

Final Monitoring Report

2020

Prepared in accordance with the
Upper Colorado River Wild & Scenic Stakeholders
Management Plan
June 10, 2021

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Abbreviations and Acronyms

303(d)	Colorado's Section 303(d) list of impaired waters per Regulation 93
AF	Acre-Feet
A&R SG Plan	Amended and Restated Stakeholder Group Plan
BLM	U.S. Bureau of Land Management
CDPHE	Colorado Department of Public Health and Environment
CWCB	Colorado Water Conservation Board
CPW	Colorado Parks and Wildlife
CPUE	Catch Per Unit Effort
CROS	Coordinated Reservoir Operations
CFS	Cubic Feet per Second
DM	Daily Maximum
HUP	Historic User's Pool
MWAT	Maximum Weekly Average Temperature
M&E	Monitoring and Evaluation list per Colorado's Regulation 93
MMI	Multi-Metric Index
ORV(s)	Outstandingly Remarkable Value(s)
SG	Upper Colorado River Wild and Scenic Stakeholder Group
SG Plan	Upper Colorado River Wild and Scenic Stakeholder Group Management Plan January, 2012
TIV	Tolerance Indicator Value
TFE	Total Fishing Effort
USFS	U.S. Forest Service
USGS	U.S. Geological Survey
WQCC	Water Quality Control Commission
WQCD	Water Quality Control Division
W&S	Colorado River Wild and Scenic
W&S Year	Wild and Scenic water year begins on April 1 and ends on March 31

EXECUTIVE SUMMARY

The Upper Colorado River Wild and Scenic Stakeholder Group (SG) monitors and protects Outstandingly Remarkable Values (ORVs) on BLM-defined segments 4 through 7 of the Colorado River from Kremmling, Colorado to approximately 2 miles east of Glenwood Springs. The Upper Colorado River Wild & Scenic Stakeholder Group Management Plan (SG Plan) provides the operating framework for the SG to protect the streamflow-influenced ORVs through long-term protection measures, cooperative measures, and monitoring of ORV Indicators and Resource Guides. The purpose of the SG Plan is to “balance permanent protection of the ORVs, certainty for the stakeholders, water project yield, and flexibility for water users.” This year marked the transition from the provisional period defined by the 2012 SG Plan to implementation of the 2020 Amended and Restated SG Plan (A&R SG Plan), which was approved by the USFS and BLM in June of 2020.

The purpose of this report is to provide a summary of monitoring activities and cooperative measures conducted by the SG during W&S water year (W&S Year) 2020, from April 1, 2020 to March 31, 2021. These monitoring activities support evaluation of the ORV Indicators and review of Resource Guides for Recreational Floatboating and Recreational Fishing. Monitoring also includes assessment of the W&S Year Type (Year Type). The 2020 Year Type in segments 4-6 was in the Wet Typical category, and in segment 7 was in the Dry Typical category.

During 2020, the Cooperative Measures Committee monitored streamflow and temperature in segments 4-7 and participated in Historic User’s Pool (HUP) calls. E-mails summarizing activities on the Colorado River including forecasted flows, current stream temperature, and flow gage data were circulated to the Cooperative Measures Committee and Executive Committee regularly throughout the summer.

The SG did not monitor the ORV Indicators in 2020 due to COVID-19. The final ORV Indicators are summarized in Table 1, below.

Table 1. Summary of ORV Indicators in 2020.

ORV Indicator	Measure/Metric	2020 Status
Recreational Floatboating	Not likely to return	No data collected
Recreational Fishing	Quality Trout	No data collected
	Biomass	No data collected
	TFE / CPUE	No data collected

The SG also monitored the Resource Guides in 2020. Resource Guides were within range for all guides where data was collected, as summarized by Table 2. Data was not collected for the Recreational Fishing Desired Species metric, or the Macroinvertebrate MMI metric, the latter of which is only collected biennially. An observational monitoring plan to better understand the effects that peak flows have on channel maintenance processes in Segments 4 through 6 is under development. Flows were within range for boatable floatboating days, early-season boatable days, and seasonal flows for fishing. The flushing flow of 2,500 cfs for 3 consecutive days occurred, with flows at or above 2,500 cfs for 5 days in 2020, and a peak flow of 3,530 cfs on June 2, 2020. Daily Max (DM) temperature observations attained the standards at all sites, however Maximum Weekly Average Temperatures (MWAT) exceeded chronic thresholds at Dotsero, No Name, and Red Dirt. Regulatory-level assessment of additional criteria for warming events or other excursions may result in these exceedances being disqualified or excused.

Table 2. Summary of ORV Resource Guides in 2020.

ORV Resource Guides	Measure/Metric	2020 Status
Recreational Floatboating	Boatable Days	Within range for all Opportunities
Recreational Floatboating	Early-Season Boatable Days	Within range for both time periods
Recreational Fishing	Desired Species	No data collected
Recreational Fishing	Seasonal Flows	Within range for all seasonal flows
Recreational Fishing	Flushing Flows	Achieved
Recreational Fishing	Channel Maintenance Monitoring	Monitoring plan development started
Water Quality ¹	Water Quality Standards	Macroinvertebrates listed on M&E list
Macroinvertebrates	MMI	No data collected
Water Temperature	Daily Maximum (DM)	No exceedances of the temperature threshold recorded
	Maximum Weekly Average Temperature (MWAT)	Potential exceedances of the temperature threshold at Dotsero, No Name, and Red Dirt

The in-person portion of the annual Gore Canyon Festival was canceled due to COVID-19 and replaced by a virtual event.

¹Colorado Department of Public Health and Environment, Water Quality Control Commission 5 CCR 1002-93, March 3, 2020.

INTRODUCTION

The 2012 SG Plan was adopted by the U.S. Bureau of Land Management (BLM) and the 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), which includes over 80 miles of the upper Colorado River (See Appendix A: Project Area Map). 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.*” The SG Plan includes provisions for protection of the ORVs and monitoring of the ORV Indicators and Resource Guides to assist in implementation of the SG Plan. In June of 2020, the Amended and Restated SG Plan (A&R SG Plan) was approved by the USFS and BLM, marking the end of the provisional period and the formal adoption of final ORV Indicators and Resource Guides.

Protection of the ORVs

The A&R SG Plan is intended to protect all ORVs identified in the Wild & Scenic Eligibility Reports for segments 4 through 7, while focusing on the primary streamflow-influenced Recreational Fishing ORVs in segments 4 through 6, and Recreational Floatboating ORVs in segments 4 through 7.

Long-Term Protection Measures are defined in the A&R SG Plan and include appropriation of Colorado Water Conservation Board (CWCB) instream flows, continued delivery of water to downstream demands, continued delivery to downstream senior water rights, and ongoing existing water deliveries to the 15-Mile Reach for the endangered fish species under the Upper Colorado River Endangered Fish Recovery Program². The A&R SG Plan contains provisions for addressing any material change in circumstances that undermines the value of these long-term protection measures.

Cooperative Measures are voluntary strategies that are used by the SG to maintain or enhance the ORVs. Opportunities for cooperative measures are considered annually and are based on

² Garrison, M., V. Lee, J. La, 2019. 2017 COLORADO RIVER RECOVERY PROGRAM FY 2010 ANNUAL REPORT COORDINATED RESERVOIR OPERATIONS (CROS) AND INFORMATION AND EDUCATION (I&E).

hydrologic conditions, consideration of the ORV Indicators and Resource Guides, 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 aims to protect all ORVs while focusing on Recreational Fishing (in Segments 4 through 6) and Recreational Floatboating (in Segments 4 through 7). The SG Plan uses two distinct tools – ‘ORV Indicators...’ and ‘Resources Guides...’” (A&R SG Plan, ES 4). ORV Indicators, which describe conditions that characterize the ORVs, are monitored to gauge whether the ORVs are being protected under the A&R SG Plan. ORV Indicators for Recreational Floatboating and Recreational Fishing became final with adoption of the A&R SG Plan in June 2020. *“Failure to meet the criteria related to the ORV Indicators would be cause for potential mediation and SG Plan termination pursuant to Section VI.J.”* (A&R SG Plan, Section III.A.1.)

Resource Guides include resource conditions that may affect the ORVs, and include flows, temperature, macroinvertebrates, and water quality. The Resource Guides are used as a source of information to inform SG discussions under the A&R SG Plan. *“Resource Guides are not intended to be used as a test for A&R SG Plan success, nor for use by permitting agencies or other entities as criteria for evaluating a project’s effects on the ORVs.”* (A&R SG Plan, Section III.A.2.)

The Monitoring Plan included in the SG Plan had an initial 5-year provisional period during which the SG monitored, evaluated, and revised the provisional ORV Indicators and Resource Guides. The provisional period began when BLM and USFS signed their Records of Decision (RODs) in June 2015. The provisional period ended with approval of the A&R SG Plan in June of 2020. Consequently, 2020 is the first year of implementing the A&R SG Plan.

PURPOSE

The purpose of this report is to provide a summary of monitoring activities and cooperative measures conducted by the SG in 2020. Monitoring activities include evaluation of the ORV Indicators and Resource Guides, evaluation of additional data collected by the SG, and review of information collected by other entities that is pertinent to the ORVs. Based on the A&R SG Plan, the 2020 monitoring year began on April 1, 2020 and ended March 31, 2021.

HYDROLOGY

The SG monitors streamflow on the Colorado River to: 1) gain a general understanding of the hydrology within segments 4 through 7; 2) identify opportunities for data collection, such as conducting additional visitor surveys during low flows; 3) identify potential issues that might benefit from cooperative measures, if available; and 4) evaluate Floatboating and Fishing Resource Guides associated with year-type and seasons.

Data for three streamflow gages were available in the W&S segments in 2020 (Table 3). The A&R SG Plan uses the U.S. Geological Survey (USGS) Kremmling (USGS 09058000) and Dotsero (USGS 09070500) gages to monitor flows in segments 4 through 7. In addition, the SG spearheaded the installation of the Catamount gage (USGS 09070500) in October of 2016 at the Catamount Bridge in segment 6. This gage is operational for 8 months each year, from March 15th through November 15th and is used to monitor streamflow, water temperature and air temperature. Figure 1, Figure 2, and Figure 3 display the average daily streamflow from all gages during the 2020 W&S Year.

All three hydrographs and all subsequent analyses use USGS data available as of May 3, 2021, including approved and provisional data. The Kremmling gage data is provisional from October 8, 2020 to March 31, 2021, the Dotsero gage data is provisional from November 16, 2020 to March 31, 2021, and the seasonal Catamount gage is provisional from March 15, 2021 to March 31, 2021. USGS data and long-term average data was used to fill missing values in order to estimate the W&S Year Type before the end of the W&S Year.

Table 3. USGS gages operated in segments 4, 6 and 7 in 2020.

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

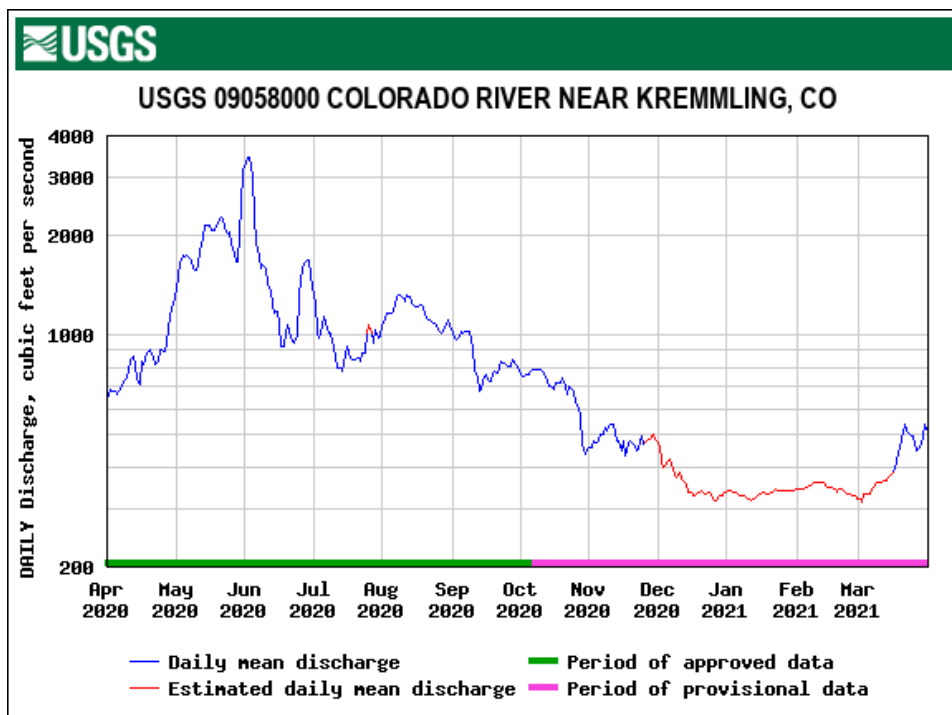


Figure 1. Daily streamflow in 2020 at the Colorado River near Kremmling, CO gage (USGS 09058000).

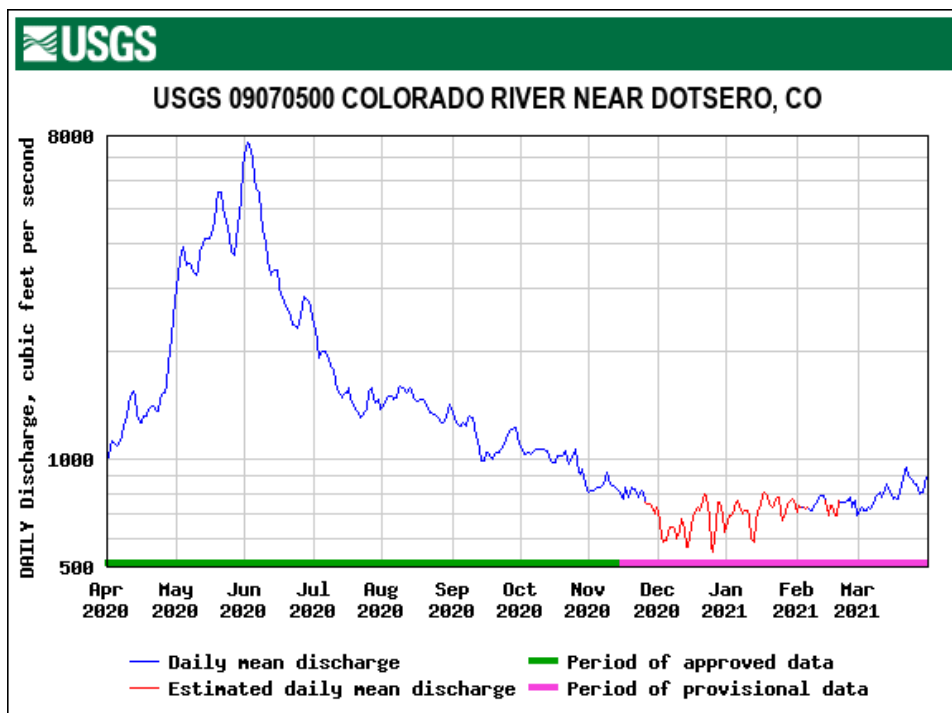


Figure 2. Daily streamflow in 2020 at the Colorado River near Dotsero, CO gage (USGS 09070500).

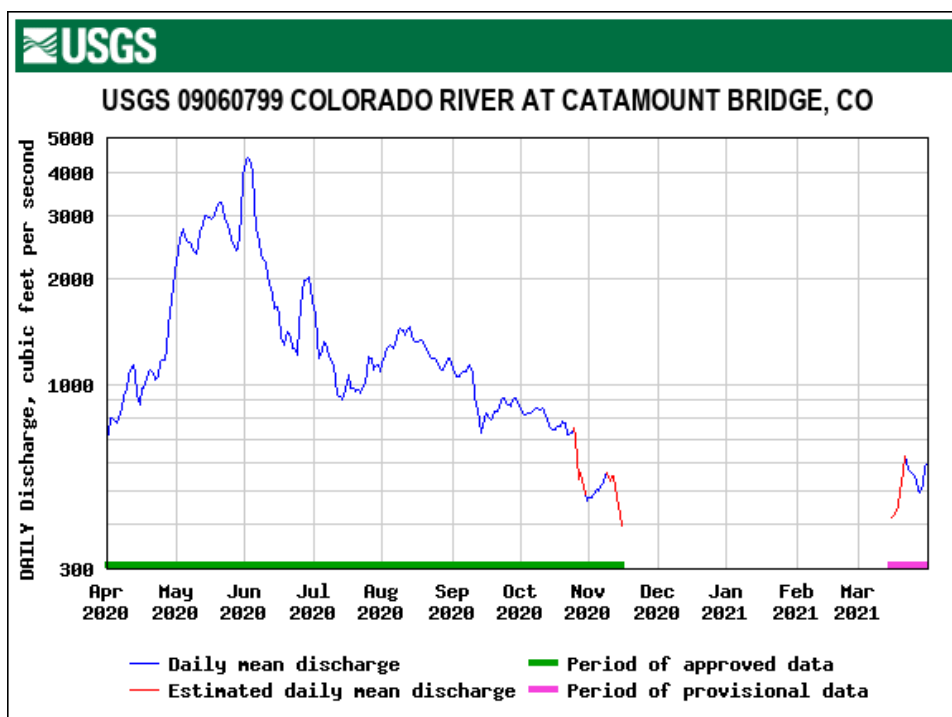


Figure 3. Daily streamflow in 2020 at the Colorado River at Catamount Bridge, CO gage (USGS 09060799).

