<u>Stream</u>: San Miguel River

Executive Summary

Water Division: 4
Water District: 60
CDOW#: 46842
CWCB ID: 09/4/A-009

<u>Segment</u>: Confluence with Calamity Draw to Confluence with Dolores River

Upper Terminus: CONFLUENCE WITH CALAMITY DRAW
(Latitude 38° 15’ 23.58”N) (Longitude 108° 36’ 48.82”W)

Lower Terminus: CONFLUENCE WITH DOLORES RIVER
(Latitude 38° 22’ 46.6”N) (Longitude 108° 48’ 1.3”W)

Watershed: San Miguel (HUC#: 14030003**)**
Counties: Montrose
Length: 17.24 miles
USGS Quad(s): Nucla, Uravan, Atkinson Creek, Red Canyon
Flow Recommendation: 325 cfs (April 15 – June 14)
170 cfs (June 15 – July 31)
115 cfs (August 1 – August 31)
80 cfs (September 1 – February 29)
115 cfs (March 1 – April 14)

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) and Colorado Division of Wildlife (CDOW) recommended this segment of the San Miguel River to the CWCB for inclusion into the Instream Flow Program. The San Miguel River 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.

The San Miguel River is approximately 70 miles long. It begins on the north side of Wasatch Mountain at an elevation of 9,100 feet and terminates at the confluence with the Dolores River at an elevation of 4,900 feet. Of the 17.24 mile segment addressed by this report, approximately 28% of the segment is located on federal lands. This segment of the San Miguel River is located within Montrose County and generally flows in a northwesterly direction. The San Miguel River has a total drainage area of approximately 1,500 square miles. The San Miguel Basin is the largest tributary to the Dolores River and is part of the Upper Colorado System. The one million acre San Miguel Basin is about 60 % semi-arid rangeland and agricultural land, both comprising the lower elevations. The remaining 40% of the basin is in higher elevation, forested subalpine and alpine zones in the San Juan Mountains. Most of the flow in the San Miguel River (240,000 acre-feet per year) is derived from snowmelt at higher elevations. Because of its relatively low human population density and lack of large water storage impoundments, the San Miguel Basin is considered to be one of the few ecologically and hydrologically intact river basins in Colorado.

The subject of this report is a segment of the San Miguel River beginning at the confluence with Calamity Draw and extending downstream to the confluence with the Dolores River. The proposed segment is located approximately 3 miles west of the Town of Nucla. The staff has received one joint recommendation for this segment, from the BLM & CDOW. The recommendation for this segment is discussed below.

Instream Flow Recommendation

The BLM & CDOW are recommending 325 cfs (April 15 – June 14), 170 cfs (June 15 – July 31), 115 cfs (August 1 – August 31), 80 cfs (September 1 – February 29) and 115 cfs (March 1 – April 14) based on their data collection efforts and staff's water availability analyses.

Land Status Review

Upper Terminus	Lower Terminus	Total Length (miles)	Land Ownership	
			% Private	% Public
Confluence w/ Calamity Draw	Confluence w/ Dolores River	17.24	72%	28%

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

Biological Data

Over the past ten years, the CDOW and BLM have been collecting stream cross-section information, natural environment data, and other data needed to quantify the instream flow needs for this reach of the San Miguel River. The San Miguel River is classified as a large river (over 100 feet wide) and fishery surveys in 2001 indicate the stream environment supports: bluehead sucker (*Catostomus discobolus*), flannelmouth sucker (*Catostomus latipinnis*), mottled sculpin (*Cottus bairdi*), roundtail chub (*Gila robusta*), speckled dace (*Rhinichthys osculus*) and white sucker (*Catostomus commersoni*). In addition, the BLM has been collecting aquatic invertebrate samples, for several years, at several sites within the proposed instream flow reaches. These sites include the San Miguel upstream of the Dolores River, at Tabequache Creek, and upstream of Tabequache Creek.

Roundtail chub (*Gila robusta*) is recognized by the State of Colorado as a species of special concern. The roundtail chub, flannelmouth sucker (*Catostomus latipinnis*) and bluehead sucker (*Catostomus discobolus*) are considered sensitive species by the BLM. Criteria that apply to BLM sensitive species include the following: 1) species under status review by the U.S. Fish and Wildlife Service; or 2) species with numbers declining so rapidly that federal listing may become necessary; or 3) species with typically small and widely dispersed populations; or 4) species inhabiting ecological refugia or other specialized or unique habitats.

The CDOW, BLM and five other state wildlife have developed a "Range-wide conservation agreement and strategy" to direct management for these species. This plan provides direction and goals for research and management of projects. The success of management strategies will depend upon the voluntary implementation of these strategies by the signatories. Special attention will need to be given to habitat degradation and influence of non-native species interactions within the native range of these species. The intention of these plans is to increase populations and distributions of identified species, thereby assisting in the long-term persistence of each species. The success of such plans could potentially curtail the need for federal listing of these species under the Endangered Species Act (ESA). These species are not currently federally listed.

Historically, roundtail chub were known to commonly occur in most medium to large tributaries of the Upper Colorado River Basin (Vanicek 1967, Holden and Stalnaker 1975, Joseph et al. 1977). Roundtail chub historically occurred in lower elevation (below 7,546 ft.) streams, including the Colorado, Dolores, Duchesne, Escalante, Green, Gunnison, Price, San Juan, San Rafael, White, and Yampa rivers (Bezzerides and Bestgen 2002). Roundtail chub are often found in stream reaches that have a complexity of pool and riffle habitats (Bezzerides and Bestgen 2002). Adults are found in eddies and pools adjacent to strong current and use instream

boulders as cover (Sigler and Sigler 1996, Brouder et al., 2000). Roundtail chub begin spawning when water temperatures reach about 65°F (Vanicek and Kramer 1969, Joseph et al. 1977). In most Colorado River tributaries, this increase in temperature coincides with a decrease in discharge after peak runoff (Bezzerides and Bestgen 2002).

