

Upper Colorado River  
Wild & Scenic Stakeholders  
Alternative Management  
Plan

2016

Monitoring Report

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## **INTRODUCTION**

The 2012 Upper Colorado River Wild and Scenic Stakeholder Alternative Management Plan (SG Plan, or Plan) was adopted by U.S. Bureau of Land Management (BLM) and U.S. Forest Service (USFS) as a Wild and Scenic (W&S) management alternative to protect the Outstandingly Remarkable Values (ORVs) identified in the Eligibility Reports for BLM Segments 4 through 7 (USFS Segments 1 through 2) on over 80 miles of the Upper Colorado River<sup>1</sup>. The purpose of the SG Plan is to “balance permanent protection of the ORVs, certainty for the Upper Colorado River Wild & Scenic Stakeholders (SG or “stakeholders”), water project yield, and flexibility for water users.” Key elements of the Plan include provisions for protection of the ORVs and a plan for monitoring the success of the SG’s efforts.

### ***Protection of the ORVs***

The SG Plan aims to protect all ORVs identified in the Eligibility Reports for Segments 4 through 7, while focusing on the water-related recreational fishing and recreational floatboating ORVs.

Long Term Protection Measures include appropriation of CWCB instream flows, continued delivery of water to downstream demands, continued delivery to downstream senior water rights, and ongoing deliveries to the endangered fish species under the Upper Colorado River Recovery Program. The SG Plan contains provisions for addressing a material change in circumstances that undermines the value of these long term protection measures.

Cooperative Measures strategies are voluntary strategies that are used by the SG to maintain or enhance the ORVs. Implementation will be considered annually and will be based on hydrologic conditions, forecasted needs for the ORVs and availability of voluntary cooperative measures that do not impair the ability of water providers to meet their water supply commitments using prudent operational constraints.

### ***Monitoring Plan***

The SG Plan includes provisional ORV Indicators and Resource Guides to monitor and protect the ORVs.

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<sup>1</sup> See Attachment A: Project Area Map.

Provisional ORV Indicators and Resource Guides are used by the SG to monitor the status of the ORVs as the SG Plan is implemented. (Refer to the SG Plan for definitions of ORV Indicators and Resource Guides.) Failure to meet criteria related to the provisional or final ORV Indicators would be cause for elevation and potential termination of the SG Plan.

ORV Indicators, which describe conditions that characterize the ORVs, are monitored to gauge whether the ORVs are being protected under the SG Plan.

Resource Guides include resource measures for recreational boating, fish habitat and sediment mobilization, as well as water quality standards. The Resource Guides are used as a source of information to inform SG discussions under the Plan. The Resource Guides are not intended to be used as a test for Plan success nor for use by permitting agencies or entities as criteria for evaluating a project's effects on the ORVs.

The Monitoring Plan included in the SG Plan has an initial 3-to-5 year provisional period during which the SG will monitor, evaluate, and revise (if necessary) the Provisional ORV Indicators and Resource Guides. The Provisional Period was triggered when BLM and USFS signed their Records of Decision (RODs) in June 2015. Consequently, the 2016 water year was the second year of the SG's provisional period.

## **2016 MONITORING ACTIVITIES**

During 2016, the SG conducted the following monitoring activities contemplated for the Provisional Period.

- Conducted temperature monitoring at three sites and gathered data to support ongoing fishing and floatboating user surveys. Where appropriate, the SG evaluated available monitoring data and compared the results to provisional ORV Indicators and Resource Guides.
- Gathered data collected by others: U.S. Geological Survey (USGS) water quality and quantity, BLM water temperature, Colorado Parks and Wildlife (CPW) biosurveys and research data collected at the Gore Canyon Playpark (Pumphouse Recreation Site).

## MONITORING BY STAKEHOLDER GROUP

### *Water Temperature*

Since 2012, the W&S Monitoring Work Group (Monitoring WG) has been collecting and reviewing water temperature data at six sites within the W&S segments. The BLM also maintains two water temperature sites located on the Colorado River at Pumphouse and Radium.

Table 1 lists the site locations and entities responsible for these eight water temperature stations.

In addition to the SG & BLM temperature monitoring sites, the USGS operates two real-time temperature monitoring sites anchoring the W&S segments; one is immediately upstream of Gore Canyon (USGS gage 09058000 Colorado River NEAR KREMMLING, CO) and the other is located in Segment 7 (USGS gage 09071750 Colorado River ABOVE GLENWOOD SPRINGS, CO). The new USGS gage at the Catamount Bridge in Segment 6 (USGS gage 09060799 Colorado River AT CATAMOUNT BRIDGE, CO) measures real time air and water temperature.

Table 1. Wild & Scenic Water Temperature Sites.

<b>Temperature Station</b>	<b>Entity</b>
09058000 Colorado River Near Kremmling	USGS
COR-Pumphouse	BLM
COR-Radium	BLM
Colorado River Above State Bridge	W&S
09060799 Colorado River at Catamount Bridge, CO	USGS
Colorado River Below Red Dirt Creek	W&S
Colorado River Above Dotsero	W&S
09071750 Colorado River Above Glenwood Springs, CO	USGS

The Monitoring WG is currently archiving water temperature data in the Water Information Library and Unified Reference (WILBUR) database maintained by the Grand County Water Information Network (GCWIN). These data are accessible on GCWIN's database website.

### *Fishing and Floatboating User Surveys*

In 2012, the SG retained RRC Associates (RRC) to conduct fishing and floatboating surveys (intercept surveys), with the understanding that the data collected from these surveys would be

used to inform management decisions. RRC completed intercept surveys between 2012 and 2015. RRC's 2016 research did not include intercept surveys.

RRC's 2016 research included:

- (a) advancing the pilot effort to establish baseline measures and methods that will be used to guide research in the future, and
- (b) continuing to evaluate existing data, and refine methods for accessing that data, to be used in developing the SG's final ORV Indicators and Resource Guides for recreational fishing and floatboating.

In 2016, RRC's efforts continued to expand the understanding of river use patterns and to expand the available databases using Tableau database platform formats. Survey research data was incorporated into a Tableau database platform, along with information from other sources including temperature, hydrology, USFS survey research, etc. These data were shared with the SG in a variety of settings.

## **MONITORING BY OTHER ENTITIES**

### ***U.S. Bureau of Land Management***

The U.S. Bureau of Land Management (BLM) conducts various monitoring activities on the W&S segments. Currently, the BLM supports two water temperature monitoring locations. In addition, the BLM is conducting various monitoring to support other ORVs. For example, the BLM currently monitors populations of bald eagles, river otters, riparian vegetation, and noxious weeds.

### ***U.S. Geological Survey***

The USGS monitors the daily average streamflow and water temperature at the Colorado River NEAR KREMMLING, CO gage (USGS 09058000) and daily average streamflow at the Colorado River NEAR DOTSERO, CO gage (USGS 09070500). The SG has selected these two stream gages for monitoring flows in the Wild and Scenic stream segments. These gages are operated by the USGS as part of the National Streamflow Information Program (NSIP)<sup>2</sup>. In

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<sup>2</sup> In addition to streamflow, each site is sampled four to six times per year for a full suite of physical and chemical water quality parameters.

addition, the SG coordinated the installation of a new USGS stream gage<sup>3</sup> to monitor average streamflow, water temperature and air temperature at the Catamount Bridge in Segment 6 (USGS 09060799 Colorado River AT CATAMOUNT BRIDGE, CO).

### ***Colorado Parks and Wildlife***

Depending on water conditions, CPW conducts fish population surveys (“biosurveys”) on established two-mile reaches within W&S segments 5 and 6. These survey reaches include: Radium, State Bridge, Catamount and Lyons Gulch.<sup>4</sup> In most cases, biosurveys are conducted every other year at each two-mile biosurvey reach.

In addition to Quality Trout<sup>5</sup> and Biomass data, CPW maintains a current list of fish species captured at each site, which can be used to monitor species diversity in Segments 5 and 6.<sup>6</sup>

### ***Grand County***

In 2015, Grand County initiated a monitoring program to assess the existing state of macroinvertebrate communities in the Colorado River at the Pumphouse Recreation Site for possible impacts from construction of the Gore Canyon Whitewater Park. The objectives of this program are to:

- monitor trends and changes in the health of the macroinvertebrate communities,
- support U.S. Army Corps of Engineers permit conditions, and
- assess compliance with Colorado’s aquatic life standard.

