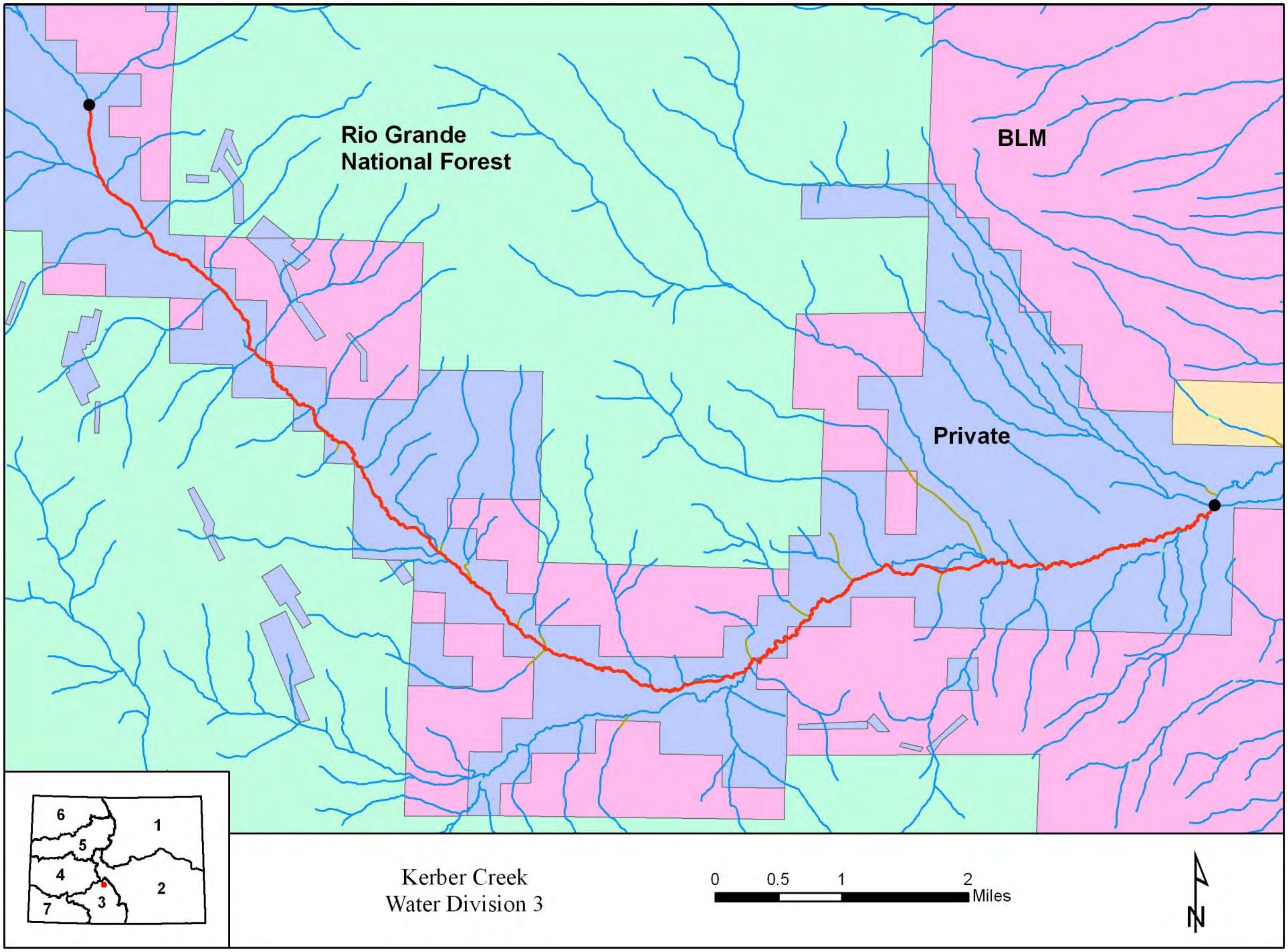
Vicinity Map



Water Rights Map



Land Use Map



Rio Grande
National Forest
BLM
Private
6
1
5
4
2
7
3
Kerber Creek
Water Division 3
0
0.5
1
2
Miles
N