Year Type Determination

The A&R SG Plan calls for evaluating and categorizing annual flow volumes by “Year Type” (Table 4). The actual Year Type is based on total annual flow volumes measured at the Kremmling (USGS 09058000) and Dotsero (USGS 09070500) gages from April 1st through March 31st. In addition, the SG evaluates the predicted Year Type based on the Colorado Basin River Forecast Center’s April 1 Water Supply Forecast (Table 5). The April 1 prediction is based on undepleted forecasted flows. The April 1 prediction in 2020 estimated that the undepleted flows would be 975,000 acre-feet (AF) for Kremmling and 1,580,000 AF at Dotsero (Table 6). Based on these volumes the predicted flows at both Kremmling and Dotsero were classified as a “Wet Typical” Year Type.

During W&S Year 2020, the total actual annual flow volume at the Kremmling gage was **605,620 AF** which ranks in the “Wet Typical” category and the total volume at the Dotsero gage was **1,116,298 AF** which ranks in the “Dry Typical” category (red font indicates provisional values). It is worth noting that 5 of 9 years since 2012 have been classified as “Wettest 25%” or “Wet Typical.” This is partly due to the Year Type classification, which is based on simulated future modeled hydrology, which includes water projects that have not yet been fully constructed.

Table 4. A&R SG Plan Year Type classification for segments 4-6 and segment 7. This table is based on data from Denver Water's PACSM future modeled hydrology for 1947-1991.

Year Type	Segment 4-6 Kremmling Gage (AF)	Segment 7 Dotsero Gage (AF)
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

Table 5. April 1, 2020 forecast predicted Year Type classifications for segments 4-6 and segment 7.

Year Type	Segment 4-6 Kremmling Gage (AF)	Segment 7 Dotsero Gage (AF)
Wettest 25%	>1,007,000	>1,757,500
Wet Typical	812,500 - 1,007,000	1,362,500 - 1,757,500
Dry Typical	607,000 - 812,500	1,007,000 - 1,362,500
Driest 25%	<607,000	<1,007,000

Table 6. Summary of April 1 flow predictions, actual flow volumes, and actual Year Type from 2012 through 2020 for all segments.

Year	Segment 4-6 Kremmling Gage			Segment 7 Dotsero Gage		
	April 1 Prediction	Actual AF	Actual Type	April 1 Prediction	Actual AF	Actual Type
2012	Driest 25%	409,208	Driest 25%	Driest 25%	733,824	Driest 25%
2013	Driest 25%	514,954	Dry Typical	Driest 25%	1,107,878	Dry Typical
2014	Wettest 25%	1,207,257	Wettest 25%	Wettest 25%	2,170,195	Wettest 25%
2015	Dry Typical	1,074,067	Wettest 25%	Dry Typical	1,744,893	Wettest 25%
2016	Wet Typical	855,910	Wettest 25%	Dry Typical	1,565,583	Wettest 25%
2017	Wet Typical	790,942	Wettest 25%	Wet Typical	1,439,400	Wet Typical
2018	Dry Typical	511,023	Dry Typical	Dry Typical	947,581	Driest 25%
2019	Wet Typical	878,157	Wettest 25%	Wet Typical	1,803,323	Wettest 25%
2020	Wet Typical	605,620	Wet Typical	Wet Typical	1,116,298	Dry Typical

*Red font indicates values that include provisional data. Values before 2019 may contain both provisional and approved data.

W&S Year Values in Table 6 may not match a given year's Annual Monitoring Report because these values have been updated based on the final approved USGS data.

2020 COOPERATIVE MEASURES

During 2020, the Cooperative Measures Committee developed web-based tools to aid in discussions on Resource Guides and potential cooperative efforts on the Colorado River. A

floatboating boatable day tool, which is populated by preliminary gage data at the Kremmling and Dotsero gages, was developed and published on the Upper Colorado W&S website. The tool provides a graphical representation and an automated summary of the number of boatable days for each opportunity category defined in the A&R SG Plan. The Cooperative Measures Committee has also been in the process of developing an automated tool to calculate year-to-date flow volumes and compare the volumes and projections to the Year Type volumes as defined in the A&R SG Plan.

Representatives from the Cooperative Measures Committee participated in State of the River/Historic User Pool (HUP) weekly calls between March and October to provide input on operations being discussed on the Colorado River. Those representatives provided updates to the Cooperative Measures Committee, summarizing information from these calls, forecasts, stream flows, and stream temperature graphs. This information was also discussed at numerous Cooperative Measures Committee meetings.

Coordinated Reservoir Operations (CROS) occurred from May 29th through June 6th in 2020. The primary objective of CROS is to enhance spring peak flows in a section of the Colorado River upstream of the confluence with the Gunnison River for the benefit of endangered fish, without diminishing reservoir or diversion yields or affecting the timing of reservoir filling. The CROS coordinating group enhanced the peak flow in the Colorado River for fish that are protected under the Endangered Species Act³. The CROS operation also created higher peak flows in all the segments as releases from participating upstream CROS reservoirs passed through the W&S segments (Figure 4).

³ Garrison, M., V. Lee, J. La, 2020. *UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM FY 2020 ANNUAL REPORT COORDINATED RESERVOIR OPERATIONS (CROS) AND INFORMATION AND EDUCATION (I&E)*. https://www.coloradoriverrecovery.org/documents-publications/work-plan-documents/arpts/2020/isf/12C_C14_FY20AR%20CROS_508_MG.pdf

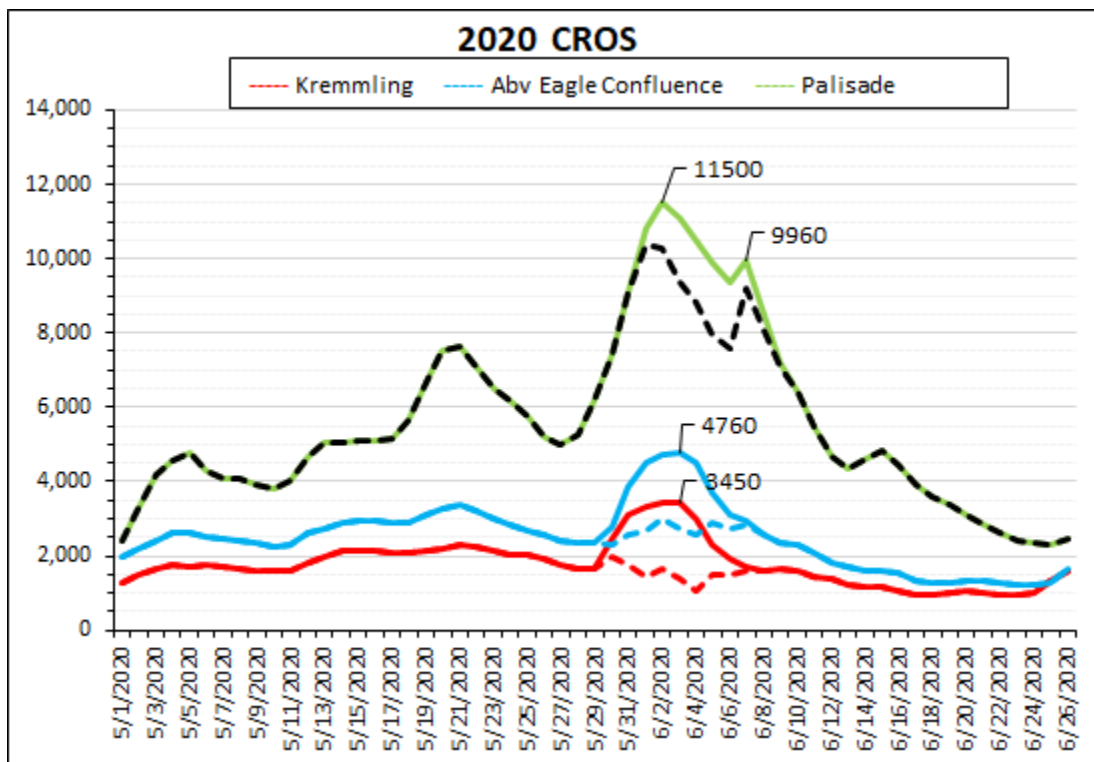


Figure 4. Daily streamflow in 2020 with CROS at the Colorado River near Kremmling gage (USGS 09058000), above the Eagle River confluence, and at the Palisade gage (USGS 09106150).

In 2020, the HUP Managing Entities declared a Surplus with the HUP allocation within Green Mountain Reservoir.⁴ Surplus deliveries commenced on October 14 and continued through October 31, allowing for release of 7,674 acre-feet for the Upper Colorado River Endangered Fish Recovery Program. Surplus releases reached a maximum of 334 cfs during this time.

2020 MONITORING RESULTS

The Monitoring Committee assembled or collected information to evaluate the ORV Indicators and review the Resource Guides. Due to COVID-19, no data was collected for Fishing or Floatboating ORV Indicators. CPW was unable to safely collect the biosurvey data due to the inability to maintain social distances on the rafts and travel restrictions in the spring. The W&S

⁴ Conditions can allow for the declaration of a HUP Surplus. Water that is surplus to the needs of the HUP, can be used for Municipal Recreation contract deliveries to entities in the Grand Valley, which uses have the ancillary benefit of providing environmental benefits to the 15-Mile Reach of the Colorado River. Such releases are administered in a manner that also provides recreational and environmental benefits the stream reaches that are the subject of the SG Plan.

SG decided not to collect boating and fishing intercept data due to concerns about potentially anomalous data due to COVID-19. During 2020, the SG conducted the following activities:

- Determined Recreational Floatboating boatable and early seasonal boatable days.
- Evaluated Recreational Fishing seasonal flows and flushing flows.
- Evaluated temperature readings at eight sites operated by USGS, BLM, and the SG.
- Funded assessment of traffic counter data and commercial outfitter activity logs.
- Initiated an RFQ to develop a channel maintenance monitoring plan.

RECREATIONAL FLOATBOATING

ORV Indicators for Recreational Floatboating

The A&R SG Plan Recreational Floatboating “Not Likely to Return” ORV Indicator was not evaluated in 2020 because boating intercept data was not collected due to COVID-19.

Resource Guides for Recreational Floatboating

Resource Guides for Recreational Floatboating are based on assessing the number of boatable days at different flow rates, which depend on the Year Type. Early-season boatable days (segment 4-6) are not dependent on the Year Type.

W&S Segments 4-6

The Floatboating Resource Guides for boatable days in segments 4-6 are shown in Table 7. In 2020, there were 175 total boatable days in these segments during the floatboating season (April 1 to September 30), which was within the Resource Guide range for boatable days in a Wet Typical Year-Type. The number of boatable days for each opportunity category were within the range for the 2020 Year Type (Table 8). Figure 5 illustrates mean daily streamflow and the range of floatboating opportunities in these segments during the 2020 floatboating season.

Table 7. Floatboating Resource Guide for number of boatable days in segments 4-6, minimum (median) maximum.

Year Type	Total Boatable Days	Opportunities (700-1,300 cfs)	Opportunities (1,300-4,000 cfs)	Opportunities (4,000-7,000 cfs)
Wettest 25%	115 (161) 180	38 (74) 121	39 (72) 79	4 (22) 28
Wet Typical	120 (153) 169	68 (108) 119	19 (57) 79	0 (0) 5
Dry Typical	74 (115) 141	69 (106) 127	0 (14) 33	0 (0) 0
Driest 25%	62 (80) 96	53 (73) 87	0 (1) 25	0 (0) 0

Table 8. Summary of boatable days in segments 4-6 from 2012 through 2020.

Year	Year Type	Total Boatable Days	Opportunities (700-1,300 cfs)	Opportunities (1,300-4,000 cfs)	Opportunities (4,000-7,000 cfs)
2012	Driest 25%	103	103	0	0
2013	Dry Typical	89	83	6	0
2014	Wettest 25%	180	50	106	24
2015	Wettest 25%	179	95	58	26
2016	Wettest 25%	170	101	57	12
2017	Wettest 25%	179	70	106	3*
2018	Dry Typical	136	93	43	0
2019	Wettest 25%	174	70	92	12
2020	Wet Typical	175	121	54	0

* Indicates that this number of boatable days was below the Resource Guide range.

Upper Colorado River Wild and Scenic Alternative Management Plan

2020 Kremmling Boatable Days Summary
(to Inform Potential Cooperative Measures)

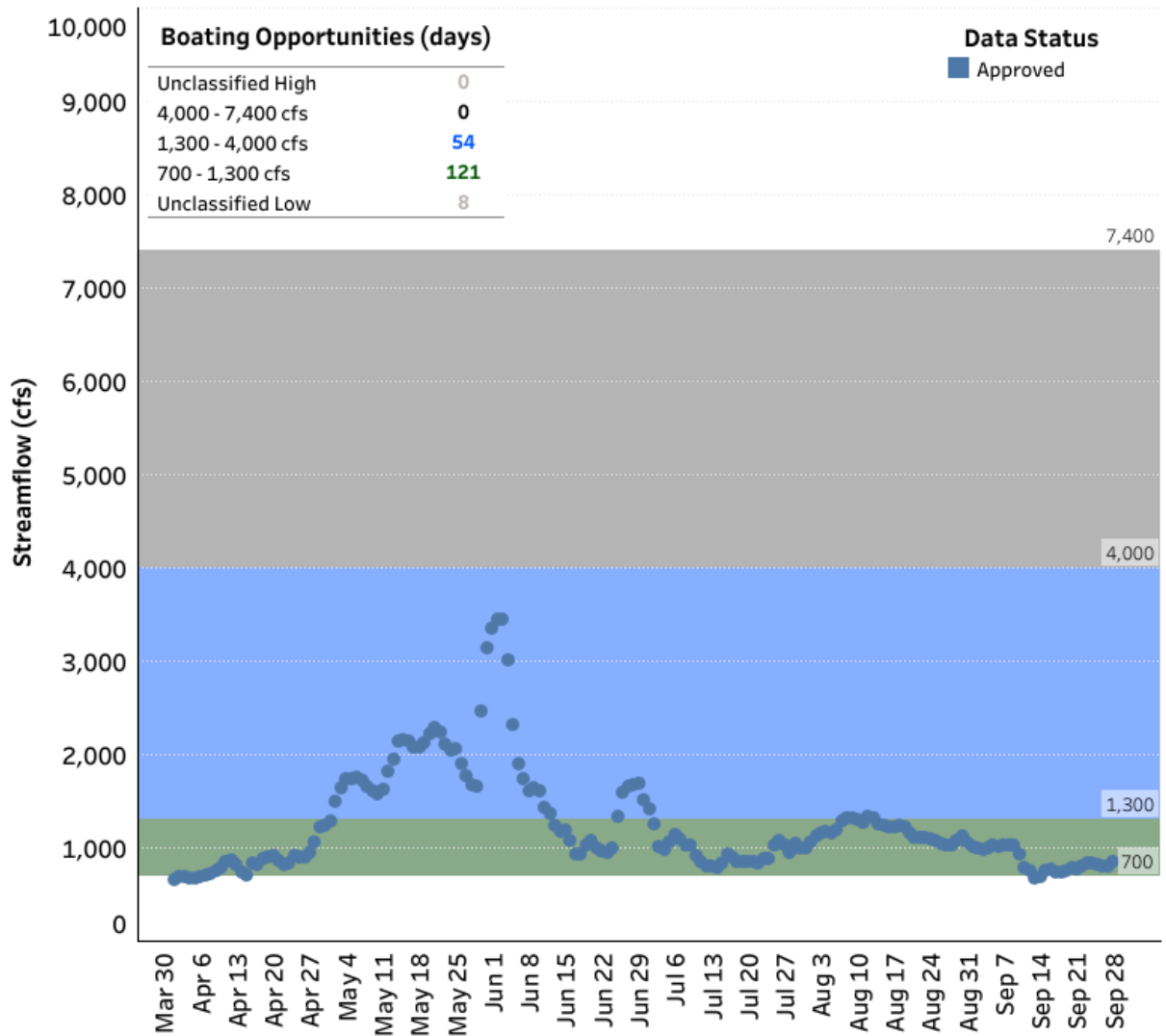


Figure 5. Hydrograph from the Colorado River near Kremmling, CO gage (USGS 0905800) demonstrating the floatboating opportunities in 2020 in segments 4-6.