Data collected through Grand County’s program are analyzed using the Colorado Water Quality Control Division’s Multi Metric Index (MMI) to assess compliance with Colorado’s aquatic life standard. Additional standard metrics are computed to provide a complete assessment of the macroinvertebrate community. Sampling methods are consistent with these objectives.

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<sup>3</sup> The Colorado Water Conservation Board provided funding for installation of the Catamount gage. Maintenance and operations are funded with financial support from BLM, under their Joint Funding Agreement (JFA) with USGS.

<sup>4</sup> See Attachment B: CPW Biosurvey Sample Sites and Associated Fishing Restrictions.

<sup>5</sup> The SG Plan uses # of quality trout per acre vs CPW’s units (# of quality fish per mile).

<sup>6</sup> CPW is also conducting research on Giant Stonefly (*Pteronarcys californica*) and Mottled Sculpin (*Cottus bairdii*) at the Pumphouse Recreation Site. The SG is monitoring progress on these efforts and may include these and/or other studies in future reports.



Grand County's monitoring activities during 2016 represented the second year in five years of required monitoring under Grand County's Clean Water Act Section 404 permit for the Whitewater Park.

### ***Colorado Department of Public Health and Environment (CDPHE)***

Colorado Department of Public Health and Environment's (CDPHE) Environmental Data Unit endeavors to collect scientifically sound water quality monitoring data on behalf of the Division's Clean Water Program. CDPHE maintains a system of statewide stream water quality monitoring sites for collecting chemical, physical and biological data. Each year sites are added in a specific focus basin to collect additional data in support of future basin wide rulemaking hearings conducted by the Water Quality Control Commission.

CDPHE's data and information is chiefly used in the development and revisions of standards and criteria or performing assessments that determine attainment of Colorado's water quality standards and criteria, including reporting the status of water quality across Colorado. The SG relies on CDPHE's monitoring and assessment efforts to evaluate water quality of the Wild & Scenic stream segments.

## **2016 COOPERATIVE MEASURES**

Representatives from the W&S Cooperative Measures Committee participated in different weekly phone calls between May and October to add input to some of the operations being discussed on the Colorado River. These included the Coordinated Reservoir Operation program (CROS) and the Historic User Pool (HUP) calls. During the 2016 season a successful CROS operation did occur, creating a flushing flow in the Wild and Scenic Colorado River segments. The details of this operation are described below.

Starting June 3, 2016, the Coordinated Reservoir Operations (CROS) program started releases to increase the peak flow in the Colorado River for fish that are protected under the Endangered Species Act. The CROS program works to enhance spring peak flows in a section of the Colorado River upstream of Grand Junction, Colorado, for the benefit of the humpback chub, razorback sucker, bonytail and Colorado pikeminnow. The flows ramped up for a few days and were then held constant for about 3-7 days before they were ramped back down.

Figure 1 presents the Colorado River flow at Cameo. The Colorado Basin River Forecast Center (CBRFC) predicted flows between 16,000 – 19,000 cfs for June 6th through June 11th. These can be seen on the graph below.

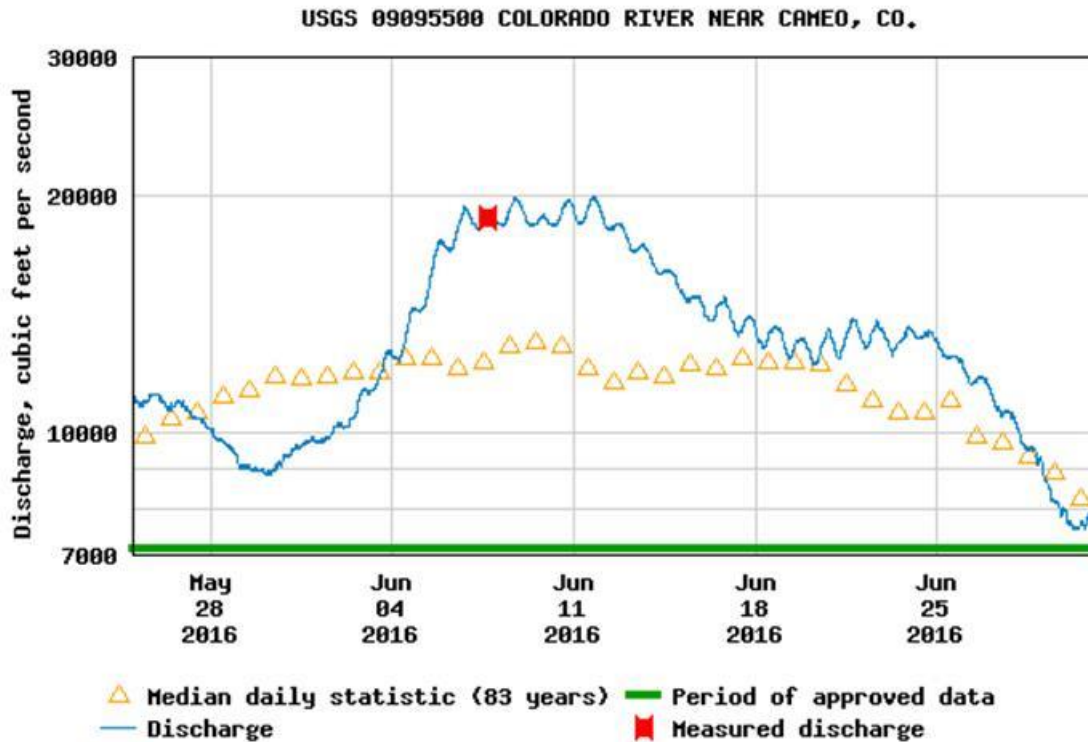


Figure 1. Daily streamflow USGS gage 09095500 Colorado River Near Cameo, CO

## 2016 MONITORING RESULTS

### OVERVIEW

The following information summarizes the results of the SG's monitoring efforts in 2016. During 2016, the SG's Monitoring WG analyzed data from all temperature monitoring sites and worked with RRC to evaluate existing data. The work group also analyzed data collected by USGS, BLM, CPW and CDPHE.

### HYDROLOGY

The SG monitors streamflows on the Colorado River to: 1) gain a general understanding of the hydrology impacting the W&S reaches; 2) identify opportunities for data collection, such as conducting additional user surveys during low flows; 3) identify potential issues that could be addressed by cooperative measures; and 4) evaluate Year Type and user days associated with Floatboating and Fishing ORV Resource Guides.

Three streamflow gages were available in the W&S reaches in 2016 (Table 2). The SG Plan uses the Kremmling and Dotsero gages to monitor flows in the Wild and Scenic stream segments. In addition, the SG spearheaded the installation of a new USGS gage in October of 2016 at the Catamount Bridge in Segment 6. This gage is currently in operation for nine months each year, and will be used to monitor streamflow, water temperature and air temperature.

Table 2. USGS gages currently operating in the vicinity of the W&S reaches.

Number	Gage Name	Parameters	W&S Segment
09058000	Colorado River near Kremmling	Discharge & Temperature	4
09060799	Colorado River at Catamount Bridge	Discharge & Temperature	6
09070500	Colorado River near Dotsero	Discharge	7

Figures 2, 3 and 4 display the historic average daily streamflow and the average daily streamflow during the 2016 Wild & Scenic Water Year.