The flannelmouth sucker is a good indicator species for flow and habitat relationships (Stewart and Anderson 2006-CR1). The flannelmouth sucker is a large fish reaching up to almost 2 feet in length. Historically, the flannelmouth sucker was commonly found in most, if not all, medium to large, lower elevation rivers of the Upper Colorado River drainage (upstream of Glen Canyon Dam). Within the State of Colorado, flannelmouth sucker are present in the Colorado River and numerous tributaries including the Gunnison River up to the Aspinall Unit reservoirs (Bezzerides and Bestgen 2002), the Uncompahgre River (Sigler and Miller 1963) and the Dolores River. Flannelmouth suckers are typically found in slower, warmer rivers in plateau regions of the Colorado River drainage (Deacon and Mize 1997). They usually inhabit the mainstem of moderate to large rivers but are occasionally found in small streams. This species frequents pools and deep runs but can also be found in the mouths of tributaries, riffles, and backwaters. Flannelmouth sucker typically spawn in the Upper Colorado River basin between April and June (McAda 1977, McAda and Wydoski 1980, Snyder and Muth 1990, Tyus and Karp 1990).

The bluehead sucker provides the most information for justifying instream flow needs to maintain the native fish assemblage (Stewart and Anderson 2006-CR1). The bluehead sucker is a large fish reaching up to 17 inches in length. This species is found in a large variety of river systems ranging from large rivers with discharges of several thousand cfs to small creeks with less than a couple of cfs (Smith 1966). Adult bluehead suckers exhibit a strong preference for specific habitat types (Holden and Stalnaker 1975). This species has been reported to typically be found in runs or riffles with rock or gravel substrate (Vanicek 1967, Holden and Stalnaker 1975, Carlson et al. 1979, Sublette et al. 1990). The bluehead sucker is known to feed on invertebrates, which have their highest densities in riffles. Although the species generally inhabits streams with cool temperatures, bluehead suckers have been found inhabiting small creeks with water temperatures as high as 82.4° F (Smith 1966).

Field Survey Data

The CDOW and BLM collected transect and flow data for 7 different cross-sections within an 815 foot reach of stream. The transect data was collected at a site approximately 1.5 miles upstream from the confluence of the San Miguel River with Tabeguache Creek. These 7 transects incorporated different mesohabitat types including riffles, runs, pools and glides. These 7 different cross-sections formed the basis for the PHABSIM/RHABSIM study conducted by the CDOW and BLM. PHABSIM is widely used in North America to quantify instream flow regimes and consists of two modeling components. The hydraulic component is a series of one-dimensional cross-sections that are linked to produce a series of rectangular cells that form a grid. Mean depth and velocity conditions are calculated for each cell for a given flow. The biological component is a set of suitability index curves for depth and velocity criteria that are used to rate micro-habitat suitability for each cell in the cross-sectional grid. Habitat availability is measured by an index called weighted useable area (WUA), the summation of cell areas weighted by its suitability index. When plotted versus discharge, WUA typically peaks at a single flow that is considered the flow that maximizes habitat.

For this study, 7 one-dimensional cross-sections were linked to produce the series of rectangular cells that formed the grid to estimate WUA. Mean depth and velocity conditions were calculated for each cell at 4 different measured flows (100, 175, 325 and 450 cfs). Habitat suitability criteria (HSC) were developed from the 2003 Riverine Fish Flow Investigation Study Report (Federal Aid Project F-289-R6) written and performed by Richard Anderson, CDOW Aquatic Researcher, and Gregory Stewart, Department of Geosciences Oregon State University. The basis for this study was a 1999 request from the CWCB for the CDOW to provide biologically justified instream flow recommendations for the Yampa and Colorado Rivers based on habitat and flow requirements for non-endangered native fish. Anderson and Stewart used two–dimensional (2D) modeling to develop habitat suitability criteria for bluehead and flannelmouth suckers, two native species. Their methods and results are more fully described in Anderson and Stewart (2003) and Stewart and Anderson (2005) and (2006).

The bluehead and flannelmouth sucker habitat suitability criteria were used to develop specific hydraulic criteria that were incorporated into a PHABSIM/RHABSIM analysis. Stewart and Anderson determined that "Abundance of bluehead sucker was a reliable indicator for instream flows and habitat maintenance for the native fish assemblage. In the Colorado, Gunnison and Yampa Rivers bluehead sucker habitat peaked at flows of 600 to 1,200 cfs. This flow range also resulted in high habitat diversity and high native fish biomass. Their assumption that flows that maintained adequate bluehead sucker abundance (about 25% of fish over 15 cm) would also maintain adequate flannelmouth sucker and roundtail chub habitat was validated by this study."

CDOW and BLM determined for this flow recommendation that the bluehead sucker would be the primary indicator species for the biologically based instream flow recommendation with the flannelmouth sucker being the secondary indicator species. The main reason for this is bluehead sucker abundance is directly related to availability and quality of riffle habitats. The primary objective of most cross section methodologies, including R2CROSS, is to maintain quality riffles. Riffles are the most vulnerable habitat to dewatering and are important for invertebrate productivity. When riffle habitats are maintained, there should be sufficient habitats for perpetuating carrying capacity (biomass) and composition for all members of the native fish assemblage (Nehring 1979). To verify the flow recommendations, CDOW and BLM compared results from their PHABSIM/RHABSIM study with results using the R2CROSS Methodology with standard criteria.