The Resource Guide for early season boatable days is shown in Table 9. During 2020, streamflow at the Kremmling gage was at or above 860 cfs for all days during both time periods.

Table 9. Floatboating Resource Guide for number of early-season boatable days in segments 4-6, minimum (median) maximum and number of early-season boatable days in 2020.

Early Season Boatable Days		
Early Season Resource Guide	May 15-31	June 1-30
	0 (4) 10	0 (9) 17
Year 2020	17	30

W&S Segment 7

The Resource Guides for segment 7 are shown in Table 10. In 2020, there were 152 total boatable days in this segment during the floatboating season (April 1 to September 30), which was within the range in the Dry Typical Year Type. The number of boatable days for each opportunity category were within the range for the 2020 Year Type (Table 10). Figure 6 illustrates mean daily streamflow and the range of floatboating opportunities in this segment during the 2020 floatboating season.

Table 10. Floatboating Resource Guide for number of boatable days in segment 7, minimum (median) maximum.

Year Type	Total Boatable Days	Opportunities (1,250-1,800 cfs)	Opportunities (1,800-5,500 cfs)	Opportunities (5,500-8,600 cfs)
Wettest 25%	114 (154) 167	27 (57) 81	49 (68) 77	21 (29) 42
Wet Typical	111 (160) 170	43 (62) 99	39 (75) 110	1 (13) 33
Dry Typical	127 (151) 171	64 (78) 111	40 (61) 91	0 (2) 11
Driest 25%	128 (150) 170	880 (118) 130	10 (32) 63	0 (0) 6

Table 11. Summary of boatable days in segment 7 from 2012 through 2020.

Year	Year Type	Total Boatable Days	Green Opportunities (1,250 - 1,800 cfs)	Blue Opportunities (1,800-5,500 cfs)	Black Opportunities (5,500-8,600 cfs)
2012	Driest 25%	136	131	5*	0
2013	Dry Typical	152	94	57	1
2014	Wettest 25%	158	34	96	28
2015	Wettest 25%	159	69	79	11*
2016	Wettest 25%	165	86	54	25
2017	Wet Typical	179	64	97	18
2018	Driest 25%	156	93	63	0
2019	Wettest 25%	152	49	81	22
2020	Dry Typical	152	79	63	10

* Indicates that this number of days was below the Resource Guide range.

Upper Colorado River Wild and Scenic Alternative Management Plan

2020 Dotsero Boatable Days Summary
(to Inform Potential Cooperative Measures)

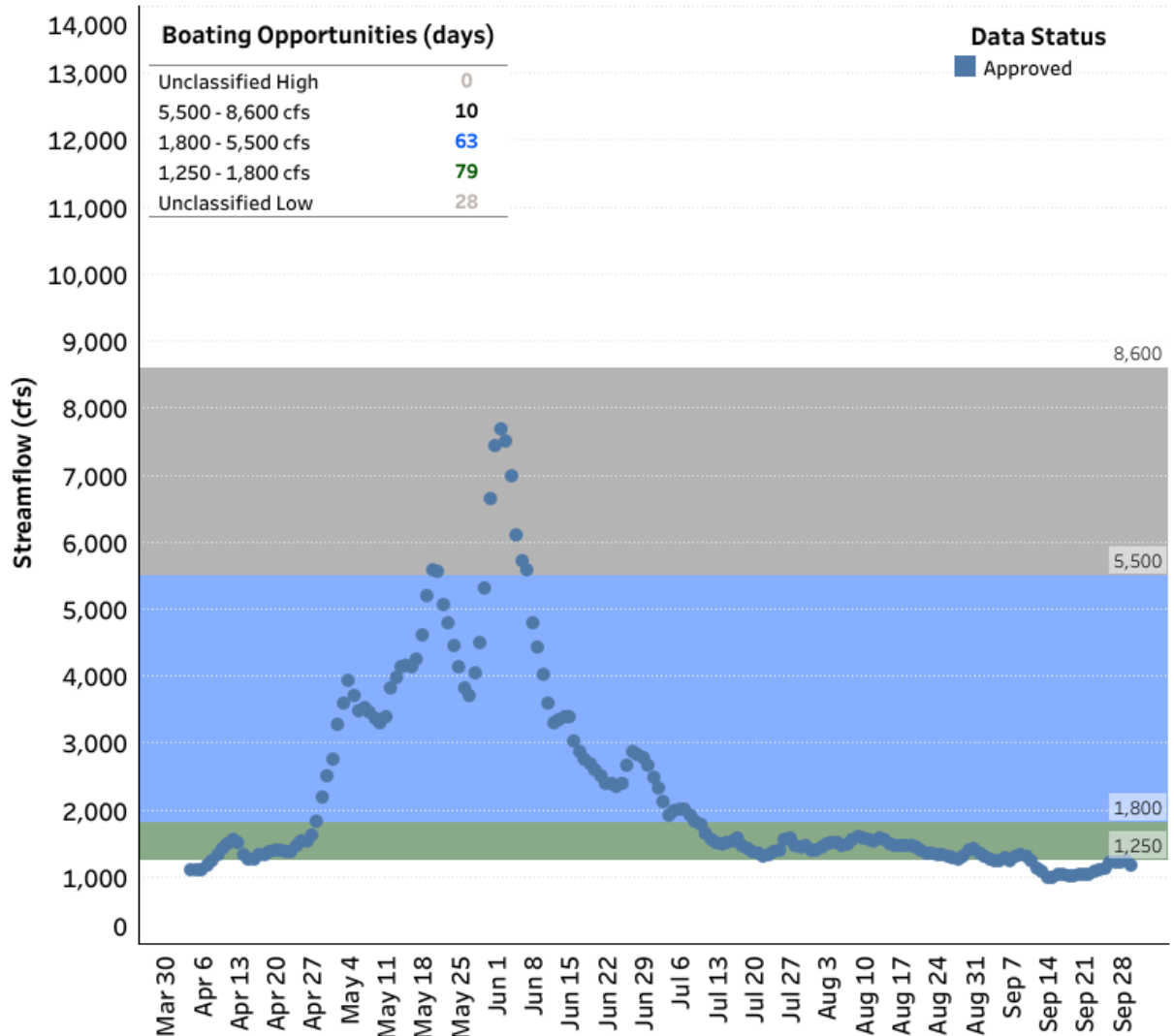


Figure 6. Hydrograph from the Colorado River near Dotsero, CO gage (USGS 09070500) demonstrating the floatboating opportunities in 2020 in segment 7.

RECREATIONAL FISHING

ORV Indicators for Recreational Fishing

The A&R SG Plan evaluates the Recreational Fishing ORV in Segments 5 and 6 between Gore Canyon and Red Dirt Creek based on three indicators: quality trout, biomass and catch-per-unit effort (CPUE). Although Recreational Fishing is an identified ORV in

Segment 4, because CPW is not able to conduct biosurveys in Gore Canyon, ORV Indicators have not been established for W&S Segment 4.

The A&R SG Plan (Section II.B.1) provides details on the Recreational Fishing ORV Indicator metrics and thresholds. In summary, trout that are 14-inches or longer are defined as “quality trout” whose abundance lends to the angler’s recreational fishing experience. Together, quality trout abundance and trout biomass (pounds per acre) gauge productivity and recruitment of a healthy and resilient fishery. Quality trout and biomass are evaluated by CPW during their annual fish monitoring surveys (biosurveys) between Glenwood Canyon and Gore Canyon; CPW has been conducting biosurveys at the Radium, State Bridge, and Catamount reaches on alternating years (dependent on conditions and priorities) each spring since 2010.

CPUE equates to the number of fish caught by each angler (calculated on an hourly basis) and helps evaluate the user experience. RRC calculates CPUE based on individual angler responses to W&S intercept surveys.

Due to travel restrictions and social distancing requirements related to the COVID-19 pandemic, data related to these Recreational Fishing ORV indicators was not collected by either CPW or RRC in 2020. Please refer to previous Annual Monitoring Reports for full analysis of results prior to 2020.

Quality Trout Evaluation

No data to evaluate for 2020.

Biomass Evaluation

No data to evaluate for 2020.

Catch Per Unit Effort (CPUE) Evaluation

No data to evaluate for 2020.

Resource Guides for Recreational Fishing

Seasonal Flows

The Resource Guides shown in Table 12 represent the seasonal ranges of flow for the Recreational Fishing ORV in segments 4, 5 and 6. Since the effective date of the A&R SG 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.⁵

Table 12. Resource Guides for Recreational Fishing in segments 4-6.

Season	Number of Days	Months	Seasonal Fish Flow Range, low to high cfs	Midpoint, cfs
1	91	April, May, June	800-1,000	900
2	92	July, August, September	600-1,000	80
3	61	October, November	400-800	600
4	121	December, January, February, March	400-600	500

Calculations of the seasonal average flow and rolling 5-year average flows are based on daily mean discharge data from April 1, 2020 to January 14, 2020 at the Kremmling gage (USGS 09058000). These calculations included use of provisional data as discussed in the Hydrology section, Seasons 3 and 4 are based on incomplete data at the time of analysis.

Figure 7 provides a comparison of 5-year average seasonal flows and annual average seasonal flows at the Kremmling gage to the Resource Guides between 2012 and 2020. The 5-year rolling average is within or above the Seasonal Flow ranges in Seasons 1, 2, 3, and 4 in 2020.

⁵ During the provisional period, the 5-year rolling average will include data from the previous 4 years.

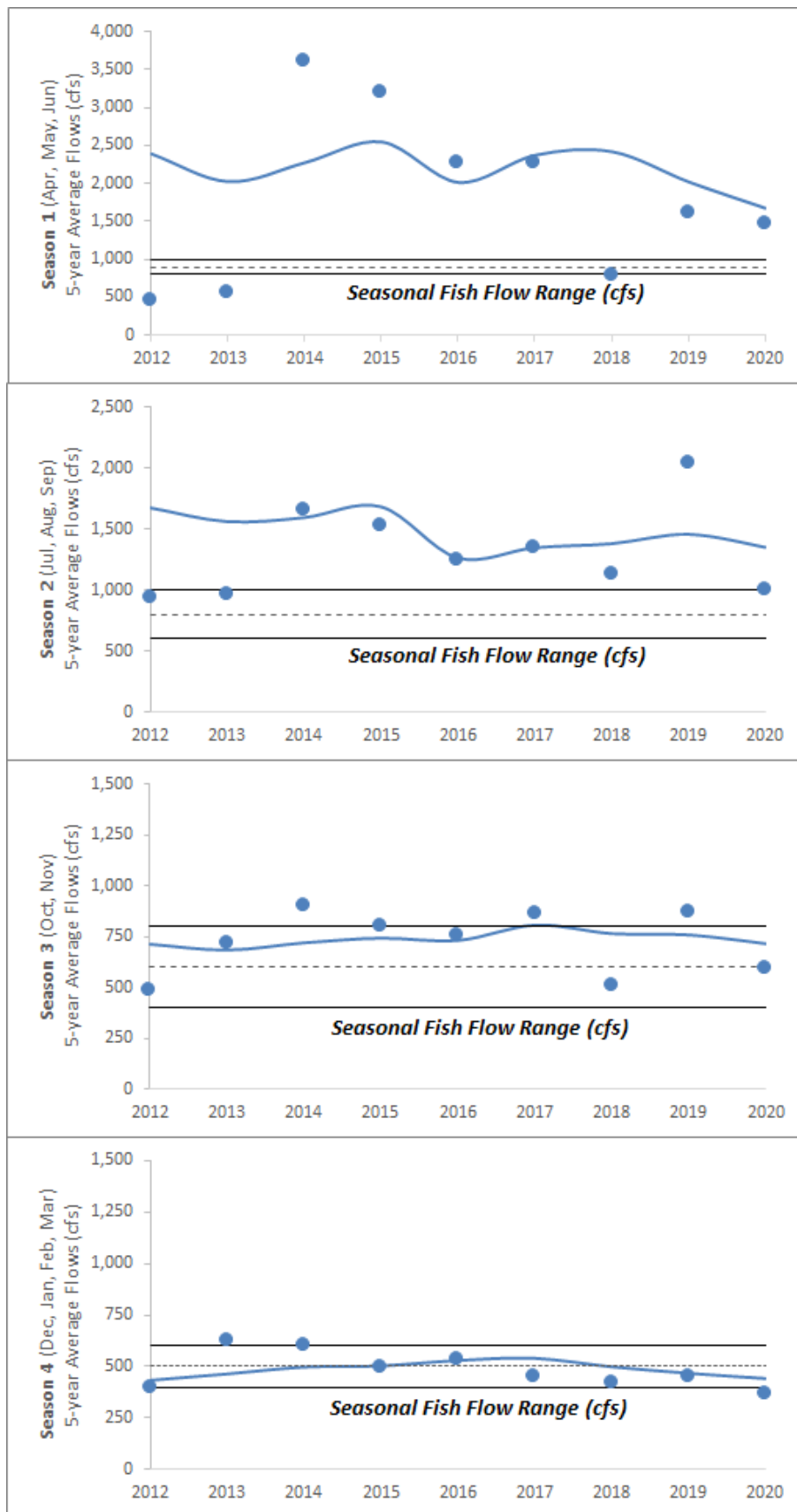


Figure 7. Annual (blue dots) and five-year rolling average seasonal flows (blue lines) for 2012-2020 compared to the Seasonal Flow Resource Guide (black lines indicate upper and lower, dashed grey line shows the midpoint). Note that y-axis changes on most graphs.

Flushing Flows

In addition to seasonal flows, the A&R SG Plan includes “Flushing Flows” as a Resource Guide for the Fishing ORV. The SG has negotiated the following Resource Guide for a periodic high flow: “A daily average flow at or above 2,500 cfs at the Kremmling gage maintained for a minimum of three consecutive days in 50% of the years over a 10-year rolling period, beginning with the period April 1, 2011 through March 31, 2021” (A&R SG Plan page 24). Table 13 summarizes peak stream flows, or “Flushing Flows” from 2012 through 2020 based on the Colorado River near Kremmling, CO gage (USGS 09058000). Streamflow exceeded 2,500 cfs for 5 consecutive days in 2020, reaching an instantaneous peak of 3,530 cfs on June 2, 2020. The flushing flow streamflow and duration occurred in 70% of years based on a 10-year rolling average between 4/1/2011 and 3/31/2021.

Table 13. Peak streamflow and flushing flow metrics based on the Colorado River near Kremmling gage (USGS 09058000).

Year	Year Type	Instantaneous Peak Streamflow, cfs	Maximum Daily Mean Streamflow, cfs	2,500 cfs for 3 consecutive days	Number of days above 2,500 cfs
2011	-	9,540	9480	Yes	96
2012	Driest 25%	1,280	1,150	No	0
2013	Dry Typical	1,750	1,680	No	0
2014	Wettest 25%	7,830	7,670	Yes	82
2015	Wettest 25%	7,860	7,820	Yes	62
2016	Wettest 25%	4,830	4,770	Yes	46
2017	Wettest 25%	4,380	4,280	Yes	21
2018	Dry Typical	1,650	1,610	No	0
2019	Wettest 25%	4,990	4,960	Yes	39
2020	Wet Typical	3,530	3,450	Yes	5

Desired Species

No data to evaluate for 2020.

WATER QUALITY

The A&R SG Plan adopted the Colorado Water Quality Control Commission’s (WQCC) water quality standards as Resource Guides for segments 4 - 7:

“The Resource Guides for water quality are the Colorado Water Quality Control Commission water quality standards. These standards are defined in 5 CCR 1002-33 and are subject to change pursuant to the Water Quality Control Commission’s rulemaking process for “Cold Water Aquatic Life 1” 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).”