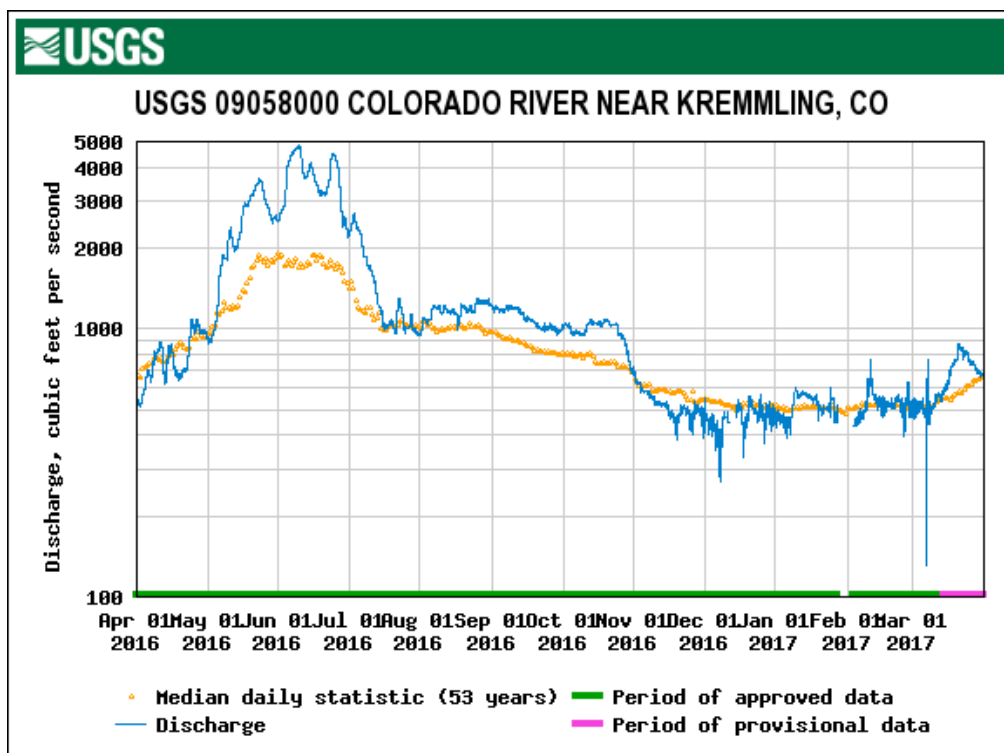


Figure 2. Daily streamflow USGS gage 09058000 Colorado River NEAR KREMMLING, CO

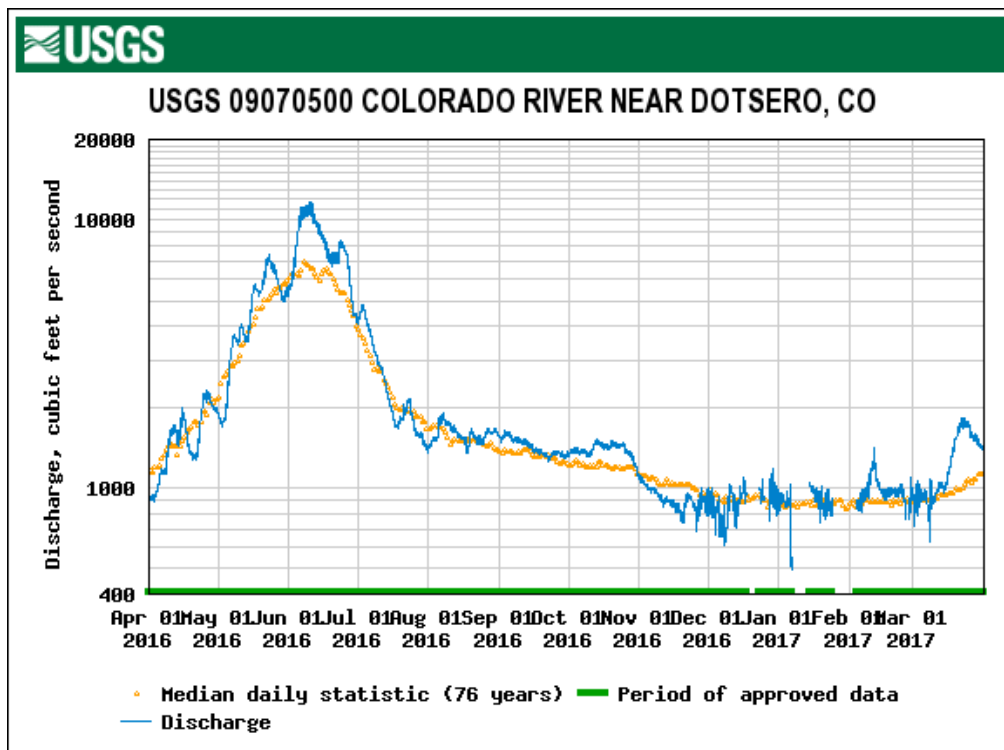


Figure 3. Daily streamflow USGS gage 09070500 Colorado River NEAR DOTSERO, CO

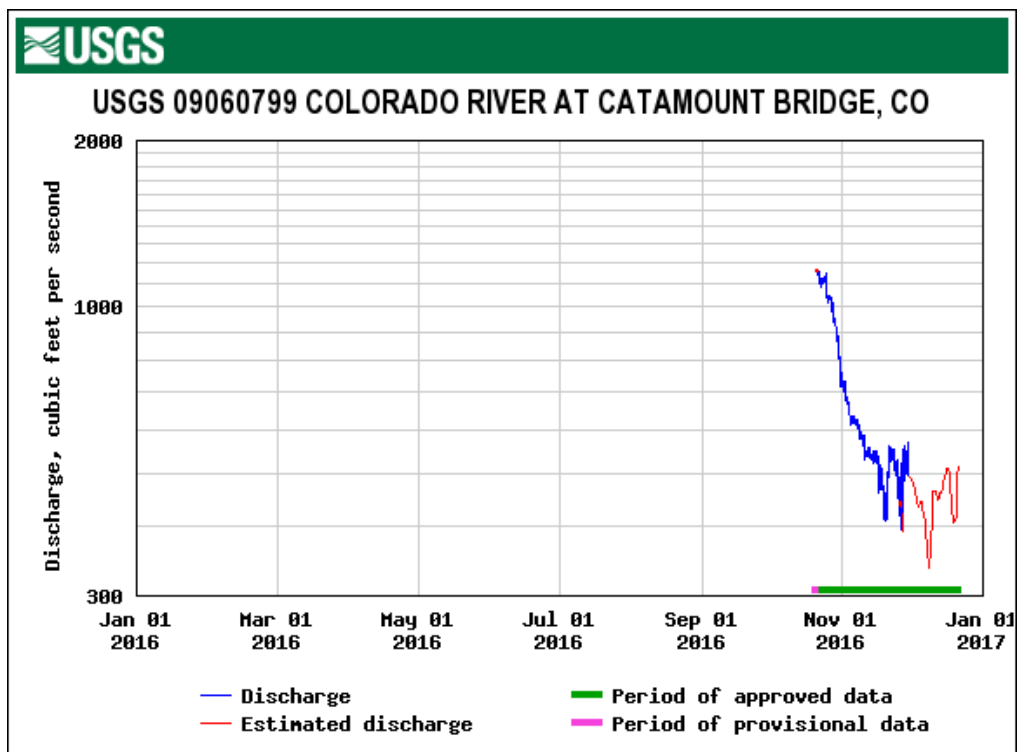


Figure 4. Daily streamflow USGS gage 09060799 Colorado River AT CATAMOUNT BRIDGE

## **Year Type Determination**

The SG Plan calls for evaluating annual flow volumes and categorizing flow volumes by “Year Type” each year (Table 3). The actual Year Type is based on total annual flow volumes measured at the Kremmling and Dotsero gages; traditionally this is calculated from April 1<sup>st</sup> to March 31<sup>st</sup>. In addition, the SG evaluates the predicted Year Type based on Colorado River Basin Forecast Center, April 1, 2016 Water Supply Forecast Discussion.

In 2016, the total annual volume at the Kremmling gage was 855,898 acre feet and the total volume at the Dotsero gage was 2,170,195 acre feet. Consequently, all segments were ranked in the “Wettest 25%” category.

Table 3. SG Plan Year Type classification for Segments 4-6 and Segments 7. Year types are based on the annual flow volume in acre feet (AF) calculated from April 1st to March 31st.