Biological Flow Recommendation

DOW and BLM staff, using a combination of PHABSIM/RHABSIM and R2CROSS methodologies, developed the proposed instream flow recommendations for the San Miguel River. Board staff relied upon the biological expertise of the cooperating agencies to interpret the output from the PHABSIM/RHABSIM and R2CROSS Methodologies to develop the initial biologic instream flow recommendations.

These initial recommendations are designed to address the unique biologic requirements of each stream without regard to water availability. In addition to the criteria developed using the PHABSIM Methodology and RHABSIM Software, the three standard instream flow hydraulic

parameters used in R2CROSS (average depth, percent wetted perimeter and average velocity) were also used to calculate and predict the biologic instream flow recommendations.

For this segment of stream, several data sets were collected with the results shown in Table 1 below. Table 1 shows who collected the data (Party), the measured discharge at the time of the surveys (Q), the accuracy range of the predicted flows based on Manning's Equation (240% and 40% of Q), the method used, the summer flow recommendation based on meeting 3 of 3 hydraulic criteria and the winter flow recommendation based upon 2 of 3 hydraulic criteria.

Table 1: Data

Party	Q	Method	250%-40%	Summer (3/3)	Winter (2/3)
BLM & CDOW	450, 325, 175, 100	PHABSIM/ RHABSIM	1125 - 40	500 (bluehead) 325 (flannelmouth)*	---
BLM & CDOW	450, 325, 175, 100	Standard R2X	1125 - 40	650	115

* The PHABSIM/RHABSIM analysis was used to only quantify the suitable versus unsuitable hydraulic habitat attributes of bluehead and flannel mouth sucker adults as a function of discharge. Amounts shown reflect the discharge which produced the maximum amount of useable habitat based on the measured mesohabitat types.

The CDOW and BLM evaluated all of the data collected to date and determined that best flow recommendation would come from using the results from a combination of methods. PHABSIM is a widely accepted method for quantifying the suitable versus unsuitable hydraulic habitat attributes of selected species and life stages as a function of discharge. R2CROSS is best suited for identifying flows with specific hydraulic criteria across riffle type habitats. The State of Colorado has used R2CROSS extensively in the past to appropriate instream flow water rights. CDOW and BLM were concerned that the standard R2CROSS method may not be appropriate for this reach of the San Miguel River due to its major width (over 75' wide in most places), type of fish species present (warm/cool water species) and its big river channel hydraulics and characteristics.

Accordingly, BLM and CDOW staff compared results from their PHABSIM/RHABSIM data analysis with their R2CROSS analysis. Using the results from the PHABSIM/RHABSIM data analysis, the maximum amount of usable habitat for bluehead suckers was produced at a flow of 500 cfs, and for flannelmouth suckers at a flow of 325 cfs. The R2CROSS analysis indicated that a spring/summer flow of approximately 650 cfs was necessary to meet all three of the critical hydraulic criteria at this site and a fall/winter flow of 115 cfs would meet 2 of 3 of the hydraulic criteria.

CDOW and BLM are recommending that a flow of 325 cfs, for the time period of April 15 through June 14, is the minimum amount necessary to preserve the natural environment to a reasonable degree, for this reach of the San Miguel River. This is based on the assumption that 325 cfs would preserve 90% of the weighted useable area available to the bluehead sucker and 100% of the weighted useable area available to the flannelmouth sucker. BLM and CDOW staff also believes a flow that maintains adequate bluehead and flannelmouth sucker habitat should also maintain adequate roundtail chub habitat. The spring/summer flow of 325 cfs was reduced to 170 cfs for the June 15 through July 31 time period because of water availability concerns.

The instream flow recommendation of 170 cfs was derived to maximize the existing bluehead and flannelmouth sucker habitat available under a declining hydrograph, by maintaining an average depth of 1.0 foot over the measured riffle cross-section. An average depth of 1.0 foot combined with average velocities exceeding 1.3 ft/sec, were determined to be marginally suitable bluehead sucker habitat (see Anderson & Stewart Report).

Because the PHABSIM/RHABSIM data only quantified suitable versus unsuitable hydraulic habitat as a function of discharge, CDOW and BLM staff used the results of the R2CROSS Method to develop the fall/winter instream flow recommendation of 115 cfs. The R2CROSS Method suggests that fall/winter flows should maintain at least 2 of 3 of the identified critical hydraulic criteria. At the Cross Section #1 site, 115 cfs meets 2 of 3 criteria (average depth and velocity) by providing on average, 0.8 feet of depth and velocities well over 1.0 ft/sec. The fall/winter flow recommendation was further reduced to 80 cfs, for the time period of September through February, due to water availability concerns. It should be noted however, that 80 cfs still maintains adequate velocity (approximately 2.5 ft/sec), a wetted perimeter of almost 60% and an average depth of nearly 0.7 feet.