Colorado’s Section 303(d) List of Impaired Waters and Monitoring and Evaluation List (Regulation #93 – 5 CCR 1002-93), effective June 14, 2020 lists Segments COUCUC03_C, COUCUC03_D, and COUCUC03_E (Derby Creek to the confluence with the Roaring Fork River) are identified as impaired for temperature (From 578 Road Bridge to the confluence with the Roaring Fork River; W&S Segments 4 – 7) with a high priority designation. Segment COUCUC03_E is on the Monitoring and Evaluation list for Escherichia coli. Appendix A shows the locations of the relevant W&S segments. Regulation 93 listings inevitably lag the most recent year’s data by as much as four years because listings are based on the most recent five years of data at the time of the data call, which must be validated and processed via the Water Quality Control Division’s listing process. The 2020 list uses data from 2014-2019.

Table 14. Segments listed for impairment in Colorado's WQCC Regulation #93 - 5 CCR 1002-93.

Listed Portion	Description	Affected Use	Parameter	Category/List	Segment
COUCUC03_C	Colorado River from 578 Road Bridge to Gore Canyon	Aquatic Life	Temperature	5. – 303(d)	4
COUCUC03_D	Colorado River from Gore Canyon to Derby Creek	Aquatic Life	Temperature	5. - 303(d)	4, 5, 6
COUCUC03_E	Colorado River from Derby Creek to the confluence with the Roaring Fork River	Aquatic Life	Temperature	5. - 303(d)	6, 7
COUCUC03_E	Colorado River from Derby Creek to the confluence with the Roaring Fork River	Recreational Use	E. Coli	3b. – M&E list	6,7

Water Temperature

The Resource Guides for water temperature are the WQCC’s stream temperature water quality standards. These standards are defined in 5 CCR 1002-33 and are subject to change pursuant to the WQCC’s rulemaking process for Daily Maximum (DM) and Maximum Weekly Average Temperature (MWAT) for the portion of the stream segment that the Colorado Department of

Public Health and Environment (CDPHE) has designated COUCUC03⁶ mainstem of the Colorado River from the outlet of Lake Granby to the confluence with Roaring Fork River. Regulations provide both numeric and narrative guidance, stating that “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 the resident aquatic life.”⁷

Table 15 shows the currently adopted numeric temperature standards for the segment COUCUC03 for Cold Stream Tier II temperature standards. The *Blue River above Colorado River Confluence* (BL-abvCOR) temperature monitoring site is located in a Cold Stream Tier I standard segment. Attainment of chronic temperature standards is based on a Maximum Weekly Average Temperature (MWAT), which is defined as a seven-day moving average. Attainment of the acute temperature standard is based on a Daily Maximum (DM), which is defined as the highest two-hour average water temperature in each 24-hour period. Temperature data are evaluated against numerical standards for chronic (MWAT) and acute (DM) seasonal maxima.

Table 15. CDPHE numeric temperature standards for Colorado River segment COUCUC03, covering the Wild and Scenic management reaches.

Standards Tier	Applicable Months	MWAT (Celsius)	DM (Celsius)
Cold Stream Tier II, CS-2	June 1 – Sept 30	18.3	23.9
	Nov 1 – Mar 31	9.0	13.0
	Apr 1 – May 31 & Oct 1 – Oct 31	16.9	21.2
Cold Stream Tier I, CS-1 (applies to BL-abvCOR only)	June 1 – Sept	17.0	21.7
	Oct – May	9	13

In 2020 the Monitoring Committee compiled time-series water temperature data throughout segments 4-7 from three SG sponsored sites, three temperature sites at USGS gage stations, and three BLM temperature sites (Table 16 and Figure 8).

⁶ Colorado Department of Public Health and Environment, Water Quality Control Commission 5 CCR 1002-31, 01/31/2018.

⁷ Colorado Department of Public Health and Environment, Water Quality Control Commission 5 CCR 1002-33, 12/31/2019.

Table 16. 2020 Temperature stations, responsible agencies, and locations.

Site ID	Description	Segment	Latitude	Longitude	Operator
09058000	COLORADO RIVER NEAR KREMMLING, CO	4	40.0366	-106.4400	USGS
COR-	Colorado River at Pumphouse	5	39.9899	-106.5084	BLM
COR-Rad	Colorado River at Radium	5	39.95467	-106.55	BLM
UPCO-SB	Upper Colorado River upstream of State	6	39.8555	-106.6445	WSSG
09060799	COLORADO RIVER AT CATAMOUNT BRIDGE,	6	39.8911	-106.8317	USGS
UPCO-DOT	Upper Colorado River upstream of Dotsero	6	39.6479	-107.0629	WSSG
UPCO-RD	Upper Colorado River downstream of Red Dirt	6	39.8005	-106.9740	WSSG
09071750	COLORADO RIVER ABOVE GLENWOOD	7	39.5588	-107.2909	USGS
BL-abvCOR	Blue River above Colorado Confluence	NA	40.0333	-106.3924	BLM

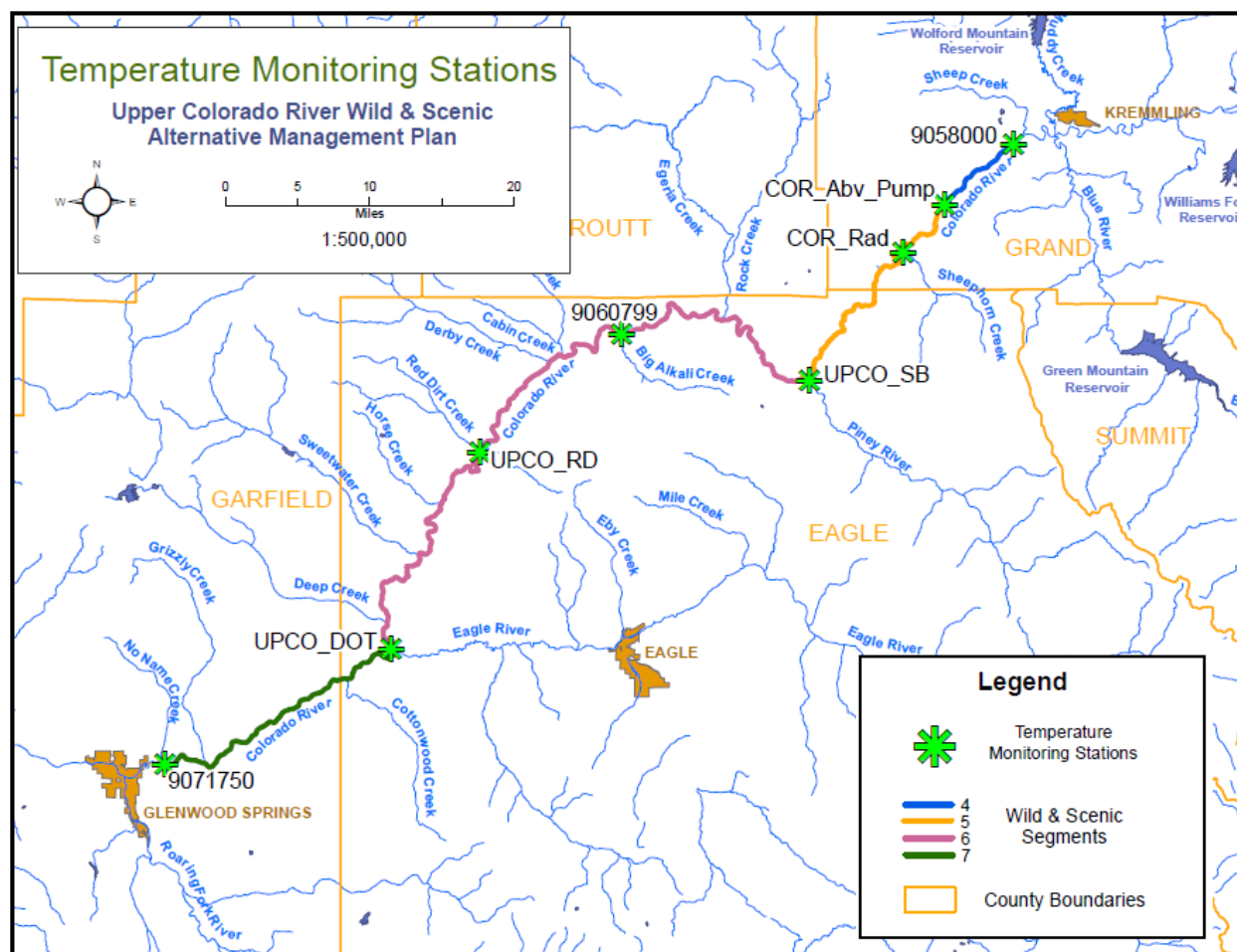


Figure 8. 2020 Time-series temperature monitoring station locations.

The Monitoring Committee has been collecting and reviewing water temperature data within the W&S segments since 2012. Data availability at each site in the years from 2012 to 2020 is shown in Table 17. Data sponsored by the W&S SG and BLM is archived through the Grand County Water Information Network on the Colorado Data Sharing Network’s Ambient Water Quality Monitoring

System (AWQMS) database at <https://www.gcwin.org/data>. USGS data can be obtained from <https://maps.waterdata.usgs.gov/mapper/>. A summary of these and other relevant time-series water temperature data were prepared for the SG and Northwest Colorado Council of Governments in the “Wild and Scenic Group Water Temperature Data Inventory and Evaluation” report completed by Lotic Hydrological in July of 2020.

Table 17. Time-series water temperature data availability from 2012 to 2020 in segments 4 – 7 (in downstream order).

Site ID	2012	2013	2014	2015	2016	2017	2018	2019	2020
9058000	X	X	X	X	X	X	X	X	X
COR-Pump	X	X	X	X	X	X		X	X
COR-Rad	X	X	X	X	X	X	X	X	X
UPCO_SB	X	X	X	X	X			X	X
9060799					X	X	X	X	X
UPCO_RD		X	X	X	X		X		X
UPCO_DOT	X		X	X	X				X
9071750	X	X	X	X	X	X	X	X	X

In 2020 water temperature data was analyzed by Lotic Hydrological. The 2020 temperature data shows the typical natural downstream warming trend between Kremmling and Glenwood Springs (Figure 9 and Figure 10). In general, during runoff and post-runoff conditions, little warming is observed between the mouth of Gore Canyon below Kremmling and Radium due to geographic confinement in a steep walled canyon, with a more-recognizable increase from site to site downstream of Radium.

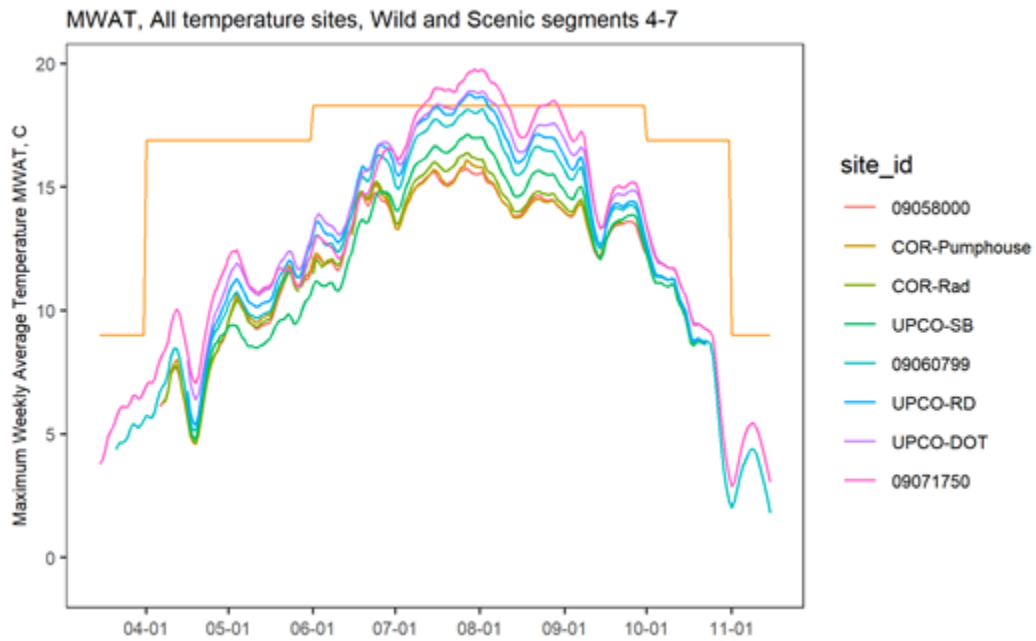


Figure 9. Weekly average temperatures (WAT) in 2020 and the applicable WQCC summer, shoulder, and winter season Maximum Weekly Average Temperature (MWAT) standards.

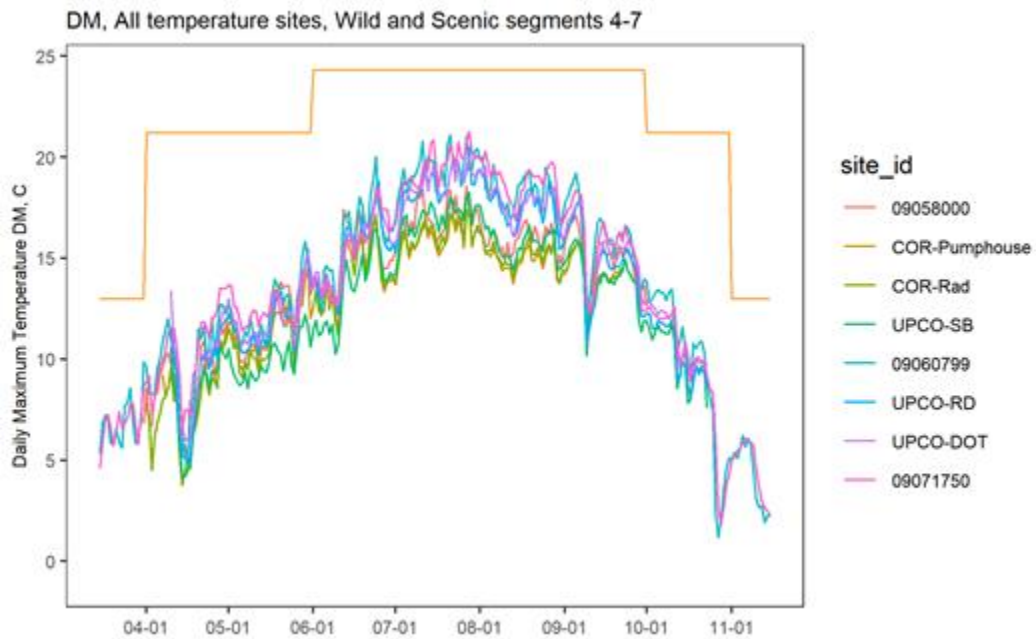


Figure 10. Daily maximum (DM) temperatures in 2020 and applicable WQCC summer, shoulder, and winter season DM standards.