<b>Year Type</b>	<b>Segment 4-6, Kremmling Gage, AF</b>	<b>Segment 7, Dotsero Gage, AF</b>
Wettest 25%	>769,500	>1,519,500
Wet Typical	525,000-769,500	1,234,000-1,519,500
Dry Typical	454,500-525,500	1,029,500-1,234,000
Driest 25%	<454,000	<1,029,500

## **RECREATIONAL FLOATBOATING**

### ***ORV Indicators for Recreational Floatboating***

The SG Plan has a provisional ORV Indicator for recreational floatboating which applies to the Upper Colorado River from Gore Canyon to No Name in Glenwood Canyon. The current ORV Indicator is the following narrative standard:

“Protect the existing range and quality of the outstanding floatboating opportunities. This narrative standard does not imply mirroring any specific hydrology.”

The intent of the SG is to develop and incorporate objective criteria into the final ORV Indicators for recreational floatboating.

## ***Resource Guides for Recreational Floatboating***

### Year-type Determination

Based on the 2016 total annual volume at the Kremmling and Dotsero gages, the SG determined the “year type” for Wild & Scenic Segments 4, 5, 6 and 7 was in the “Wettest” category.<sup>7</sup>

### Usable Days Evaluation

Provisional Floatboating Resource Guides for all year types in Segments 4-7 are shown in Tables 4 and 5.

Table 4. Provisional Resource Guide: Number of Usable Days in Segments 4 - 6 [min (med) max].

<b>Year Type</b>	<b>Total Usable Days</b>	<b>Green Opportunities 700-1,300 cfs</b>	<b>Blue Opportunities 1,300-4,000 cfs</b>	<b>Black Opportunities 4,000-7,000 cfs</b>
Wettest	115	38 (74) 121	39 (72) 79	4 (22) 28
Wet	120	68 (108) 119	19 (57) 79	0 (0) 5
Dry	74	69 (106) 127	0 (14) 33	0 (0) 0
Driest	62 (80)	53 (73) 87	0 (1) 25	0 (0) 0

Table 5. Provisional Resource Guide: Number of Usable Days in Segment 7 [min (med) max].

<b>Year Type</b>	<b>Total Usable Days</b>	<b>Green Opportunities 12000/1250- 1,800 cfs</b>	<b>Blue Opportunities 1,800-5,500 cfs</b>	<b>Black Opportunities 5,500-8,600 cfs</b>
Wettest	120	33 (57) 83	49 (68) 77	21 (29) 42
Wet	126	44 (68) 102	39 (75) 110	1 (13) 33
Dry	138	75 (86) 121	40 (61) 91	0 (2) 11
Driest	136	88 (126) 137	10 (32) 63	0 (0) 6

*Segments 4 – 6:* Table 6 summarizes year types and actual usable days in Segments 4 – 6. There were 170 total usable days in these segments during the 2016 boating season (April 1 - September 30), including 101 days in the “Green Opportunities” category (higher than the median), 57 usable days in the “Blue Opportunities” category (lower than the median), and 12 days in the “Black Opportunities” category (lower than the median) (Table 5). Figure 5

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<sup>7</sup> For more details on year-type determination, refer to the Hydrology section of this report.

illustrates mean daily streamflow and the provisional range of floatboating opportunities in these segments during the 2016 boating season.

Table 6. Year Type and Usable Days in Segments 4 - 6 based on the Provisional Resource Guides.

Year	Year Type	Total Usable Days	Green Opportunities 700-1,300 cfs	Blue Opportunities 1,300-4,000 cfs	Black Opportunities 4,000-7,000 cfs
2012	Driest	103	103	0	0
2013	Dry	89	83	6	0
2014	Wettest	180	50	106	24
2015	Wettest	179	95	58	26
2016	Wettest	170	101	57	12

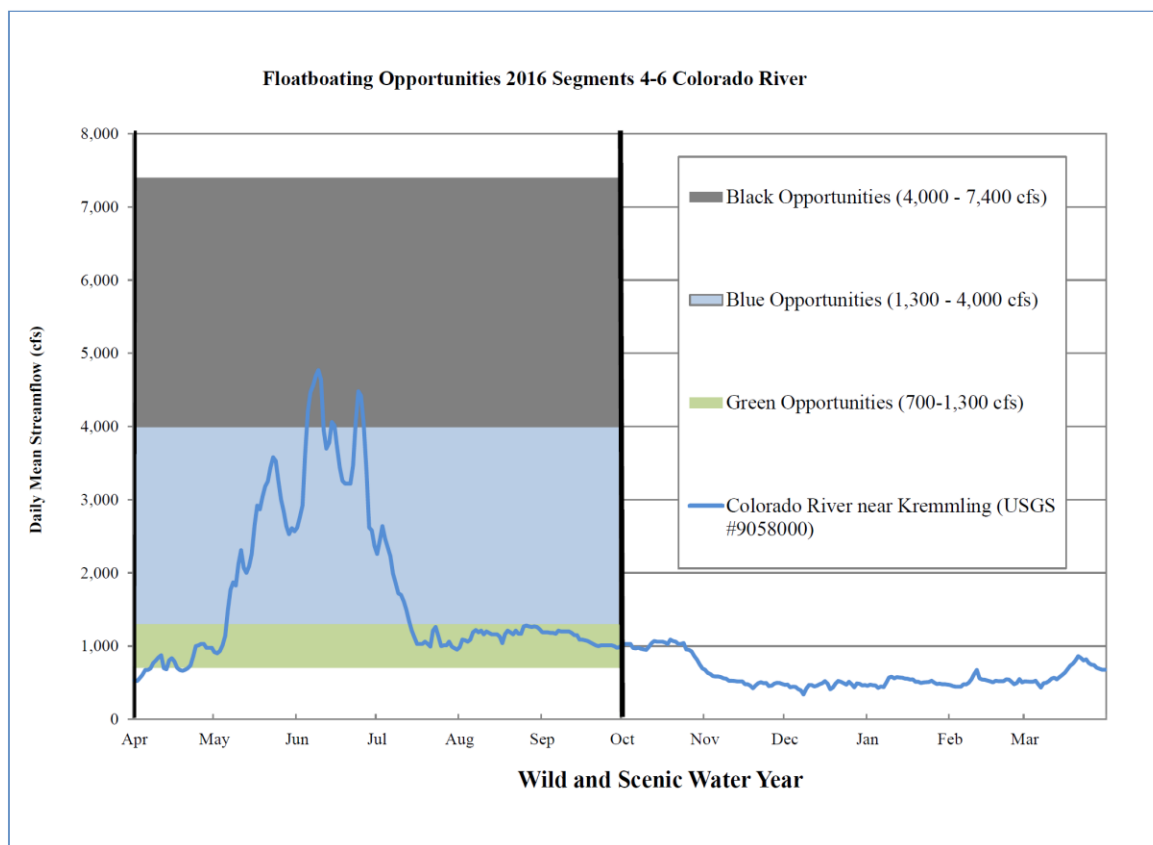


Figure 5. 2016 Floatboating Opportunities in Wild & Scenic Segments 4-6.

*Segment 7:* Table 7 summarizes year types and actual usable days in Segment 7. . There were 165 total usable days in this segment during the 2016 boating season (April 1 - September 30). The number of usable days in the “Green Opportunities” category was 86 (higher than the median), 54 usable days in the “Blue Opportunities” category (lower than the median), and 25

usable days in the “Black Opportunities” category (lower than the median) (Table 7). Figure 6 illustrates mean daily streamflow and the provisional range of floatboating opportunities in this segment during the 2016 boating season.

Table 7. Year Type and usable days in Segment 7 based on the Provisional Resource Guides.