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 **San**

Miguel River there is a USGS gage record of discharge on the creek. However, the gage station is upstream from the LT. The USGS gage is SAN MIGUEL RIVER AT URAVAN, CO (USGS 09177000); it has a period of record (POR), of 42 years collected between 1953 and 2007. The gage is at an elevation of 5,000 ft above mean sea level (amsl) and has a drainage area of 1499 mi^2. The hydrograph (plot of discharge over time) produced from this gage includes the consumptive uses of numerous 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 San Miguel River 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 San Miguel River above the LT by multiplying the "adjusted" gage discharge values by an area ratio; specifically, the area of San Miguel River above the LT (1557.17 mi^2) to San Miguel River at Uravan (1499 mi^2). Next, the resulting proportioned "adjusted" hydrograph was itself "adjusted" (decreased) to reflect depletions on San Miguel River above the LT resulting from upstream consumptive irrigation uses. 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 San Miguel River above LT is to compute the Geometric Mean of the area-prorated "adjusted" data values from the San Miguel River at Uravan 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. 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

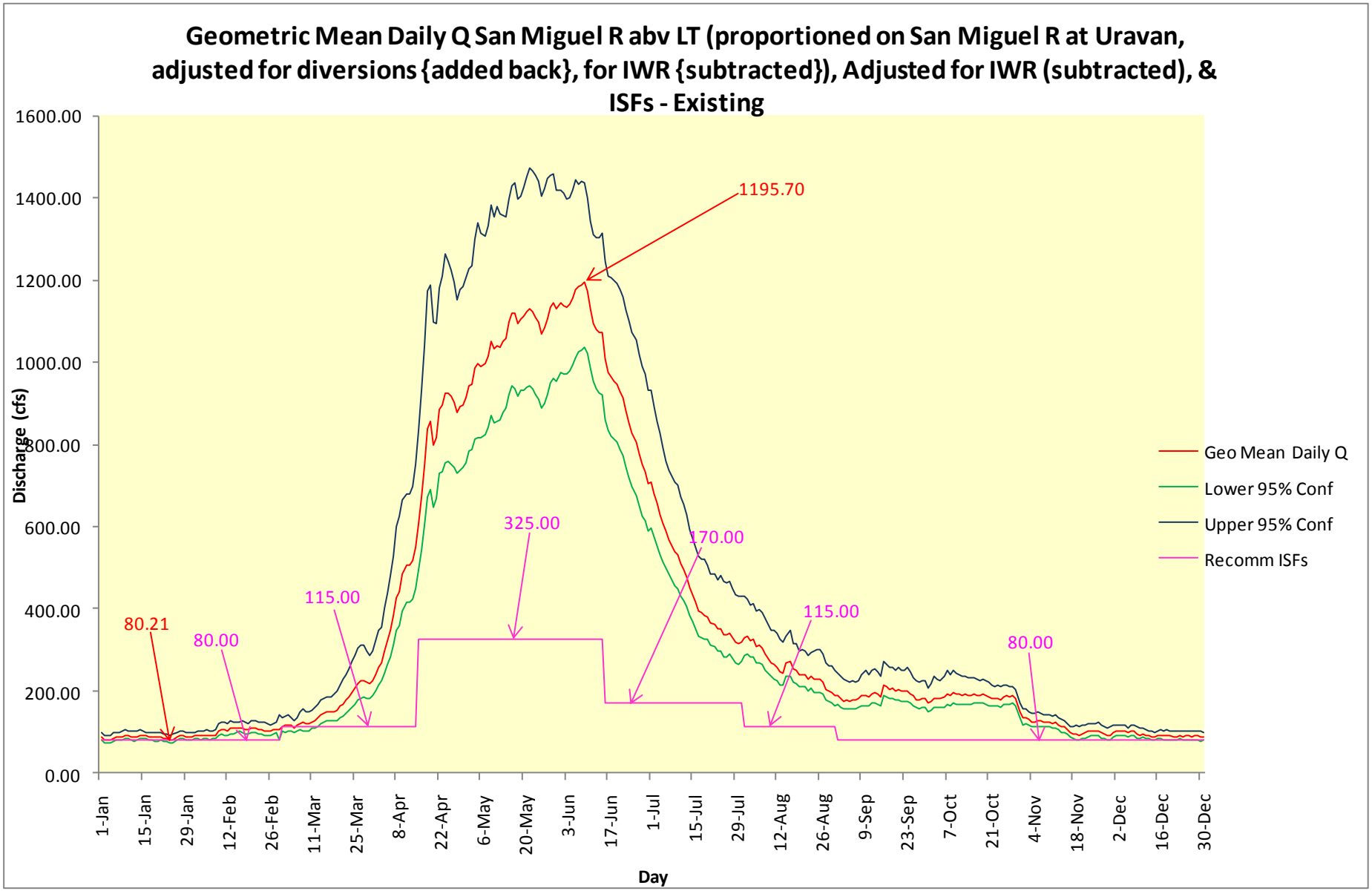

Geometric Mean Daily Q San Miguel R abv LT (proportioned on San Miguel R at Uravan, adjusted for diversions {added back}, for IWR {subtracted}), Adjusted for IWR (subtracted), & ISFs - Existing
Discharge (cfs)
1600.00
1400.00
1200.00
1000.00
800.00
600.00
400.00
200.00
0.00
1195.70
325.00
170.00
115.00
115.00
80.21
80.00
80.00
Geo Mean Daily Q
Lower 95% Conf
Upper 95% Conf
Recomm ISFs
1-Jan
15-Jan
29-Jan
12-Feb
26-Feb
11-Mar
25-Mar
8-Apr
22-Apr
6-May
20-May
3-Jun
17-Jun
1-Jul
15-Jul
29-Jul
12-Aug
26-Aug
9-Sep
23-Sep
7-Oct
21-Oct
4-Nov
18-Nov
2-Dec
16-Dec
30-Dec
Day