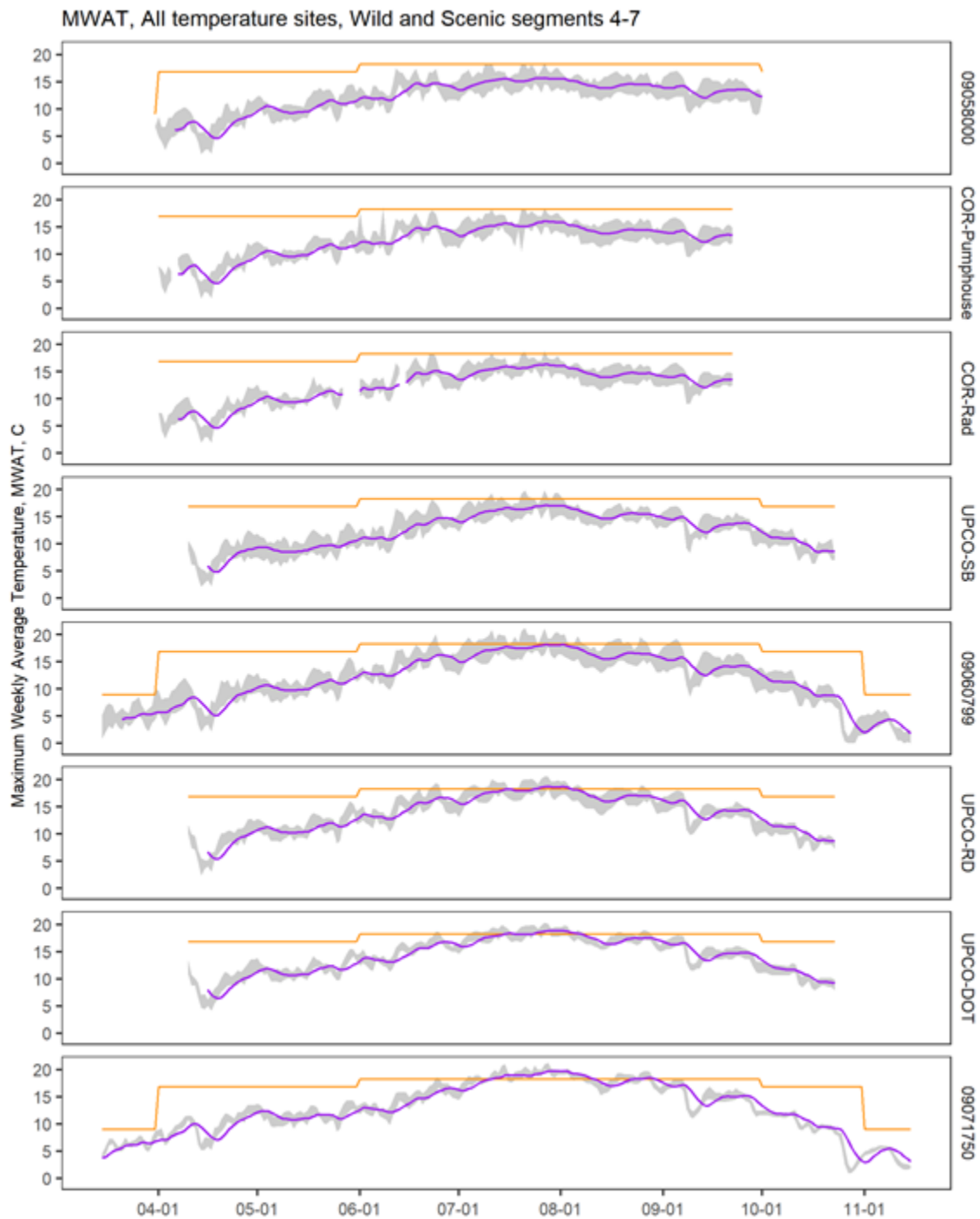


Figure 11. Maximum Weekly Average Temperatures (WAT) temperatures in 2020 and applicable WQCC standards at all sites.

Based on comparison to State standards⁸ no sites exceeded the acute (DM) temperature standards in 2020. Three sites exceeded the chronic (WAT) temperature standards in 2020: Red Dirt (UPCO-RD), Dotsero (UPCO-DOT), and No Name (09071750) (Figure 11). Blue River above the Colorado River confluence (BL-abvCOR) exceeded the MWAT standard in the last two weeks of May prior to the seasonal standard shift.

The Blue River had a notable period of standards exceedances in the last two weeks of May (Figure 11, top panel) prior to the shift to summer standards. Although this period is considered a shoulder season and might be excused under the state's narrative guidance that allow for standards excursions if the natural progression of seasonal patterns is present, the late spring/early summer season temperature concerns in the lower Blue are more likely driven by flow management regimes from Green Mountain Reservoir rather than by naturally warm conditions. During this period, the runoff peak flow on the Blue River was strongly attenuated as both Dillon and Green Mountain Reservoirs filled. In 2020, a natural runoff ascension and recession pattern was practically absent except for a short spike around June 1, 2020, with reservoir operations holding the Blue River approximately at a low and steady 250 cfs until the last week of May (See individual site reports for thermograph/hydrograph comparisons). Operational schedules at Green Mountain are part of a complex coordination of diversion and reservoir infrastructure throughout the Upper Colorado River headwaters.

An official regulatory analysis per WQCD's 2018 Section 303(d) listing methodology and Policy Statement 06-1, which tallies exceedances using only non-overlapping 7-day periods and may exclude exceedances based on exceptions for air temperature, low flow, or shoulder-season excursions has not been conducted. Temperature concerns existed for local fisheries on the lower Eagle and Upper Colorado during portions of the warm season, with the Eagle receiving voluntary closure requests from CPW on some afternoons in August. On the Colorado River, these concerns were more prevalent during the transitional period between the end of snowmelt recession and initiation of downstream water calls at Cameo and/or Shoshone that increase flows in the W&S reach. The peak temperatures at all sites occurred in the period from the final week

⁸ Colorado Department of Public Health and Environment, Water Quality Control Commission 5 CCR 1002-33, 12/31/2019. Segment-specific standards for Whitefish Spawning also apply to the W&S reach (COUCUC03), as specified in Regulation 33 sections 33.6(3)(7) and 33.6(4)

of July to the first week of August. This period also coincided with relatively sustained warm air temperatures, however the peak seasonal air temperatures in 2020 occurred later in mid-August. MWAT potential exceedance summaries by site for 2013-2020 are shown in Table 18, below.

Table 18. MWAT potential exceedances at W&S temperature sites from 2012 – 2020.

Site	Segment	2012	2013	2014	2015	2016	2017	2018	2019	2020
9058000	4	n	y	n	n	n	y	n	n	n
COR-Pump	4/5	n	y	n	n	n	n	*	n	n
COR-Rad	5	n	y	n	n	n	n	n	n	n
UPCO_SB	5/6	n	y	n	n	n	nd	n	n	n
9060799	6	nd	nd	nd	nd	nd	y	y	n	n
UPCO_RD	6	nd	y	n	y	y	nd	y	n	y
UPCO_DOT	6	y	y	n	*	y	nd	nd	n	y
9071750	7	y	y	y	y	y	y	y	n	y

**Not reported due to data issues such as incomplete record or QA/QC concerns.*

nd: No data collected or reported for this year at this location.

y: Yes, an exceedance occurred.

n: No, an exceedance did not occur.

Water temperature in the Upper Colorado River is strongly influenced by fluctuations in air temperature and streamflow. It is useful to place the seasonal water temperature monitoring within the context of weather and streamflow conditions experienced in the region during 2020. The mean Snow Water Equivalent (SWE) value for NRCS remote snowpack monitoring stations in Colorado Basin headwaters peaked at 17 inches in April 2020 - approximately 107% of the 30-year median peak of 15.9 inches.⁹ Summer followed with a relatively weak or absent monsoon season that brought very little rain and warm air temperatures. At the statewide level, the National Oceanic and Atmospheric Administration ranked 2020 as Colorado's second driest and seventh-warmest year ever recorded.¹⁰ Un-regulated tributary streams in the region experienced low flows early in the summer and temperature concerns persisted throughout the Colorado Headwaters region for summer and fall. The Colorado River at Kremmling peaked slightly earlier in the season than average during the first week of June at approximately 4,400 cfs. Flow receded to approximately 900 cfs by the second week of July before downstream water calls resulted in augmented flows that proceeded through August and early September.

⁹ <https://www.nrcs.usda.gov/wps/portal/nrcs/main/co/snow/>

¹⁰ <https://www.ncdc.noaa.gov/sotc/national/202013>

Segments 4 through 7 (WQCD 305(b) segments COUCUC03_D and COUCUC03_E) maintained their status as Category 5 for temperature (Water Quality Impaired, or '303(d)-listed') in 2020. Monitoring data for the 2021 monitoring season will not be considered in this report update but may be submitted for the 2022 data call¹¹ by April 15, 2021 if desired by the stakeholder group.

FISHING AND FLOATBOATING USER SURVEYS

In 2013, the SG retained RRC Associates (RRC) to develop and conduct fishing and floatboating surveys (intercept surveys) at river access sites within the W&S segments (see Appendix D), with the understanding that the data collected from these surveys would be used to inform management decisions. RRC has completed intercept surveys between 2013 and 2015 and again in 2018 and 2019.^{12 13 14 15} This data was not collected in 2020 due to COVID-19.

Floatboating and Angling Survey Research

For the purposes of quantifying visitor use levels and satisfaction, the SG has elected to cross reference visitor experiences on the Upper Colorado River as indicated in surveys with Year Types as described in the Hydrology section. Year Types include: Driest (0 to 25th percentile), Dry Typical (26th to 50th percentile), Wet Typical (51st to 75th percentile), and Wettest (76th to 100th percentile). A key goal of the SG is to collect a sufficient number of surveys in each Year Type to enable a scientifically valid characterization of the visitor experience. No surveys were conducted in 2020 due to COVID-19.

User Group Surveys

No User Group Surveys were conducted in 2020.

¹¹ <https://colorado.gov/pacific/cdphe/rivers-lakes-and-streams-data>

¹² RRC Associates, Inc., 2014, Upper Colorado River Wild & Scenic Stakeholder Group, 2013 Pilot Study - Final Results.

¹³ RRC Associates, Inc., 2015, Upper Colorado River Wild & Scenic Stakeholder Group, 2014 Pilot Study - Final Results

¹⁴ RRC Associates, Inc., 2016, Upper Colorado River Wild & Scenic Stakeholder Group, 2015 Pilot Study and 3-year provisional period summary

¹⁵ RRC Associates, 2018, Upper Colorado River Wild & Scenic Stakeholder Group, 2018 Pilot Study Final Results

Outfitter Surveys

No Outfitter Surveys were conducted in 2020.

Wade Fishing Surveys—Special Angler Survey

The kiosk was not used to collect data in 2020.

Commercial Log Data

RRC tabulated 2020 commercial data as reported by outfitters to the Kremmling and Colorado River BLM offices and USFS. Commercial outfitters typically report their river use daily to the agencies. These reports have been obtained since 2013 and RRC has aggregated the available data into a master file that permits analysis of both floatboating and angling commercial user groups by date, party size, craft type, and location of launch and takeout. See Appendix D for selected summary graphs of Commercial Data.

Vehicle Counters Program

The BLM Kremmling and Colorado River Field Offices maintained vehicle counters at 12 sites during the 2020 season. A map showing these site locations is included in Appendix D. RRC compiled and analyzed the results from 2020, in addition to a backlog of data from previous years. Vehicle counters were monitored and downloaded by BLM periodically from May through October. The 2020 vehicle count information was incorporated into the master file and is available on a daily as well as hourly basis for the period during which counters were in place.

The vehicle counters provide a source of information that can support additional analysis describing visitation patterns and relative volumes of visitors, year over year and by day of week. These data and the associated analyses have taken on greater importance as a result of additional language that was added to the A&R SG Plan. The A&R SG Plan includes the statement: “Subject to budgetary constraints, the committee will annually consider available user-day data for both commercial and private use. The committee will gain an understanding of floatboating use on each segment and changes in use between segments.” See Appendix D for a map of vehicle counter sites and selected summary graphs of Vehicle Counts.

River Ranger Data

In 2020, as in prior years, USFS and participating outfitters supported interviews of river users in segment 7 by USFS River Rangers. Daily tabulations of boaters were recorded including observations of user patterns at the sites, and the resulting graphs portray the number of people observed and segment 7 user patterns. Historic dates are aligned by 2020 day of week. The data have been shared with the SG on a cooperative basis and are compiled in Tableau format to permit various analyses. The 2020 findings are summarized in Appendix D along with results from previous years (2014-2018). The River Ranger data can be segmented and explored as requested by SG members.

Data Management and W&S SG Support

RRC conducted a number of other activities including warehousing and management of W&S SG data, maintaining data in Tableau dashboard format, and analysis and visualization. RRC also continued participation in SG and Committee work as requested.

MACROINVERTEBRATES

Aquatic macroinvertebrates vary in sensitivity to environmental perturbations, which cause measurable responses in their production, diversity, and relative abundance in aquatic communities. Macroinvertebrate biomonitoring is therefore widely used to assess overall aquatic ecosystem health. A variety of bioassessment metrics can be calculated in biomonitoring, which also vary in response to different environmental stressors. Through biomonitoring with application of strategically selected metrics, and monitoring of physical habitat and water quality parameters, it is possible in some cases to identify specific factors or types of factors that are likely driving observed changes in aquatic communities.

In 2019, the Fishing ad hoc Committee agreed that macroinvertebrate biomonitoring was useful for understanding the health of the aquatic ecosystem and its continued ability to support the strong fishery needed to support the Recreational Fishing ORV for segments 4 through 6. In August 2019, the SG approved a long-term macroinvertebrate sampling and analysis protocol that includes sampling for macroinvertebrates every other year starting in 2021, subject to funding. Accordingly, macroinvertebrate sampling did not occur in 2020.

Because WQCC water quality standards for cold water aquatic life are the Water Quality Resource Guides in the A&R SG Plan, the 2019 Bioassessment study was conducted using an approach consistent with CDPHE’s Aquatic Life Bioassessment methodology (assessment methodology).¹⁶ The CDPHE methodology relies on Colorado’s multi-metric index (MMI). Upper Colorado Wild & Scenic segments 4 through 6 are classified as “Transition” or “Biotype 1” streams. The current applicable MMI v4 attainment and impairment thresholds are 45 and 34, respectively. When MMI falls between these scores for a site, a Shannon Diversity index (SDI) score greater than 2.1, or an Hilsenhoff’s Biotic Index (HBI) score less than 5.8 would indicate attainment of aquatic life standards. All sites had MMI scores greater than 56 in 2018, making them subject to the alternative assessment approach intended to protect high-quality stream habitat from large declines, greater than 22 points in representative samples taken more than 12 months apart.

2019 Biomonitoring

During October 2019 Timberline Aquatics, Inc. collected macroinvertebrate samples at five sites in the segments from Pumphouse to below Red Dirt Creek (Table 19, Figure 11). All macroinvertebrates collected were identified, counted, and their CDPHE bioassessment metrics calculated using the MMI v4 method and subsampling process, which includes a range of metrics and the overall MMI v4 calculation, plus the SDI and HBI auxiliary metrics.

In 2019, MMI scores (Table 20) for all sites indicated they were in attainment of currently applicable aquatic life use (Cold Water, Class I). The MMI scores were above the attainment thresholds for each site and did not decline more than 22 points from 2018. In their full 2019 biomonitoring report, Timberline Aquatics Inc. reports a range of other useful metrics that are not part of CDPHE Aquatic Life Use assessment, including density, taxa richness, EPT (*Ephemeroptera*, *Plecoptera*, *Trichoptera*) taxa, Giant Stonefly (*Pteronarcys californica*) density, percent EPT taxa excluding *Baetidae*, and percent *Chironomidae*. Some metrics provided were only possible because of the full count Hess sampling method employed for sample collection, and they provide additional indication of macroinvertebrate community health or impacts. See

¹⁶ Colorado Department of Public Health and Environment, Water Quality Control Commission, *Aquatic Life Use Attainment Methodology to Determine Use Attainment for Rivers and Streams. Policy Statement 10-1*, August 7, 2017.

the full Bioassessment report from Timberline Aquatics for an explanation of these additional metrics.¹⁷

Table 19. Bioassessment monitoring sites.

Segment	Station ID	Location	Latitude	Longitude	Elevation (m)
5	CR-PH	Colorado River at Pumphouse	39.98471	-106.514	2170
5	CR-Rad	Colorado River at Radium	39.94985	-106.558	2093
5	CR-SB	Colorado River at State Bridge	39.85783	-106.647	2060
6	CR-aC	Colorado River above Catamount	39.91239	-106.785	2046
6	CR-bRD	Colorado River below Red Dirt	39.70996	-107.047	1914

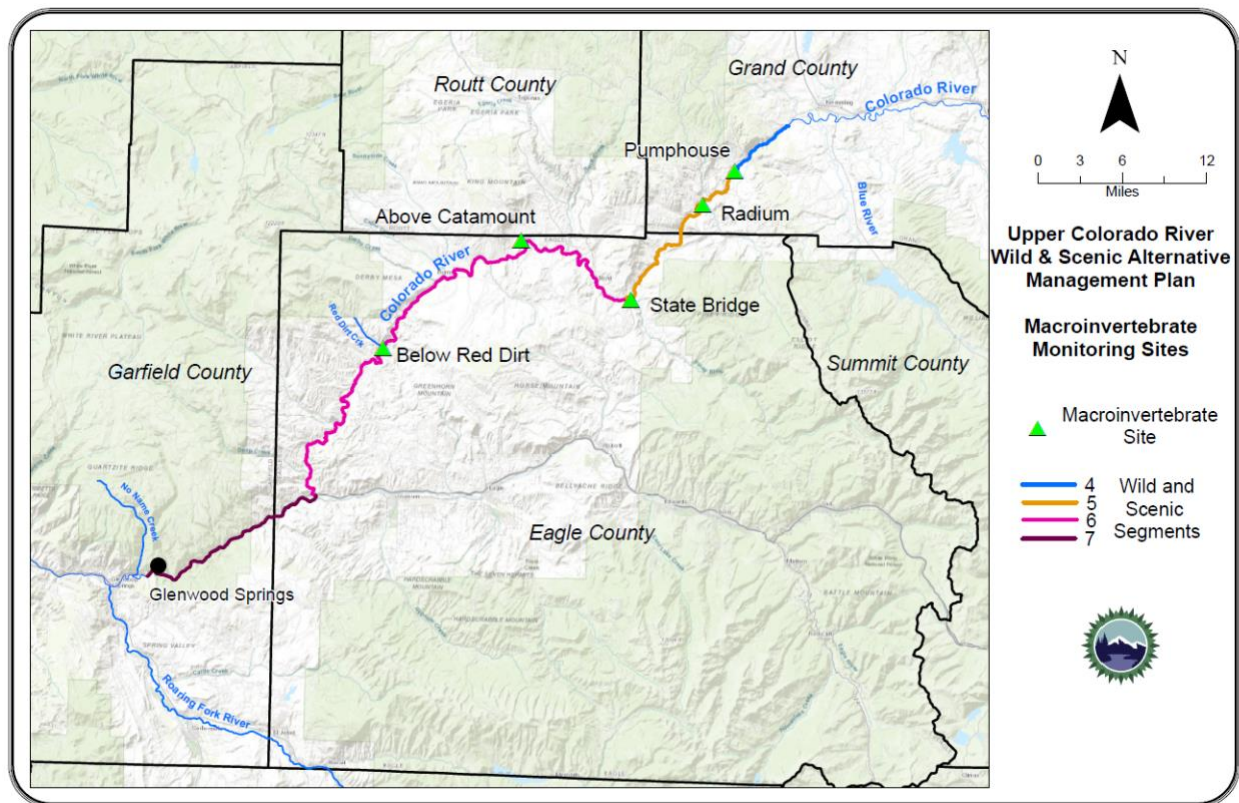


Figure 11. Bioassessment monitoring site locations

¹⁷ Rees, D., and Musto, D., 2020. *Benthic Macroinvertebrate Biomonitoring Study, Upper Colorado River, 2019*, Timberline Aquatics, Inc.