Year	Year Type	Total Usable Days	Green Opportunities 12000/1250- 1,800 cfs	Blue Opportunities 1,800-5,500 cfs	Black Opportunities 5,500-8,600 cfs
2012	Driest	136	131	5	0
2013	Dry	152	94	57	1
2014	Wettest	158	34	96	28
2015	Wettest	179	95	58	26
2016	Wettest	165	86	54	25

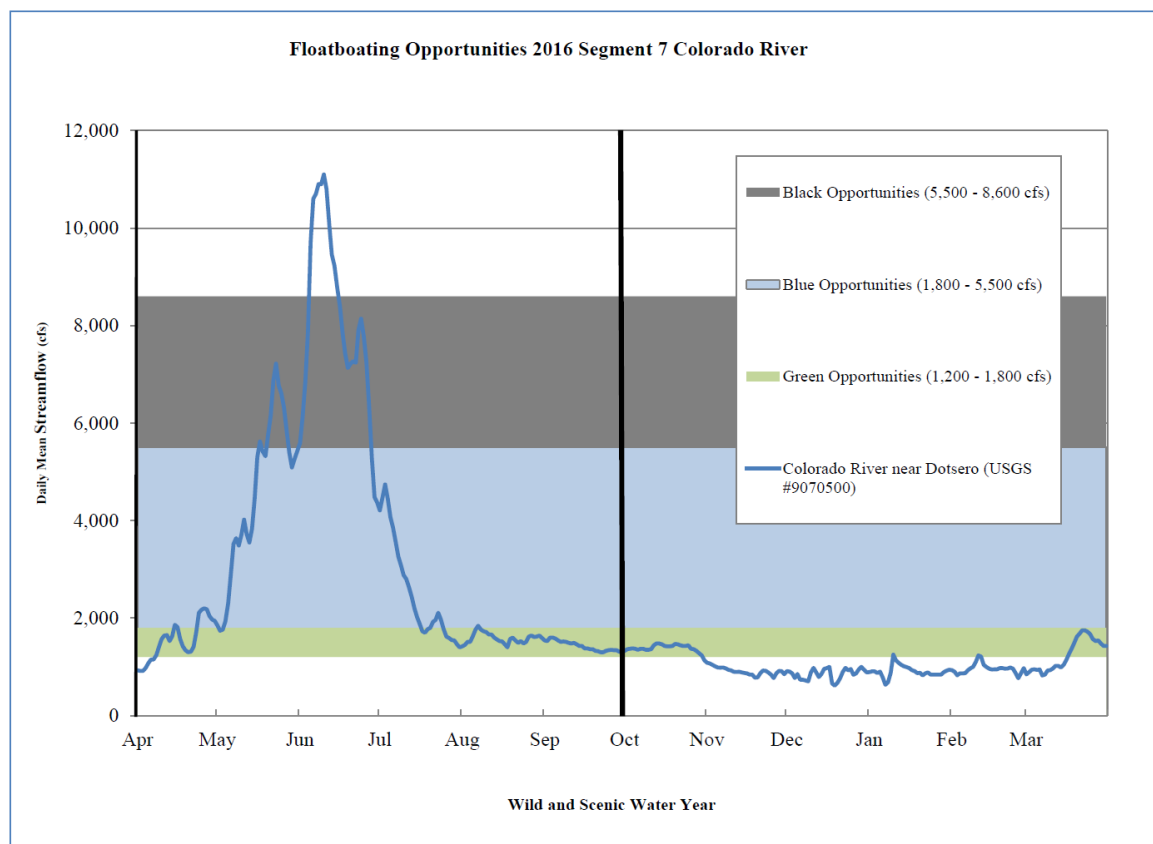


Figure 6. 2016 Floatboating Opportunities in Wild & Scenic Segment 7



## RECREATIONAL FISHING

### *ORV Indicators for Recreational Fishing*

The SG Plan includes the numeric standards shown in Table 8 as the provisional ORV Indicators for Recreational Fishing.<sup>8</sup>

Table 8. Provisional ORV indicators for recreational fishing in W&S Segments 4-6

Type	Name	Current level (if available)
Fishery	Quality Trout	24 fish over 14" per acre
Fishery	Biomass	90 pounds per acre
Fishery	Species Diversity (SD)	14 species of fish
Recreational Fishing	Total Fishing Effort (TFE)	TBD
Recreational Fishing	Catch/Unit Effort (CPUE)	TBD

The SG monitors these provisional indicators based on the results of fish population surveys conducted by CPW. Depending on water conditions, CPW conducts fish population surveys (“biosurveys”) on established two-mile reaches within W&S segments 5 and 6. These survey reaches include: Radium, State Bridge, Catamount and Lyons Gulch.<sup>9</sup> In most cases, biosurveys are conducted every other year at each two-mile biosurvey reach. In addition to Quality Trout<sup>10</sup> and Biomass data, CPW maintains a current list of fish species captured at each site, which can be used to monitor species diversity in Segment 5 and 6 of the Wild and Scenic stream reach.<sup>11</sup>

The results from the CPW biosurveys between 2010 and 2016 are shown in Table 9. Note that CPW’s 2016 biosurveys were only conducted on the two-mile State Bridge reach. Between 2010 and 2015, CPW data primarily focused on brown trout populations. However, in 2016 CPW recalculated the biosurvey data from all previous years; resulting in revised quality trout and biomass numbers for the biosurvey reaches between 2010 and 2016. In addition, both brown and

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<sup>8</sup> Provisional ORV Indicators for Recreational Fishing apply to the Upper Colorado River from Gore Canyon to Red Dirt Creek.

<sup>9</sup> See Attachment B: CPW Biosurvey Sample Sites and Associated Fishing Restrictions.

<sup>10</sup> The SG Plan contemplates using # of quality trout per acre vs CPW’s units (# of quality fish per mile).

<sup>11</sup> CPW is also conducting research on Giant Stonefly (*Pteronarcys californica*) and Mottled Sculpin (*Cottus bairdii*) at the Pumphouse Recreation Site. The SG is monitoring progress on these efforts and may include these and/or other studies in future reports.

rainbow trout are represented in the revised table. Any comparisons made between this 2016 report and previous reports need to take this into consideration.

### Quality Trout Evaluation

With 31 fish (brown + rainbow trout) over 14” captured per acre at State Bridge, the ORV Indicator for Quality Trout was exceeded by approximately 30 percent.

### Biomass Evaluation

With 74 pounds of fish (brown + rainbow trout) per acre, the State Bridge biosurvey reach falls short (82 percent) of the ORV Indicator for biomass (90 pounds/acre).

Table 9. CPW Annual fish biosurvey results, 2010 to 2016

<b>Sampling Metric</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014<sup>a</sup></b>	<b>2015</b>	<b>2016</b>
<b>Radium (Segment 5)</b>							
Trout Quality (# > 14”/acre)	44	60	49	58	-	65	-
Biomass (lbs/acre)	121	143	155	164	-	145	-
<b>State Bridge (Segment 6)</b>							
Trout Quality (# > 14”/acre)	-	-	-	52	-	23	31 <sup>b</sup>
Biomass (lbs/acre)	-	-	-	172	-	71	74 <sup>c</sup>
<b>Catamount (Segment 6)</b>							
Trout Quality (# > 14”/acre)	-	18	-	19	-	22	-
Biomass (lbs/acre)	-	57	-	57	-	50	-

a: High water conditions prevented CPW personnel from conducting biosurveys in the Wild & Scenic stream segments in 2014.

b: Upon further review, CPW determined that the biosurvey data collected at State Bridge in 2013 was poor quality; therefore, an additional biosurvey was performed in this survey reach in 2016.

c: State Bridge biomass results for 2016 are similar to 2015 results. This lends credence to CPW’s determination that 2013 data was poor quality, and increases confidence in the validity of 2015/2016 results.

### Evaluation of Species Diversity

In addition to Quality Trout<sup>12</sup> and Biomass data, CPW maintains a current list of fish species captured at each site, which can be used to monitor species diversity in Segment 5 and 6 of the

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<sup>12</sup> The SG Plan uses # of quality trout per acre vs CPW’s units (# of quality fish per mile).

Wild and Scenic stream reach.<sup>13</sup> As of 2016, CPW had captured 17 different species of fish at the Radium Site, which is three species more than the SG's Provisional ORV Indicator of 14 species of fish. Table 10 summarizes CPW's species diversity results through 2016.