Table 2. Geometric Mean Discharge and Recommended Instream Flows		
Date	Recommended ISF	Proportioned Adjusted GM (abv gage) Adj (-) for Irr & OoB in SanMiguel R abv LT
1-Jan	80.00	87.97
2-Jan	80.00	82.24
3-Jan	80.00	81.55
4-Jan	80.00	80.70
5-Jan	80.00	86.31
6-Jan	80.00	87.50
7-Jan	80.00	89.03
8-Jan	80.00	89.91
9-Jan	80.00	92.51
10-Jan	80.00	91.98
11-Jan	80.00	89.47
12-Jan	80.00	86.78
13-Jan	80.00	89.52
14-Jan	80.00	92.44
15-Jan	80.00	92.12
16-Jan	80.00	90.57
17-Jan	80.00	89.40
18-Jan	80.00	87.85
19-Jan	80.00	87.77
20-Jan	80.00	86.99
21-Jan	80.00	87.65
22-Jan	80.00	85.54
23-Jan	80.00	83.44
24-Jan	80.00	80.21
25-Jan	80.00	81.88
26-Jan	80.00	87.75
27-Jan	80.00	92.12
28-Jan	80.00	91.22
29-Jan	80.00	88.02
30-Jan	80.00	88.23
31-Jan	80.00	88.38
1-Feb	80.00	90.35
2-Feb	80.00	91.46
3-Feb	80.00	91.17
4-Feb	80.00	91.44
5-Feb	80.00	92.01
6-Feb	80.00	90.33
7-Feb	80.00	91.14
8-Feb	80.00	93.06
9-Feb	80.00	102.61
10-Feb	80.00	105.57
11-Feb	80.00	104.39
12-Feb	80.00	102.47
13-Feb	80.00	108.34
14-Feb	80.00	108.50
15-Feb	80.00	109.49

16-Feb	80.00	111.47
17-Feb	80.00	109.49
18-Feb	80.00	106.71
19-Feb	80.00	105.66
20-Feb	80.00	109.80
21-Feb	80.00	110.11
22-Feb	80.00	107.38
23-Feb	80.00	106.10
24-Feb	80.00	104.09
25-Feb	80.00	104.18
26-Feb	80.00	102.13
27-Feb	80.00	105.16
28-Feb	80.00	107.91
29-Feb	80.00	106.99
1-Mar	115.00	114.28
2-Mar	115.00	115.30
3-Mar	115.00	117.78
4-Mar	115.00	115.30
5-Mar	115.00	110.33
6-Mar	115.00	115.84
7-Mar	115.00	122.01
8-Mar	115.00	123.44
9-Mar	115.00	119.83
10-Mar	115.00	120.33
11-Mar	115.00	125.23
12-Mar	115.00	129.24
13-Mar	115.00	134.05
14-Mar	115.00	143.00
15-Mar	115.00	144.23
16-Mar	115.00	148.65
17-Mar	115.00	149.08
18-Mar	115.00	150.93
19-Mar	115.00	153.80
20-Mar	115.00	163.25
21-Mar	115.00	168.56
22-Mar	115.00	177.12
23-Mar	115.00	185.50
24-Mar	115.00	196.50
25-Mar	115.00	207.59
26-Mar	115.00	219.32
27-Mar	115.00	224.59
28-Mar	115.00	225.41
29-Mar	115.00	221.34
30-Mar	115.00	219.54
31-Mar	115.00	225.43
1-Apr	115.00	240.84
2-Apr	115.00	258.64
3-Apr	115.00	269.76
4-Apr	115.00	296.99
5-Apr	115.00	322.08
6-Apr	115.00	347.23

7-Apr	115.00	383.68
8-Apr	115.00	428.45
9-Apr	115.00	442.98
10-Apr	115.00	483.48
11-Apr	115.00	507.86
12-Apr	115.00	507.08
13-Apr	115.00	515.66
14-Apr	115.00	550.60
15-Apr	325.00	606.58
16-Apr	325.00	670.53
17-Apr	325.00	748.00
18-Apr	325.00	838.41
19-Apr	325.00	854.69
20-Apr	325.00	797.33
21-Apr	325.00	815.52
22-Apr	325.00	885.28
23-Apr	325.00	895.50
24-Apr	325.00	926.18
25-Apr	325.00	925.47
26-Apr	325.00	915.75
27-Apr	325.00	901.61
28-Apr	325.00	878.20
29-Apr	325.00	891.22
30-Apr	325.00	896.51
1-May	325.00	913.17
2-May	325.00	942.10
3-May	325.00	947.21
4-May	325.00	984.57
5-May	325.00	997.98
6-May	325.00	989.21
7-May	325.00	995.01
8-May	325.00	1015.78
9-May	325.00	1051.99
10-May	325.00	1032.07
11-May	325.00	1038.83
12-May	325.00	1036.65
13-May	325.00	1051.43
14-May	325.00	1058.59
15-May	325.00	1096.10
16-May	325.00	1120.05
17-May	325.00	1118.68
18-May	325.00	1093.41
19-May	325.00	1105.01
20-May	325.00	1112.17
21-May	325.00	1123.02
22-May	325.00	1131.29
23-May	325.00	1122.64
24-May	325.00	1108.82
25-May	325.00	1097.19
26-May	325.00	1068.74
27-May	325.00	1082.43