Table 20. Individual metrics and MMI v4 scores from benthic macroinvertebrate samples collected in the Colorado River Wild & Scenic study area during October 2019. All metric scores based on MMI v4 subsampling process.

Metric	Station ID				
	CR-PH	CR-Rad	CR-SB	CR-AC	CR-BRD
EPT taxa	54.5	87.6	100.0	100.0	75.2
% Non-Insect individuals	96.9	98.2	94.1	95.5	96.6
% EPT individuals, no <i>Baetidae</i>	33.0	75.1	90.0	72.4	95.0
% <i>Coleoptera</i> individuals	2.9	13.5	24.1	8.0	14.3
% Intolerant Taxa	71.7	81.4	82.1	64.6	61.0
% Increasers, Mid-Elevation	100.0	100.0	94.7	96.1	98.6
Clinger taxa	62.9	92.8	100.0	100.0	81.8
Predator/Shredder taxa	50.0	57.1	64.3	71.4	50
MMI	59.0	75.7	81.1	76.0	71.6
Auxiliary Metrics					
Diversity	1.95	2.93	3.87	3.77	3.20
HBI	4.40	3.08	2.61	3.60	2.64

2021 MONITORING PLAN

The SG approved its fiscal year 2021 Monitoring Plan at the April 2021 SG meeting. The 2021 Monitoring Plan is attached as Appendix E. This year's monitoring plan includes provisions for surveys of the boating and fishing communities, monitoring for water temperature, macroinvertebrates, streamflow's, and assessment of data collected by others, and for the development and implementation of channel maintenance flow monitoring.

APPENDICES

Appendix A: Project Area Map

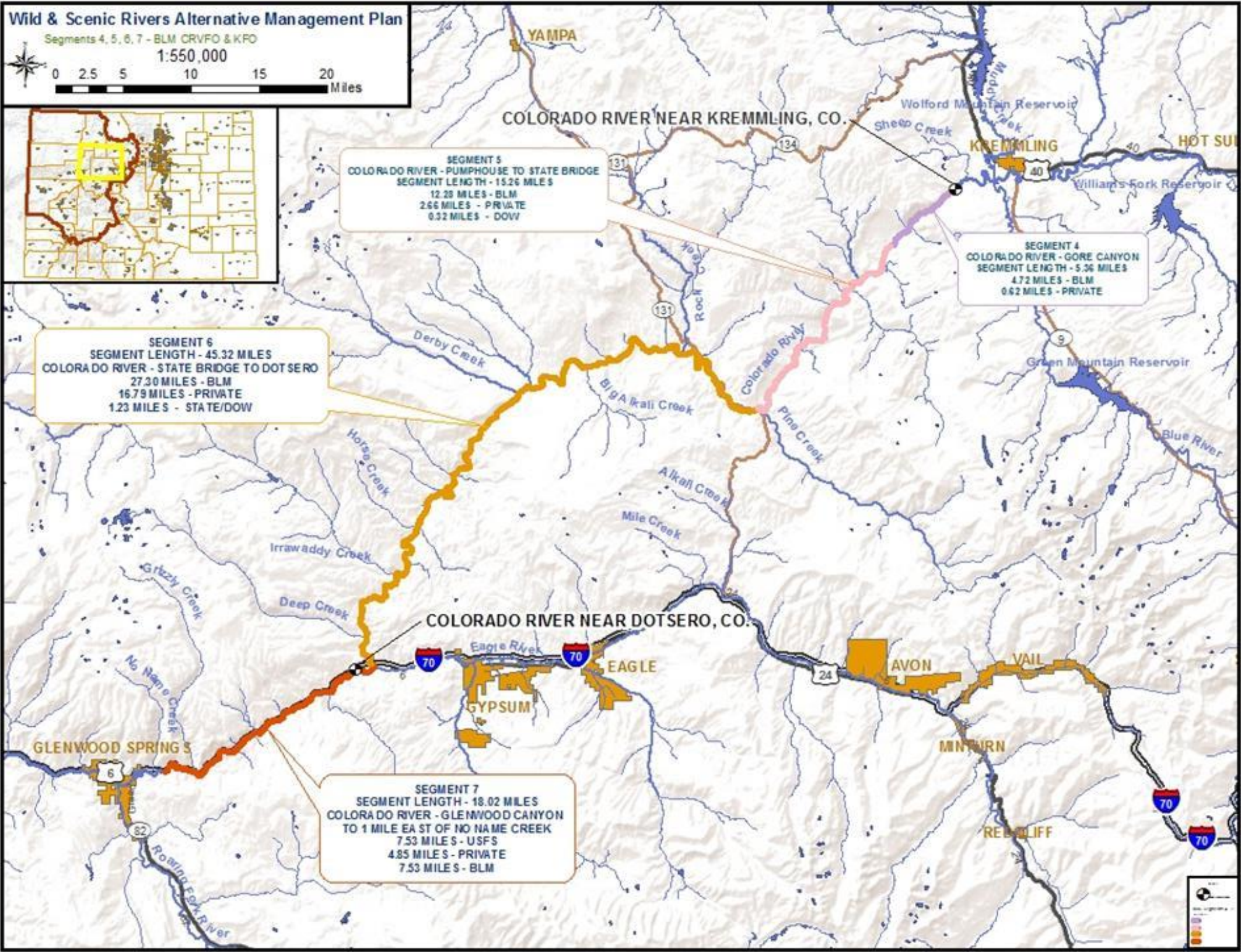
Appendix B: CPW Biosurvey Sample Sites

Appendix C: Monitoring by Other Entities

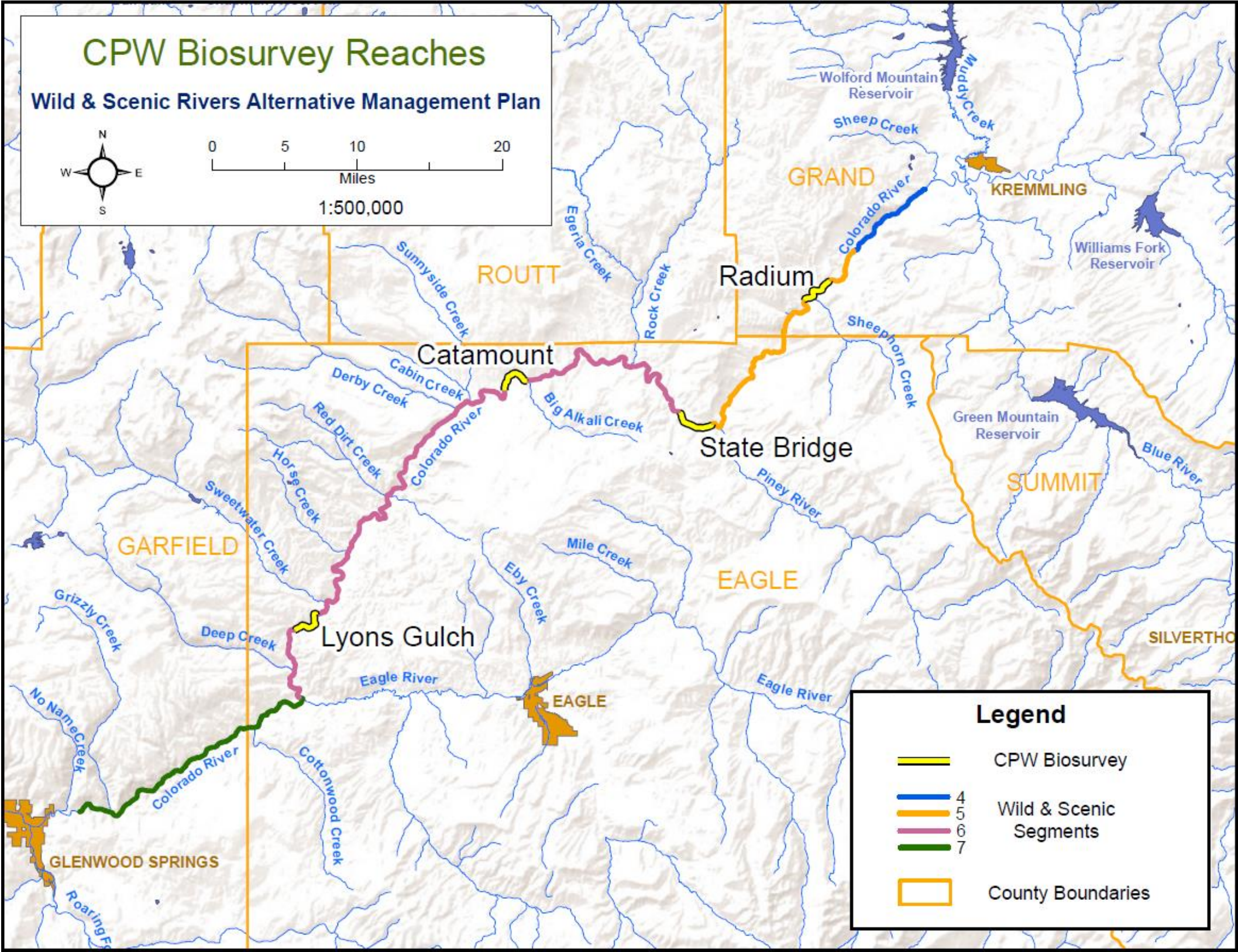
Appendix D: 2020 RRC Research Program

Appendix E: 2021 Monitoring Plan

APPENDIX A: PROJECT AREA MAP



APPENDIX B: CPW BIOSURVEY SAMPLE SITES



APPENDIX C: MONITORING BY OTHER ENTITIES

U.S. Bureau of Land Management

The U.S. Bureau of Land Management (BLM) conducts various monitoring activities on the segments. Currently, the BLM supports three water temperature monitoring locations, collects additional vehicle counter data at select locations, and has paid for operating and maintenance costs of the Catamount gage. In addition, the BLM conducts monitoring to support other non-flow related ORVs such as bald eagles, river otters, riparian vegetation, and noxious weeds.

Colorado Parks and Wildlife

In addition to their annual biosurveys, CPW is also conducting research on Giant Stonefly (*Pteronarcys californica*) and Mottled Sculpin (*Cottus bairdii*) sampling methods at the Pumphouse Recreation Site. The SG is monitoring progress on these efforts and may include results or parameters from these and/or other studies in future reports.

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 the provisional Water Quality Resource Guide for segments 4-7.

APPENDIX D: AN OVERVIEW SUMMARY OF THE RRC 2020 RESEARCH PROGRAM

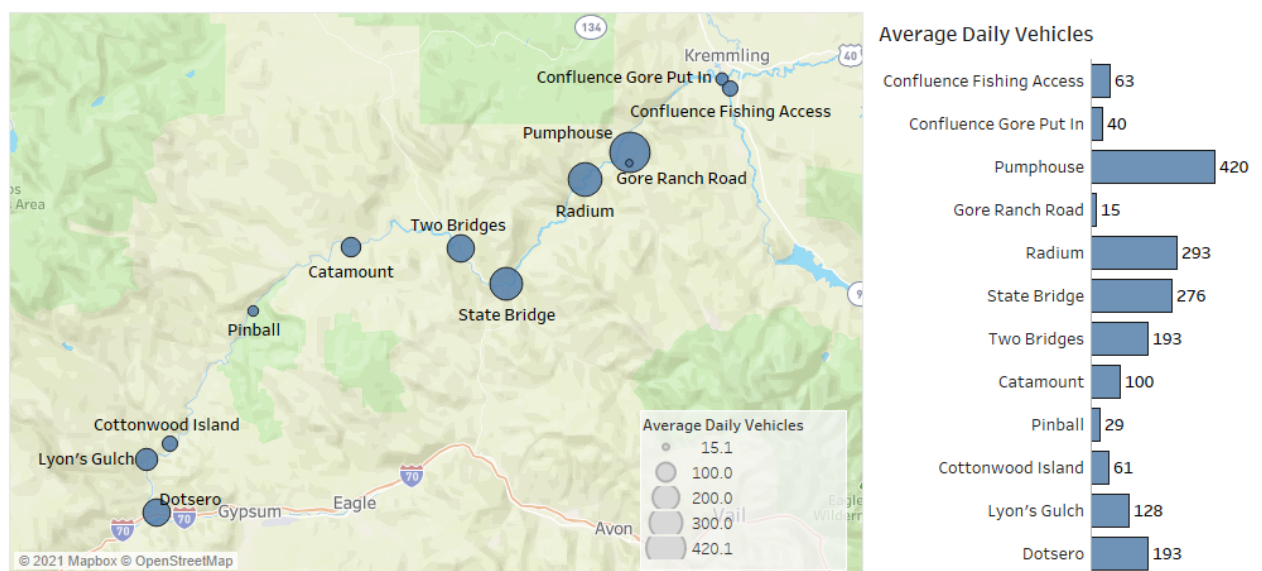
VEHICLE COUNTS

Daily Visitation

Vehicle counters have been used as tools for data collection on the Upper Colorado River since 2013 when the RRC Associates (RRC) research team began working with the Stakeholders. Summer 2020 represented the largest effort to count vehicles and the resulting data provide an important foundation for the Stakeholders monitoring of river users and the approved ORV's. The 2020 vehicle counts were based on a more comprehensive effort with participation from BLM. Counters placed by the Kremmling and Colorado River BLM offices resulting in a significantly expanded monitoring.

Data analysis of the BLM counts was provided by RRC in 2020. A total of 12 counting sites are now maintained by the BLM offices and data from the counters is shared with RRC. Locations of counters are summarized in the graphic below. Additionally, the figure and the associated graph shows the average (mean) number of daily vehicles identified. This figure is calculated by dividing total number of vehicles counted by number of days (24-hour time periods) for which counts were available. It portrays the vehicle activity at access points along the river, and the data show the relative use, with Pumphouse most visited in 2020, followed by Radium, State Bridge, Two Bridges and Dotsero.

Average Daily Vehicle Counts by Location



Data represents May - September, 2020
Source: BLM Kremmling and Colorado River Field Offices, graphed by RRC Associates

Obtaining baseline vehicle traffic data is useful for several purposes. First, the data permit comparisons between the different recreation sites where counters were placed. Not only are total counts recorded resulting in summaries like the graph above, but the counts are available on a daily (and hourly) basis providing an enhanced understanding of use patterns along the Upper Colorado River corridor.