Table 10. Fish species captured within W&S Segments, including 2016 biosurvey results

<b>Fish</b>	<b>Class</b>	<b>Endemic Status</b>
Colorado Cutthroat Trout	Coldwater fish	Native
Rainbow Trout	Coldwater fish	Introduced
Rainbow/Cutthroat Hybrid	Undefined	
Brown Trout	Coldwater fish	Introduced
Brook Trout	Coldwater fish	Introduced
Kokanee Salmon	Coldwater fish	Introduced
Lake Trout	Coldwater fish	Introduced
Bluehead Sucker	Non-game	Native
Flannelmouth Sucker	Non-game	Native
Mountain Whitefish	Coldwater fish	Native
Speckled Dace	Non-game	Native
Mottled Sculpin	Non-game	Native
White Sucker	Non-game	Introduced
White/Longnose hybrid	Undefined	
White/Flannel hybrid	Undefined	
Longnose Sucker	Non-game	Introduced
Northern Pike	Warmwater fish	Introduced

#### Total Fishing Effort (TFE) and Catch Per Unit Effort (CPUE)

Angler intercept surveys were not performed during 2016. However, RRC Associates continued to explore the data generated by angler intercept surveys and coordinated with CPW to consider the relationships between biosurvey data and RRC's data. In addition, in 2016 RRC began to

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<sup>13</sup> CPW and Trout Unlimited are also conducting preliminary studies of *Pteronarcys californica* (Giant Stonefly) exuviae as a possible indicator of macroinvertebrate population density. The SG is monitoring progress on these efforts and may include these and/or other studies in future reports.

assist the SG in interpreting the data collected to date on TFE and CPUE. This assistance will continue as the SG considers refining the ORV indicators during the provisional period.

### ***Resource Guides for Recreational Fishing***

The provisional Resource Guides shown in Table 11 represent the seasonal ranges of flow for the Recreational Fishing ORV in Segments 4, 5 and 6. Since the effective date of the Plan, the SG has agreed to use the mid-point value as a reference flow and compare it to the 5-year rolling average each season for purposes of discussion under the Plan.<sup>14</sup> While the highly variable flow conditions in these segments could be addressed through the use of criteria addressing a specified frequency of meeting these guides, such implementation criteria have not been established for purposes of the Plan. The SG may develop such criteria in the future, but the Plan is designed to operate in the absence of frequency criteria for these seasonal flow ranges.

Table 11. Provisional Resource Guides for Recreational Fishing in W&S Segments 4-6

<b>Season</b>	<b>Number of Days in Season</b>	<b>Month</b>	<b>Seasonal Fish Flow Range and Midpoint, cfs</b>
1	91	April	800-1000 900 midpoint
		May	
		June	
2	92	July	600-1000 800 midpoint
		August	
		September	
3	61	October	400-800 600 midpoint
		November	
4	121	December	400-600 500 midpoint
		January	
		February	
		March	

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<sup>14</sup> During the provisional period, the 5-year rolling average will include data from the previous 4 years.

In order to calculate the seasonal average flow and rolling 5-year average flows, the Kremmling gage (USGS 09058000) was accessed for the daily mean discharge data from April 1, 2008 to March 31, 2016.

Figure 7 provides a comparison of 5-year average seasonal flows at the Kremmling Gage to the W&S Provisional Resource Guides between 2012 and 2016. In all but one case, the 5-year average streamflows exceed the mid-point value of the seasonal flow ranges for each season. The exception is the 2012 average flow of 434 cfs during Season 4, which falls within the target flow range, but below the midpoint of 500 cfs.

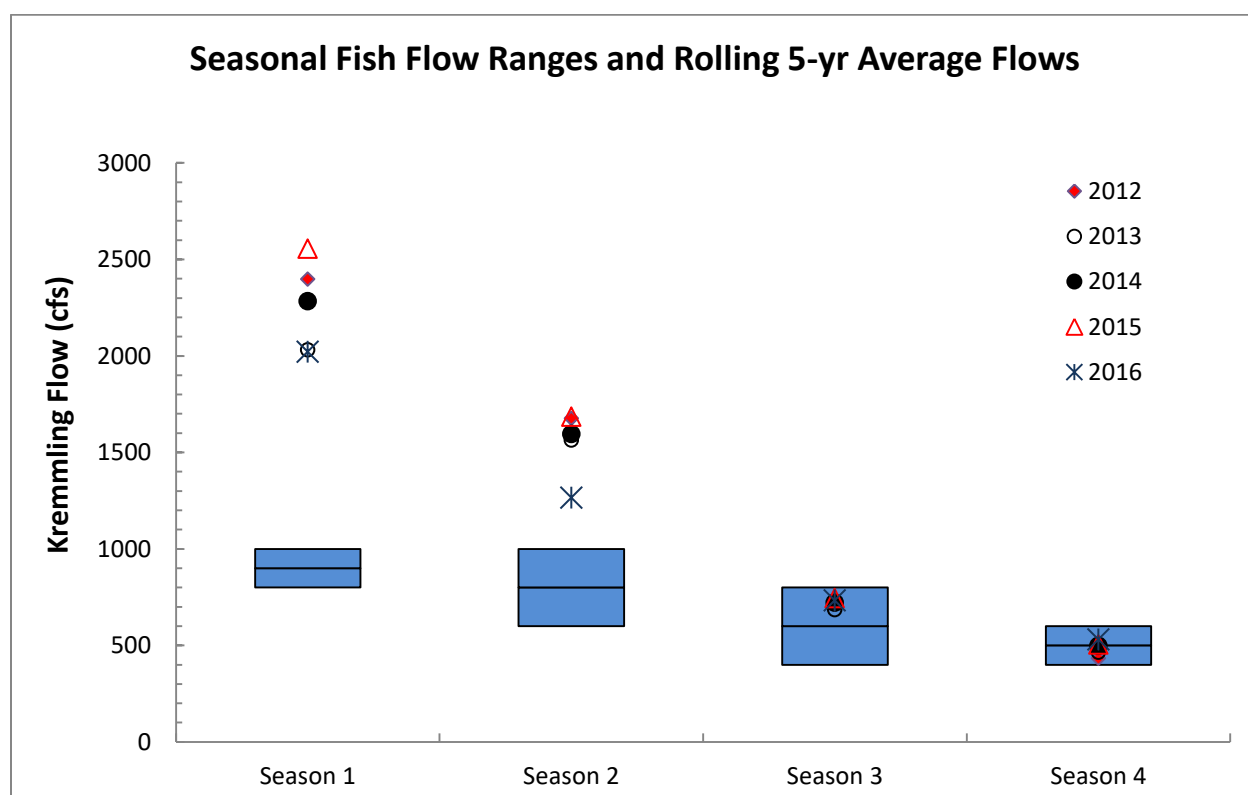


Figure 7. 5-year average streamflows for 2012 - 2016 compared to W&S Provisional Resource Guides for Recreational Fishing

In addition to Seasonal Fish Flows, the SG Plan includes “Flushing Flows” as a provisional Resource Guide for the Fishing ORV. During the Provisional Period, the SG has negotiated the following provisional Resource Guide for a periodic high flow: “A daily average flow of at least 2,000 cfs maintained for three consecutive days with a frequency of occurrence of once in two years on average.” Table 12 summarizes “Flushing Flow” results from 2012 through 2016.

Table 12. Annual peak discharge and flushing flow metrics

<b>Year</b>	<b>Peak discharge, cfs</b>	<b>2,000 cfs met?</b>	<b>Consecutive days above 2,000 cfs</b>
2012	1,280	No	0
2013	1,750	No	0
2014	7,830	Yes	99
2015	7,830	Yes	76
2016	4,830	Yes	58

## **WATER QUALITY**

As stated in the SG Plan, “The [provisional] Resource Guides for water quality are the CDPHE water quality standards for cold water aquatic life and recreation uses for the portion of the stream segment that CDPHE has designated COUCUC03 Mainstem of the Colorado River from the outlet of Granby Reservoir to the confluence with the Roaring Fork River that is within the Wild & Scenic segments 4 - 7.” These standards are reported in CDPHE’s *Regulation #33 - Classifications and Numeric Standards for Upper Colorado River Basin and North Platte River*.