28-May	325.00	1106.45
29-May	325.00	1132.35
30-May	325.00	1142.74
31-May	325.00	1129.21
1-Jun	325.00	1144.48
2-Jun	325.00	1138.10
3-Jun	325.00	1134.44
4-Jun	325.00	1141.06
5-Jun	325.00	1156.13
6-Jun	325.00	1177.64
7-Jun	325.00	1184.45
8-Jun	325.00	1189.06
9-Jun	325.00	1195.70
10-Jun	325.00	1173.10
11-Jun	325.00	1128.82
12-Jun	325.00	1093.89
13-Jun	325.00	1080.23
14-Jun	325.00	1071.14
15-Jun	325.00	1071.76
16-Jun	170.00	1006.26
17-Jun	170.00	975.49
18-Jun	170.00	964.80
19-Jun	170.00	954.27
20-Jun	170.00	946.21
21-Jun	170.00	928.70
22-Jun	170.00	912.67
23-Jun	170.00	881.91
24-Jun	170.00	853.50
25-Jun	170.00	828.12
26-Jun	170.00	805.56
27-Jun	170.00	776.08
28-Jun	170.00	749.80
29-Jun	170.00	734.77
30-Jun	170.00	705.87
1-Jul	170.00	709.66
2-Jul	170.00	680.49
3-Jul	170.00	656.57
4-Jul	170.00	630.61
5-Jul	170.00	608.26
6-Jul	170.00	587.83
7-Jul	170.00	569.06
8-Jul	170.00	553.27
9-Jul	170.00	537.89
10-Jul	170.00	529.84
11-Jul	170.00	509.19
12-Jul	170.00	497.26
13-Jul	170.00	478.11
14-Jul	170.00	450.54
15-Jul	170.00	433.61
16-Jul	170.00	414.46
17-Jul	170.00	394.78

18-Jul	170.00	389.31
19-Jul	170.00	385.41
20-Jul	170.00	381.63
21-Jul	170.00	364.99
22-Jul	170.00	363.87
23-Jul	170.00	352.07
24-Jul	170.00	349.86
25-Jul	170.00	336.03
26-Jul	170.00	336.16
27-Jul	170.00	341.94
28-Jul	170.00	330.77
29-Jul	170.00	317.96
30-Jul	170.00	314.21
31-Jul	170.00	318.59
1-Aug	115.00	331.10
2-Aug	115.00	332.99
3-Aug	115.00	324.20
4-Aug	115.00	324.91
5-Aug	115.00	307.91
6-Aug	115.00	310.26
7-Aug	115.00	305.13
8-Aug	115.00	290.50
9-Aug	115.00	279.90
10-Aug	115.00	269.00
11-Aug	115.00	263.73
12-Aug	115.00	258.39
13-Aug	115.00	246.75
14-Aug	115.00	244.59
15-Aug	115.00	266.63
16-Aug	115.00	271.56
17-Aug	115.00	252.43
18-Aug	115.00	249.65
19-Aug	115.00	239.17
20-Aug	115.00	238.76
21-Aug	115.00	241.00
22-Aug	115.00	227.48
23-Aug	115.00	234.37
24-Aug	115.00	228.06
25-Aug	115.00	228.46
26-Aug	115.00	228.68
27-Aug	115.00	219.99
28-Aug	115.00	205.22
29-Aug	115.00	200.29
30-Aug	115.00	197.09
31-Aug	115.00	188.71
1-Sep	80.00	189.80
2-Sep	80.00	181.81
3-Sep	80.00	176.43
4-Sep	80.00	176.96
5-Sep	80.00	176.24
6-Sep	80.00	176.74

7-Sep	80.00	177.94
8-Sep	80.00	180.90
9-Sep	80.00	188.43
10-Sep	80.00	190.56
11-Sep	80.00	185.23
12-Sep	80.00	194.27
13-Sep	80.00	195.74
14-Sep	80.00	191.28
15-Sep	80.00	186.04
16-Sep	80.00	214.88
17-Sep	80.00	209.11
18-Sep	80.00	205.28
19-Sep	80.00	205.43
20-Sep	80.00	201.06
21-Sep	80.00	202.47
22-Sep	80.00	200.28
23-Sep	80.00	199.02
24-Sep	80.00	200.56
25-Sep	80.00	194.11
26-Sep	80.00	187.43
27-Sep	80.00	179.80
28-Sep	80.00	178.62
29-Sep	80.00	181.06
30-Sep	80.00	180.26
1-Oct	80.00	169.99
2-Oct	80.00	174.91
3-Oct	80.00	182.79
4-Oct	80.00	181.32
5-Oct	80.00	180.85
6-Oct	80.00	184.53
7-Oct	80.00	193.42
8-Oct	80.00	189.94
9-Oct	80.00	197.93
10-Oct	80.00	193.40
11-Oct	80.00	191.97
12-Oct	80.00	189.70
13-Oct	80.00	191.38
14-Oct	80.00	189.82
15-Oct	80.00	190.02
16-Oct	80.00	192.47
17-Oct	80.00	190.83
18-Oct	80.00	190.79
19-Oct	80.00	191.14
20-Oct	80.00	188.52
21-Oct	80.00	184.38
22-Oct	80.00	182.88
23-Oct	80.00	181.02
24-Oct	80.00	182.16
25-Oct	80.00	179.33
26-Oct	80.00	184.49
27-Oct	80.00	187.48

28-Oct	80.00	183.98
29-Oct	80.00	187.46
30-Oct	80.00	181.21
31-Oct	80.00	148.69
1-Nov	80.00	133.24
2-Nov	80.00	134.23
3-Nov	80.00	131.41
4-Nov	80.00	125.92
5-Nov	80.00	125.08
6-Nov	80.00	128.24
7-Nov	80.00	127.60
8-Nov	80.00	123.85
9-Nov	80.00	125.58
10-Nov	80.00	124.95
11-Nov	80.00	121.82
12-Nov	80.00	123.70
13-Nov	80.00	117.18
14-Nov	80.00	112.07
15-Nov	80.00	111.98
16-Nov	80.00	105.18
17-Nov	80.00	98.28
18-Nov	80.00	94.97
19-Nov	80.00	94.30
20-Nov	80.00	93.36
21-Nov	80.00	96.70
22-Nov	80.00	97.72
23-Nov	80.00	100.85
24-Nov	80.00	103.03
25-Nov	80.00	103.50
26-Nov	80.00	103.81
27-Nov	80.00	97.41
28-Nov	80.00	94.12
29-Nov	80.00	91.55
30-Nov	80.00	92.36
1-Dec	80.00	98.72
2-Dec	80.00	100.86
3-Dec	80.00	102.72
4-Dec	80.00	100.97
5-Dec	80.00	101.19
6-Dec	80.00	97.63
7-Dec	80.00	101.18
8-Dec	80.00	101.39
9-Dec	80.00	96.57
10-Dec	80.00	93.26
11-Dec	80.00	96.86
12-Dec	80.00	93.28
13-Dec	80.00	92.05
14-Dec	80.00	88.93
15-Dec	80.00	89.18
16-Dec	80.00	91.22
17-Dec	80.00	91.75