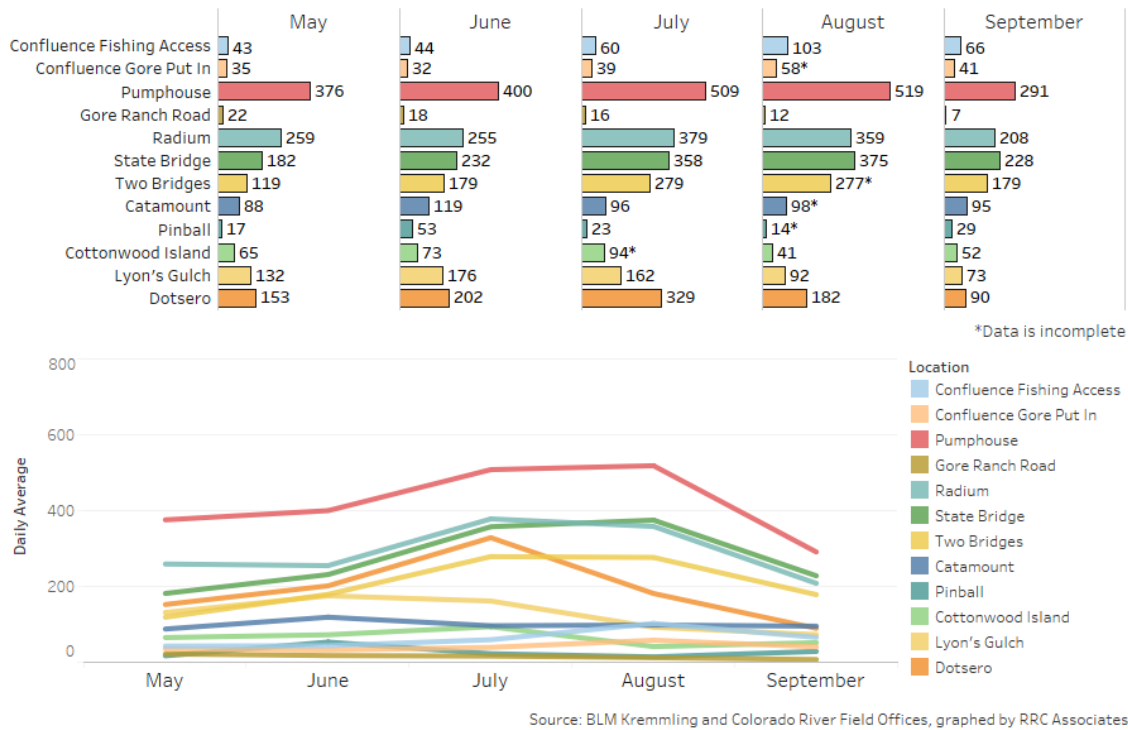
In addition, analysis can include comparisons between vehicle counts and data obtained from the commercial logs summarizing outfitter reports of outfitter use on a daily basis. Taken together, the vehicle counts, and commercial data provide data sources that can be used to estimate total river use throughout the summer. In other words, rough estimates of private use can be estimated from the vehicle counts and outfitter logs that have been collected. The analysis of the combined vehicle data and commercial/outfitter logs are at a preliminary stage; additional investigation of these results will be performed in the future. The vehicle count information has taken on added importance as the Stakeholders have placed more attention on visitor use on the Upper Colorado in 2020.

Monthly Visitation

The average (mean) number of vehicles counted by month by location is further summarized in the chart below. These results illustrate some of the differences in visitation by location, as well as the relative volumes of traffic at the various sites. As shown, counts at Pumphouse showed the highest average use, followed by Radium and State Bridge which closely parallel one another. Two Bridges showed a sharp increase in use in July and August, while the use at Dotsero peaked in July but was significantly lower in other months.

A second graph below shows the relative patterns of use across the 12 sites where BLM counters are installed. This is a different view of the Average Daily Vehicles by Month data. It is intended to show some of the differing monthly use patterns, and particularly those at Dotsero.

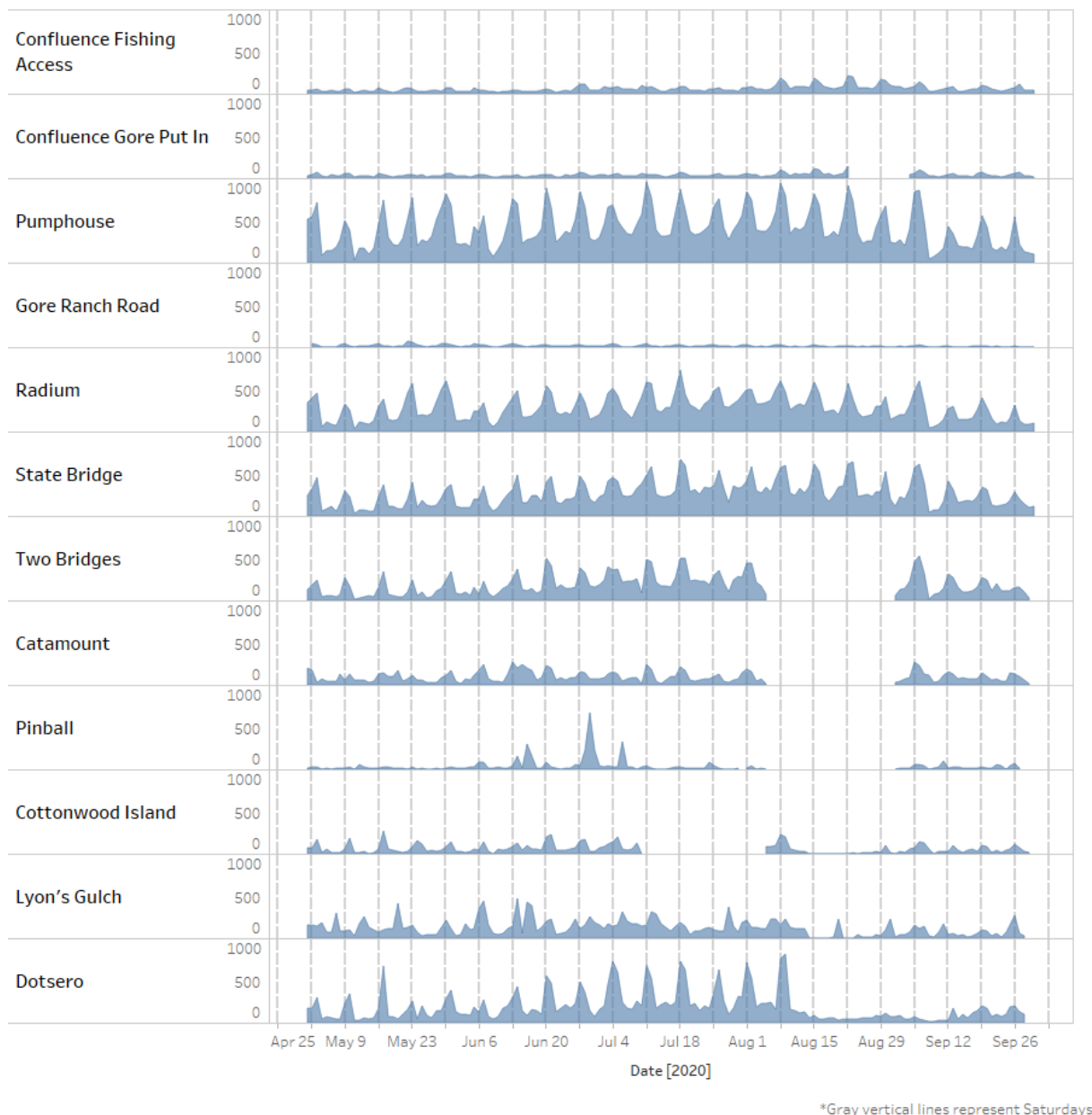
Average Daily Vehicle Counts by Month and Location



Daily Counts of Vehicles by Location

Additionally, these data can be portrayed at the daily level as shown below. The graphs are for general reference and are not intended for detailed analysis. Rather, they illustrate the relative patterns of visitation by location by day of week over the May through September period. An ability to look at the daily results by location in more detail is provided on the Wild and Scenic Research Website via the dashboard: <http://rrcinteractive.squarespace.com>. The jagged shapes of the curves are indicative of heavy use on weekends and particularly Saturdays, with much lower use mid-week. The gaps in the graphs that are evident at Two Bridges, Catamount and Pinball are the result of the fires that closed the Colorado River Road in August and made vehicle counting impossible.

Daily Counts of Vehicles by Location May – September 2020



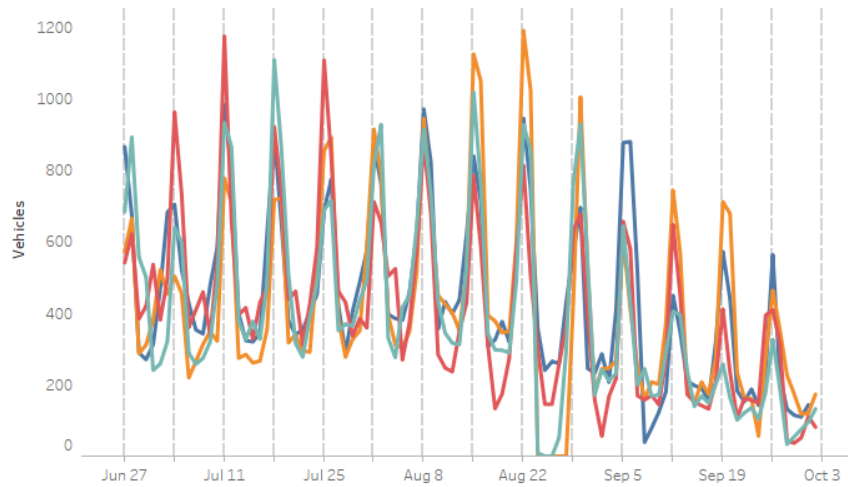
Vehicle Counter Data Comparisons Over Time

The following graphs summarize vehicle counts from 2020 compared to other years for which counter data is available. In general, the data show that vehicle use was up sharply in 2020 across all comparable sites and over comparable time periods. For example, the data indicate that Pumphouse vehicle use was up 7% and it has shown consistent growth over the past four years. State Bridge was up 20%. While comparable counts are not available for ever year at Two Bridges and Dotsero, the data from 2016 and 2015 respectively show very high levels of growth in users over time, particularly at Dotsero where visits have more than doubled since 2015.

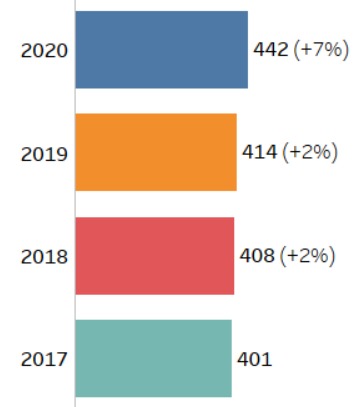
Comparisons to Historic Data for Select Locations:

Pumphouse

Jun. 27 - Oct. 02, 2020

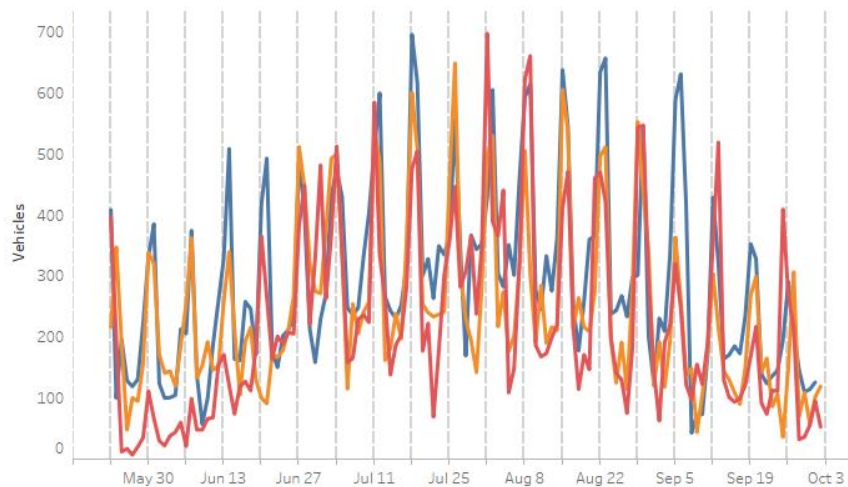


Average Daily Vehicles (% Change from Previous Year)

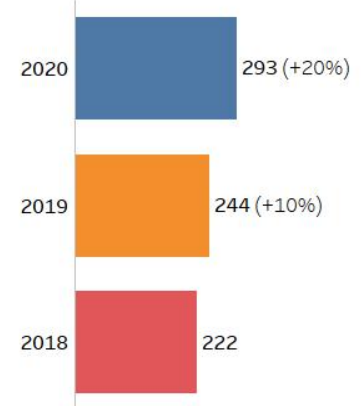


State Bridge

May. 23 - Oct. 02, 2020

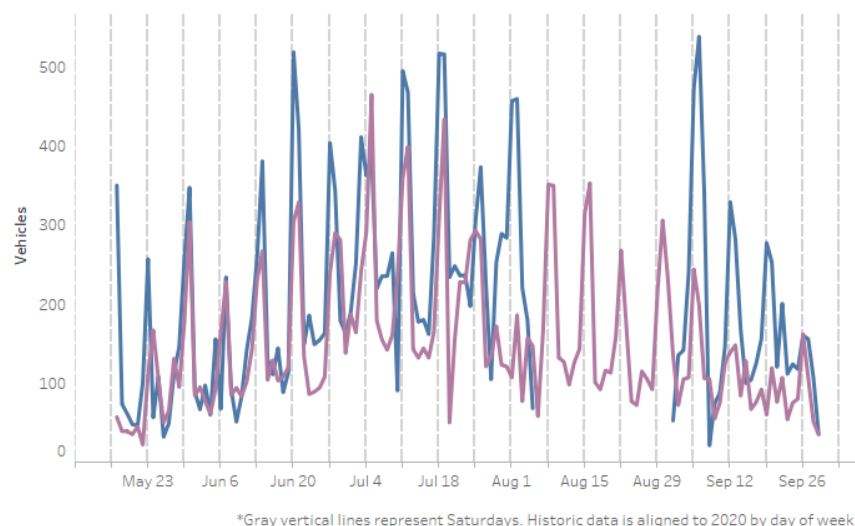


Average Daily Vehicles (% Change from Previous Year)

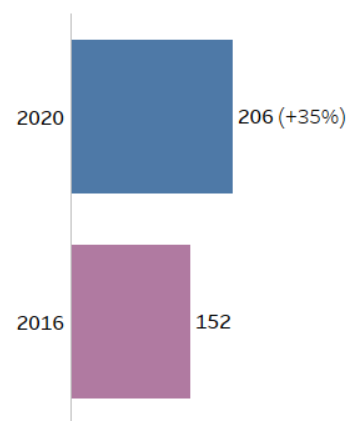


Two Bridges

May. 17 - Sep. 29, 2020

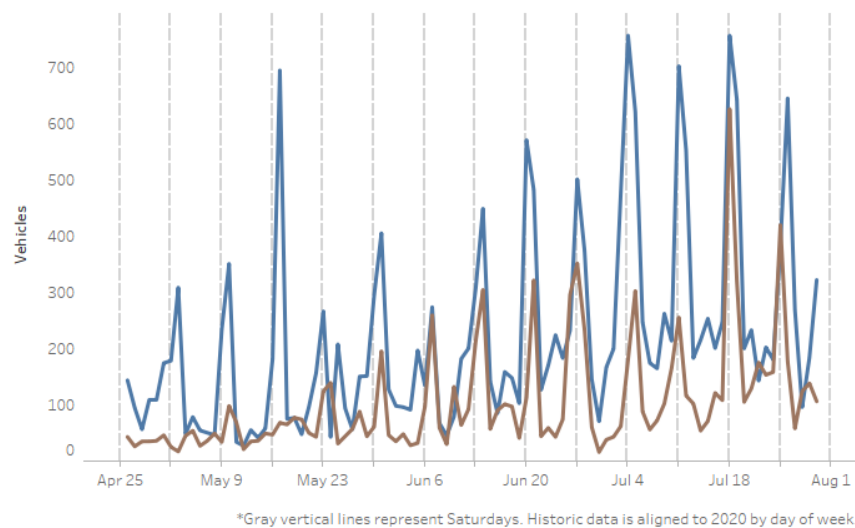


Average Daily Vehicles
(% Change from Previous Year)

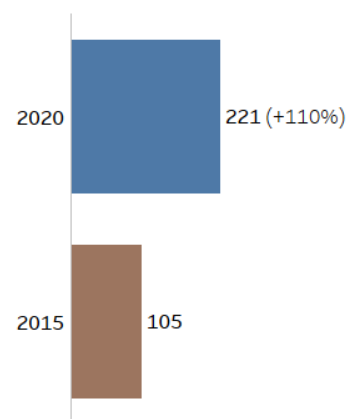


Dotsero

Apr. 26 - Jul. 30, 2020



Average Daily Vehicles
(% Change from Previous Year)