Colorado’s Section 303(D) List of Impaired Waters and Monitoring and Evaluation List (Regulation #93 – 5 CCR 1002-93), effective March 1, 2016, lists Segment COUCUC03 as “impaired” for Arsenic, Temperature, and Aquatic Life. While Segment COUCUC03 encompasses all of Wild and Scenic Segments 4 through 7, it also includes extensive reaches of the Colorado River above and below the Wild and Scenic segments. The current 303(D) listings are for specific stream reaches located upstream of Kremmling, which are outside of the Wild and Scenic segments. The next Administrative Action Hearing for Regulation # 33 is scheduled to occur in December 2017.

## TEMPERATURE

All 2016 temperature data were evaluated against the current water quality standards for segment COUCUC03<sup>15</sup>. According to current regulations, temperature shall maintain a normal pattern of diurnal and seasonal fluctuations with no abrupt changes and shall have no increase in temperature of a magnitude, rate, and duration deemed deleterious to resident aquatic life.<sup>16</sup>

Temperature data collected by the SG, USGS and the BLM were analyzed utilizing the temperature macro4.5v application developed by CDPHE. Temperature data are evaluated against numerical standards for “chronic” and “acute” seasonal maxima.

Attainment of chronic temperature standards is based on a “Maximum Weekly Average Temperature” (MWAT), which is defined as a simple moving average. Attainment of the acute temperature standard is based on a “Daily Maximum” (DM), which is defined as the highest 2-hour average water temperature in a given 24-hour period. Two W&S temperature sites in 2016 showed an MWAT temperature excursion in mid-August as compared to the currently adopted stream temperature standard of 18.3°C (65°F). The “Colorado River at No Name” and “Red Dirt Creek” temperature sites reported excursions above the MWAT temperature standard of 23.9°C (75°F). No DM or winter season excursions were reported at sites in the Wild & Scenic stream reaches.

The 2016 temperature data shows a downstream warming trend through W&S segments 4 through 7, a tendency which is consistent with the elevational change in this stream reach. Table 13 shows the currently adopted numeric temperature standards for the Upper Colorado River Basin. Figures 8 and 9 depict the MWAT and DM for all temperature sites monitored within Wild and Scenic Segments 4-7 during 2016.

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<sup>15</sup> Colorado Department of Public Health and Environment, Water Quality Control Commission 5 CCR 1002-31, March 1, 2017.

<sup>16</sup> Colorado Department of Public Health and Environment, Water Quality Control Commission 5 CCR 1002-33, January 1, 2012.

Table 13. CDPHE Numeric Temperature Standards for Cold Stream Tier II

Temperature Tier	Tier Code	Species Expected	Applicable Months	Temperature Standard (°C)	
				MWAT	DM
Cold Stream Tier II	CS-II	Brown Trout, Rainbow Trout	April - October	18.3	23.9
			November - March	9.0	13.0

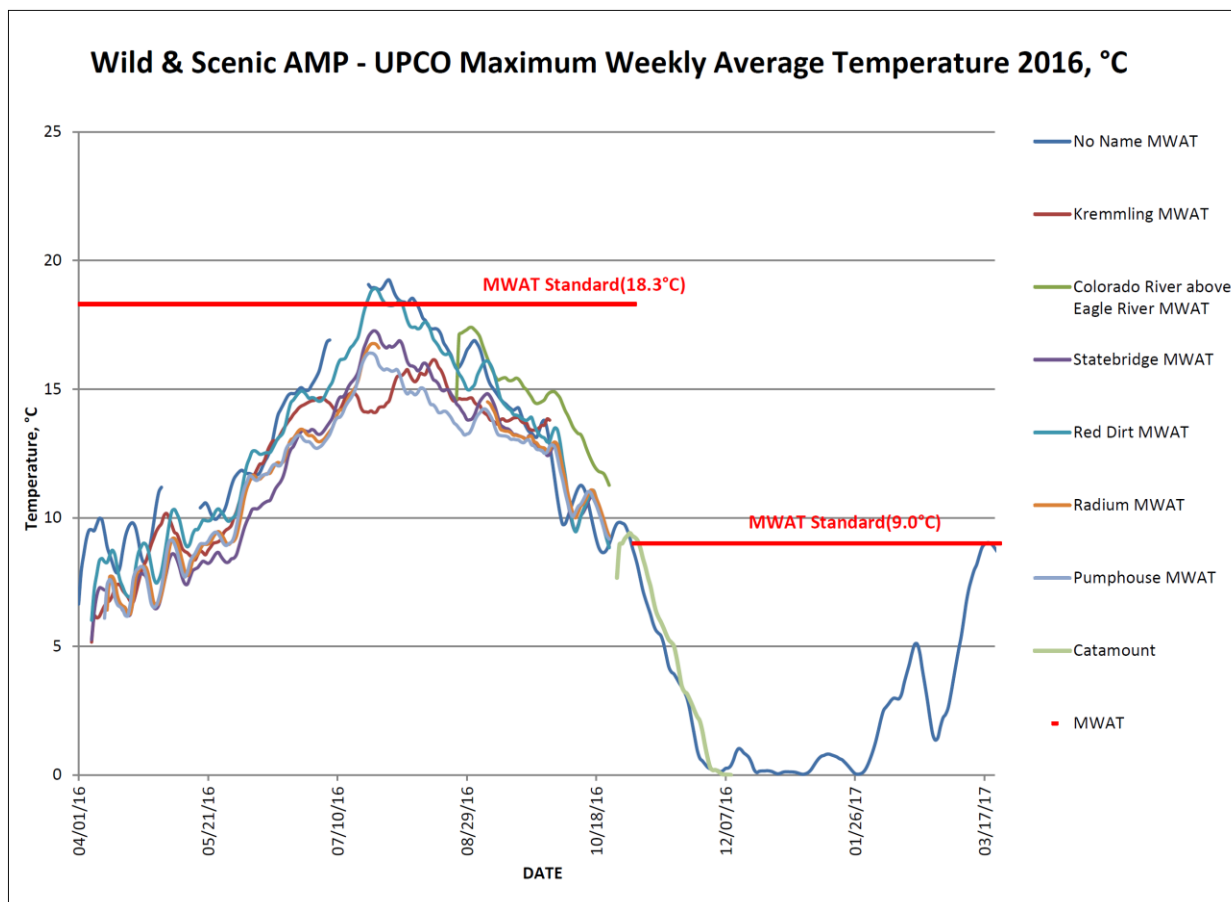


Figure 8. 2016 Measured Maximum Weekly Average Temperatures (MWAT) vs CDPHE Standard