18-Dec	80.00	90.25
19-Dec	80.00	91.60
20-Dec	80.00	90.02
21-Dec	80.00	88.57
22-Dec	80.00	89.28
23-Dec	80.00	91.43
24-Dec	80.00	89.49
25-Dec	80.00	90.04
26-Dec	80.00	90.36
27-Dec	80.00	88.60
28-Dec	80.00	89.97
29-Dec	80.00	90.77
30-Dec	80.00	88.63
31-Dec	80.00	88.15

Existing Water Right Information

Staff has analyzed the water rights tabulation and has discussed the water availability analysis with the Division Engineer Office (DEO). There are four decreed surface diversions within this reach of stream: Richards Pump Station No. 1 (12.326 cfs, 1894/1896/1902/1926 appropriations), Blake & Payson Pump Station (6cfs, 1917 appropriation), Johnson Ditch (50.55 cfs, 1891/1903/1913 appropriations) and San Miguel Power Co. Canal (40 cfs, 1926 appropriation) Staff has determined that water is available for appropriation on the San Miguel River between the confluence with Calamity Draw and the confluence with the Dolores River, 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:

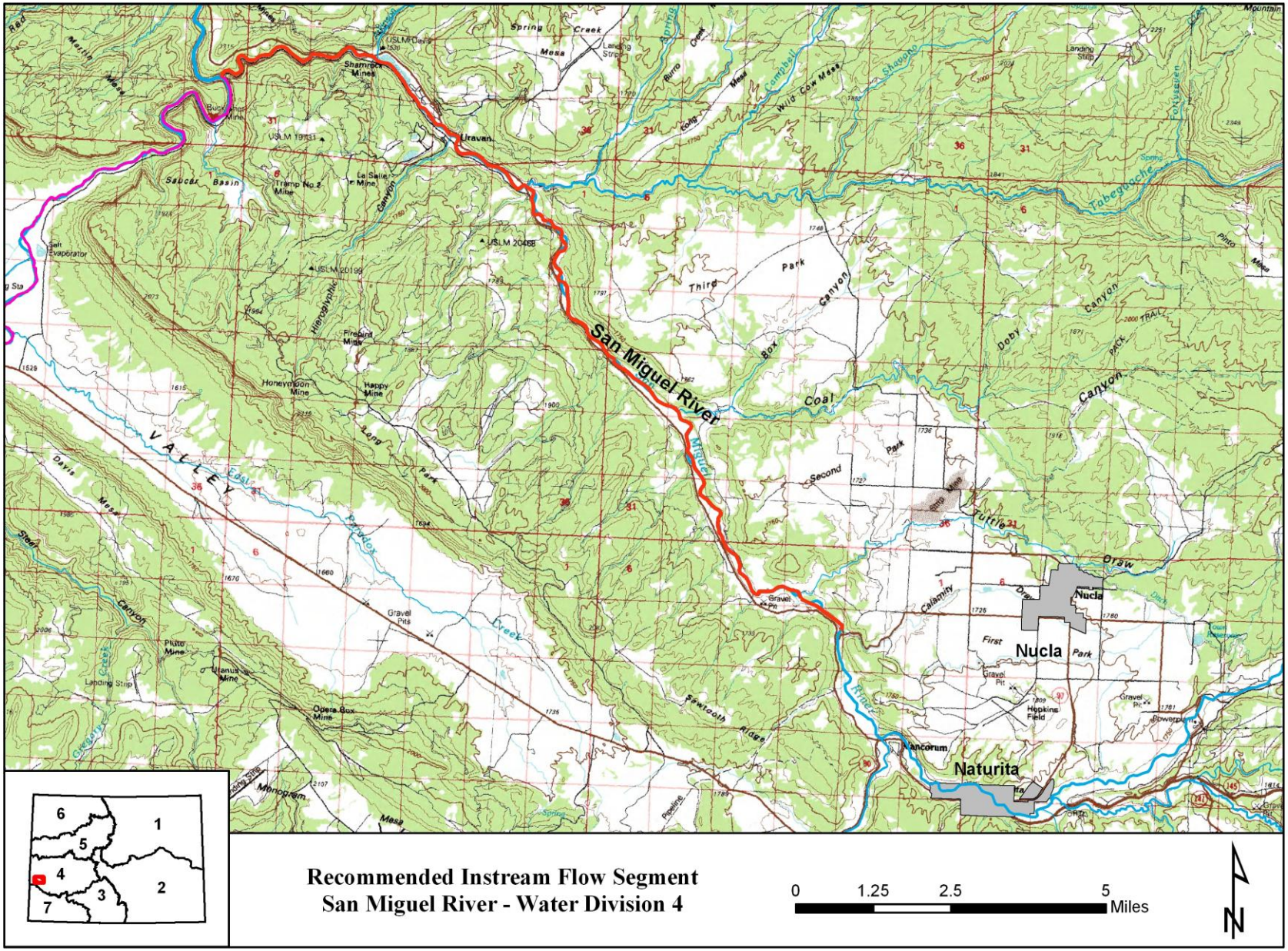
Segment: Confluence with Calamity Draw to Confluence with Dolores River