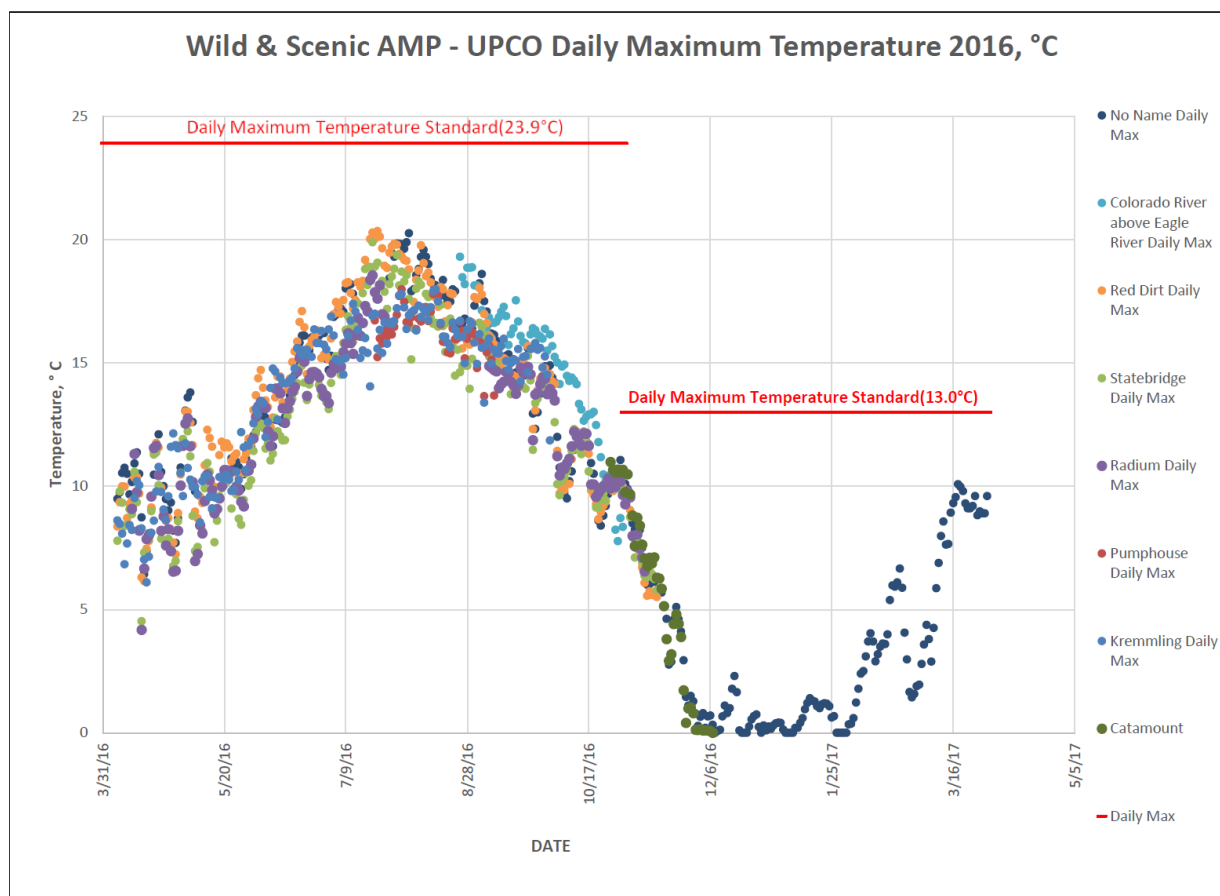


Figure 9. 2016 Measured Daily Maximum (DM) Temperatures vs CDPHE Standard

## ADDITIONAL MONITORING RESULTS

### *RRC Associates*

In 2016, the SG enlisted RRC Associates to advance the pilot effort to establish baseline measures and survey methods that will be used to guide research in the future. RRC will continue to evaluate existing data and refine methods for accessing that data, to be used in developing the SG’s provisional ORV Indicators and Resource Guides.

A summary of RRC’s work in 2016 includes:

- Commercial Data: RRC continued the collection of 2015 commercial boating data from the BLM and USFS. That data was incorporated into the master file for sharing with the SG.
- Vehicle Counters Program: RRC placed five vehicle counters at agreed-upon sites, and monitored these units once placed. The counters included four of the enhanced capacity

MetroCount units purchased in 2015, as well as the fifth unit (which is similar to those used by the BLM, requiring frequent readings to get detailed results).

- Tabulation of Fee Envelope Data from 2015. RRC continued to tabulate fee envelope information in formats that permit comparisons of visitor use patterns over time.
- Data Management, Analysis and Visualization, and Database Management: RRC made ongoing improvements to Tableau to support the above identified tasks.
- Refined Angling Data: Continued to explore the angling database for consideration by the Fishing Ad-Hoc Committee and develop a work program to expand angling data into the future. This effort included collaborative discussions with CPW staff to consider the relationships between biosurvey data and intercept survey results.
- Refined Floatboating Data: Working with the Floatboating Ad-Hoc Committee, RRC began the analysis of data to support discussions of potential refinements to provisional ORV Indicators and Resource Guides.

### ***Macroinvertebrates***

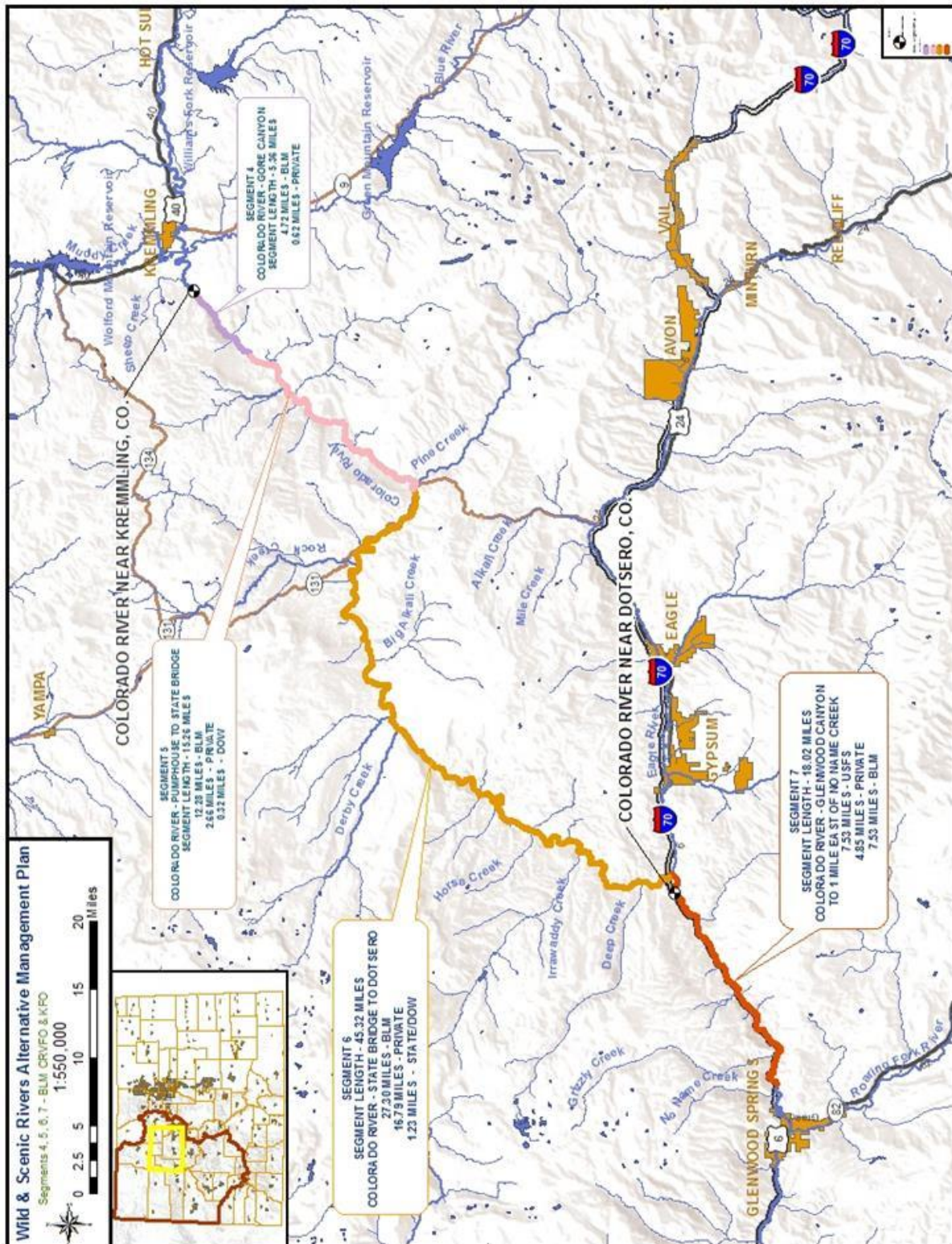
The Fishing Ad-Hoc Committee is exploring the relative merits of monitoring macroinvertebrate populations as part of the W&S long-term monitoring program. During the planning cycle for 2016 monitoring activities, the Monitoring Committee was assigned the task of contracting for macroinvertebrate sampling at four locations on the Colorado River within Wild & Scenic Segments 5 and 6. Subsequently, GEI Consultants were contracted and conducted macroinvertebrate sampling in early October 2016. As of October 2017, the 2016 macroinvertebrate samples are in the process of being analyzed at Utah State University's National Aquatic Monitoring Center (BugLab). Most of the costs for this lab analysis are being covered by the Bureau of Land Management with a portion of funding coming from the SG.

## **LIST OF ATTACHMENTS:**

Attachment A: Project Area Map.

Attachment B: CPW Biosurvey Sample Sites and Associated Fishing Restrictions.

# ATTACHMENT A: PROJECT AREA MAP





## ATTACHMENT B: CPW BIOSURVEY SAMPLE SITES