Upper Terminus: CONFLUENCE WITH CALAMITY DRAW
(Latitude 38° 15' 23.58"N) (Longitude 108° 36' 48.82"W)
UTM North: 4240458.99 UTM East: 183798.21
SE NE S10 T46N R16W NMPM
285' West of the East Section Line; 1890' South of the North Section Line

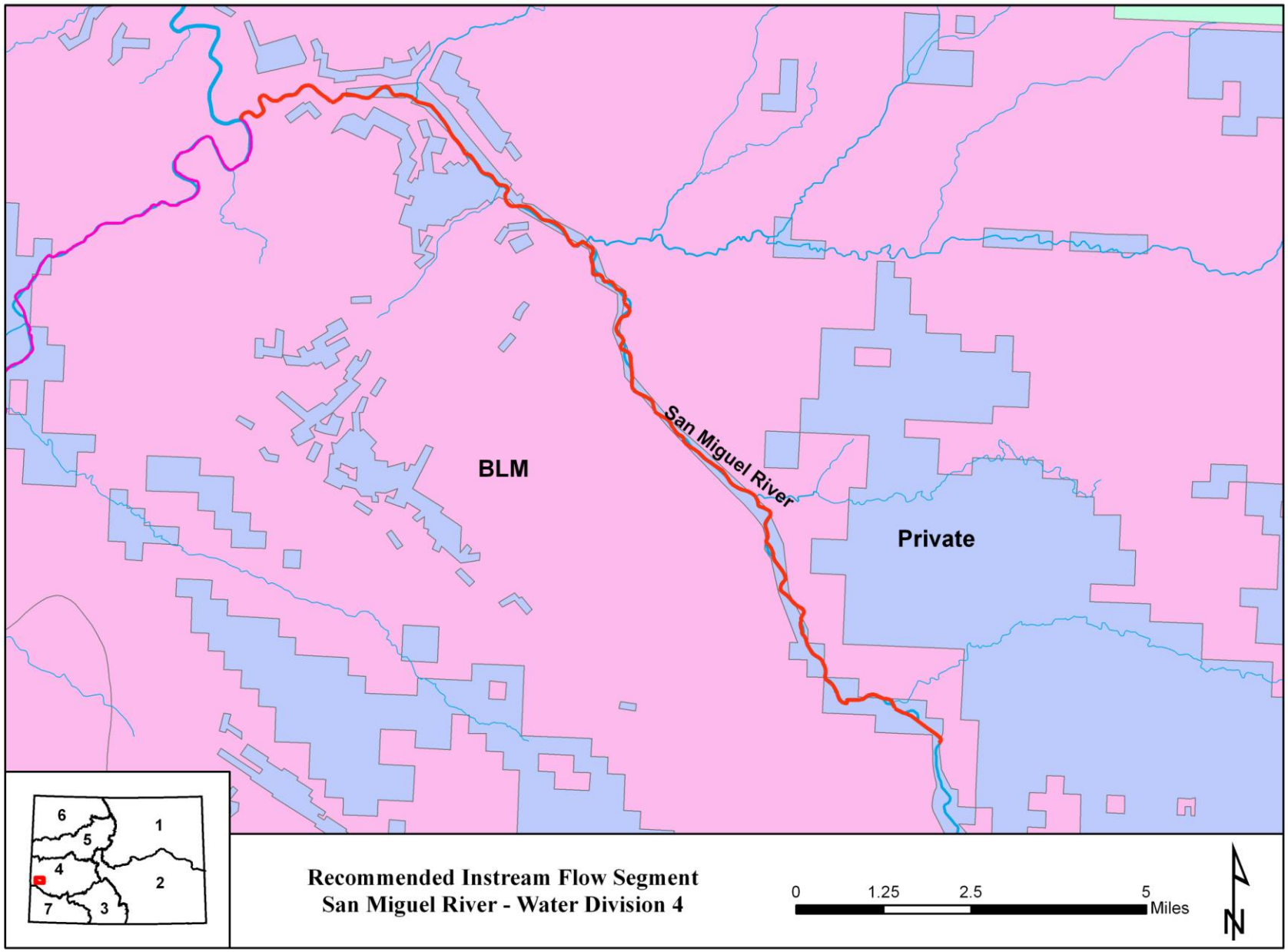
Lower Terminus: CONFLUENCE WITH DOLORES RIVER
(Latitude 38° 22' 46.6"N) (Longitude 108° 48' 1.3"W)
UTM North: 4254788.31 UTM East: 167725.50
SW SE S25 T23N R18W NMPM
2120' West of the East Section Line; 290' North of the South Section Line

Watershed: San Miguel (HUC#: 14030003**)**
Counties: Montrose
Length: 17.24 miles
USGS Quad(s): Nucla, Uravan, Atkinson Creek, Red Canyon
Flow Recommendation: 325 cfs (April 15 – June 14)
170 cfs (June 15 – July 31)
115 cfs (August 1 – August 31)
80 cfs (September 1 – February 29)
115 cfs (March 1 – April 14)

Vicinity Map



Land Use Map


BLM
San Miguel River
Private
6
1
5
4
2
7
3
Recommended Instream Flow Segment
San Miguel River - Water Division 4
0
1.25
2.5
5
Miles
N

Topographic and Water Rights Map