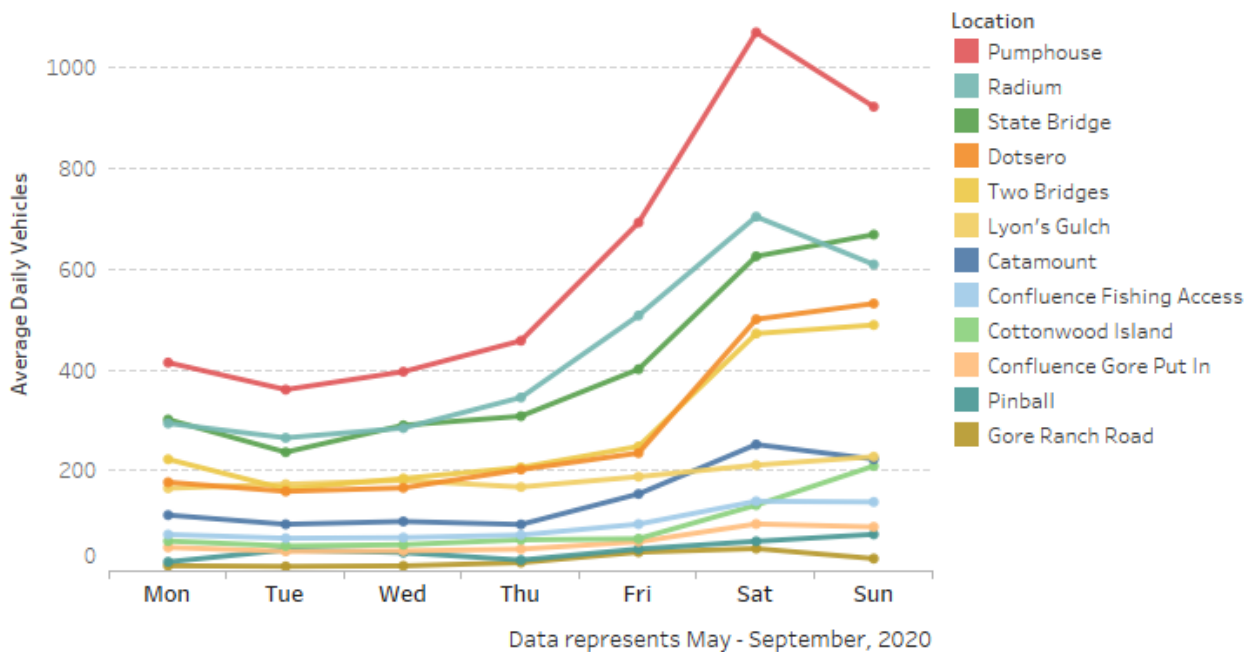


Average Daily Vehicle Counts by Day of Week

Further analysis of the 2020 data provides other insights on use patterns along the river corridor. The graph below illustrates average daily vehicles counted by day of week and location. Pumphouse is busiest on all days of the week, and Radium and State Bridge are consistently next most busy. In general, all sites are busiest on Saturdays, followed by Sundays. Tuesday is the least busy day on average, and all mid-weekdays show averages significantly lower than weekends. Interestingly, the patterns of use by day of week may have management

implications as use of the Upper Colorado Rivers is analyzed in the future. Additional segmentation of the data from 2020 is illustrated by several graphs that follow.

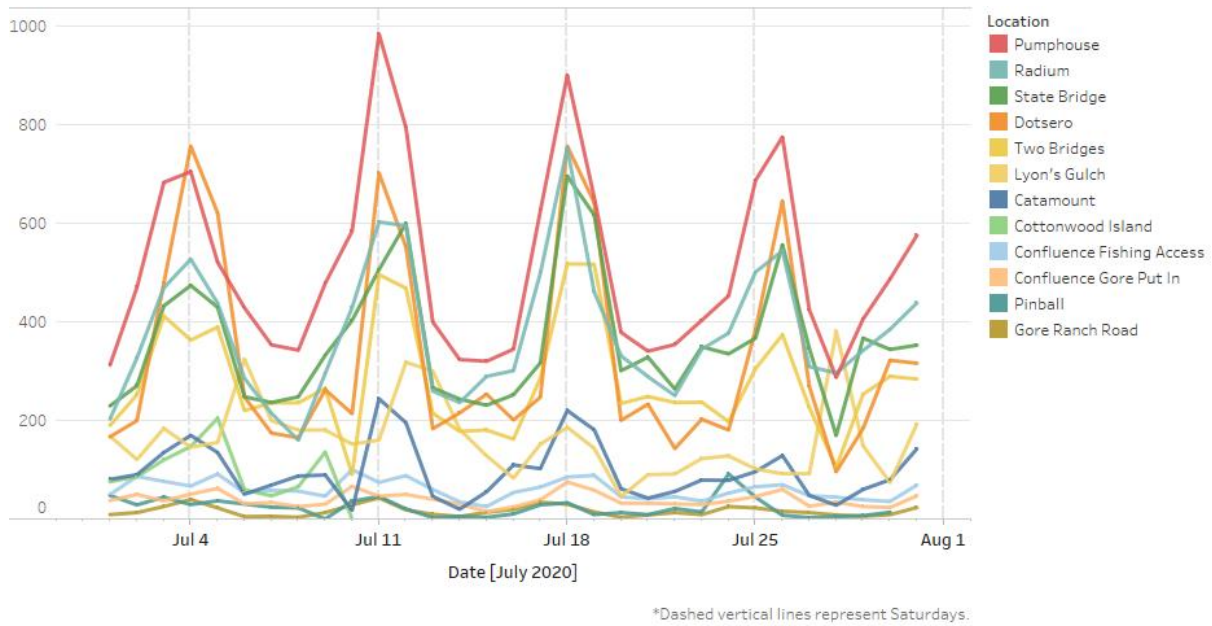
Average Daily Vehicles by Day of the Week



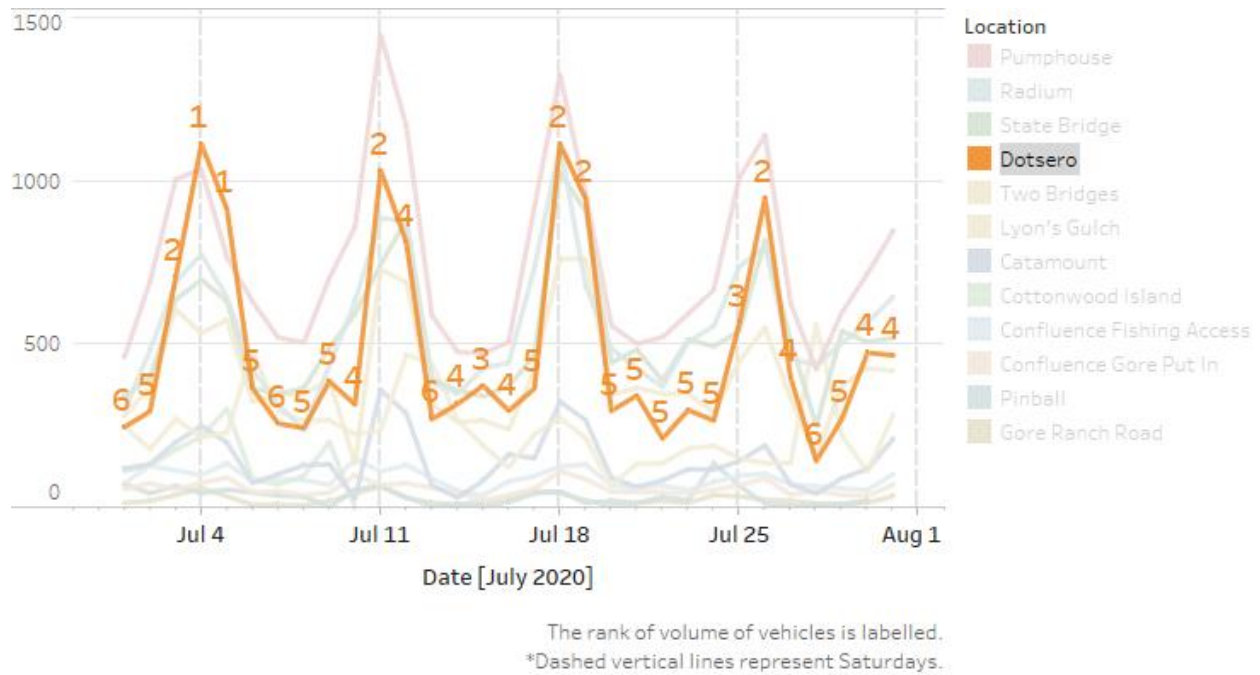
July 2020 Counts of Vehicles

Another way of looking at the data is to focus on specific time periods. The graph below shows all counts from 2020 in July. This chart further illustrates the weekend peaks and the relative strength of Saturdays. In general, peaks and valleys are similar but not identical across all sites, this indicates that there are some differences that should be further investigated if there is a goal to make inferences on use patterns by day of week and location. Note that the day of week does not explain all of the variation at all the sites in 2020, but it is a very important indicator (and predictor) of what the relative use levels may be expected to be at a particular time of season or on a day of the week.

Daily Vehicle Counts in July



Example of Additional Analysis by Location



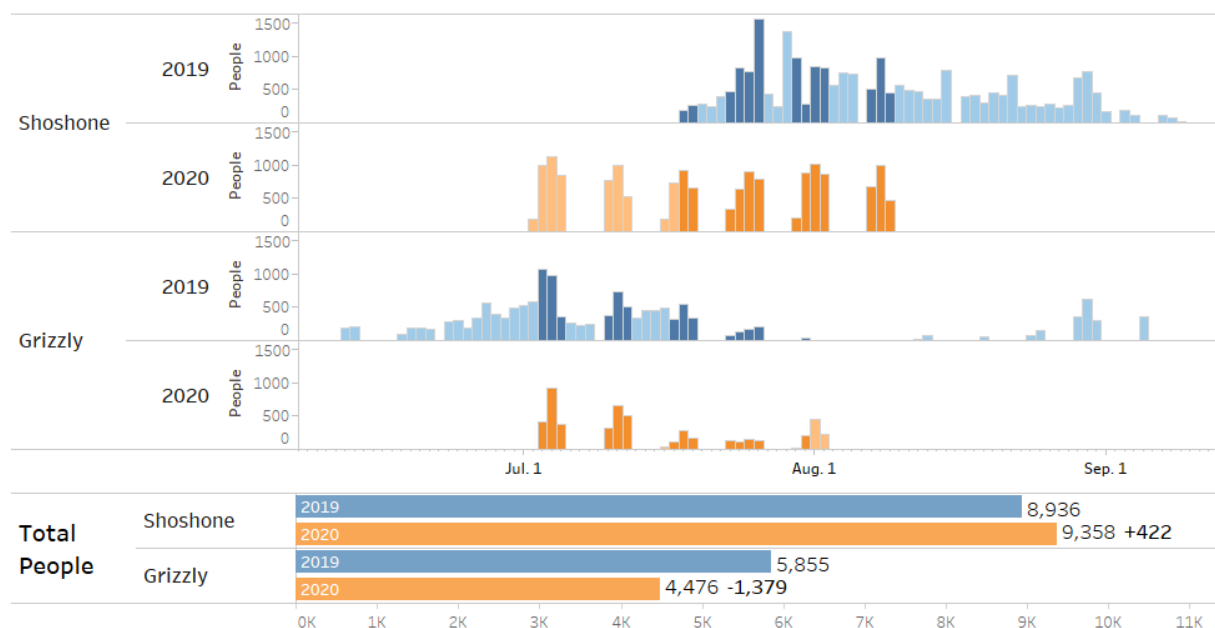
OVERVIEW OF THE RIVER RANGER OBSERVATION DATA

Summary of River Ranger Observation Data – Overall 2020 and 2019

The River Ranger Program is supported by the USFS and is based on observations by a staff team that is present on selected days at the Shoshone and Grizzly boat ramps. The team records observations of users (people) at each location. The graphs presented below compare 2019 observations to those recorded in 2020. Note that the data is incomplete in various respects, there are gaps in the times that observations occurred. Further, in 2019 observations were not made at Shoshone until mid-July because of high flow conditions which limited commercial activity. In 2020 observations occurred on a more limited number of days, and observance ended in early August due to the Grizzly Creek fire in Glenwood Canyon.

The RRC research team conducted further analysis of observations in 2020 compared to 2019. The results are based on counts from days when observations took place in both years. As shown on the Total People graph below, observed people were up at Shoshone (by 422 persons on the 13 days when counts occurred in both years), compared to a decline in counts at Grizzly (by 1,379 persons over 13 days). Observations were discontinued on August 2, 2020 at Grizzly.

Summary of River Ranger Observation Data: 2019 and 2020

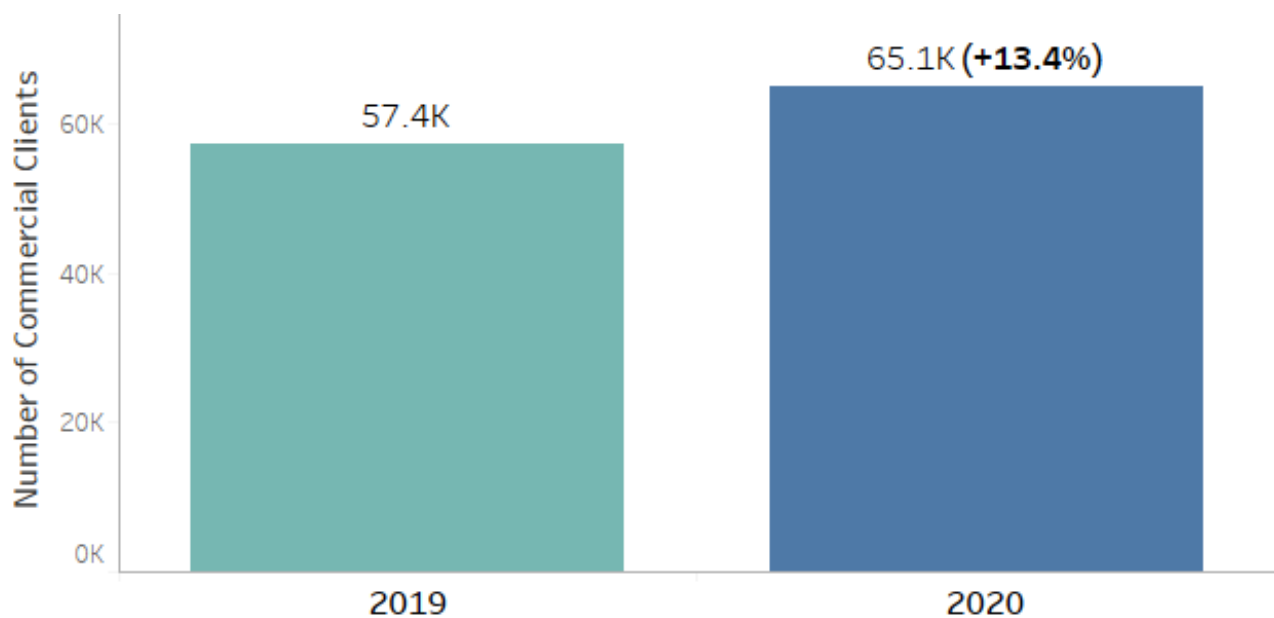


*Comparison includes only days in which comparable observations by day of week were made in both 2019 and 2020, denoted by the darker bars in figure 1.

COMMERCIAL DATA LOGS ANALYSIS

As in past years, RRC Associates collected outfitter logs from the three agency sources that oversee commercial operations on the Upper Colorado. These data included logs from the USFS covering commercial activity in Glenwood Canyon (Segment 7), as well as the BLM Colorado Field Office (Segment 6), and the BLM Kremmling Office (Segments 4 and 5). Based on these data, it appears that commercial use was up in 2020 approximately 13% to a total of 65,100 clients as reported by outfitters and tabulated by RRC. These results are quite remarkable in light of the COVID-19 pandemic and the associated restrictions and protocols that were applied to outfitters as well as in the resort communities where many of the commercial clients typically stay. In an important finding, these data suggest that the increases in visitation that were recorded through the Vehicle Counters were also found in the Commercial data. In other words, commercial activity was up from 2019, similar to the findings showing number of vehicles were also up sharply.

Commercial Clients 2020 vs. 2019

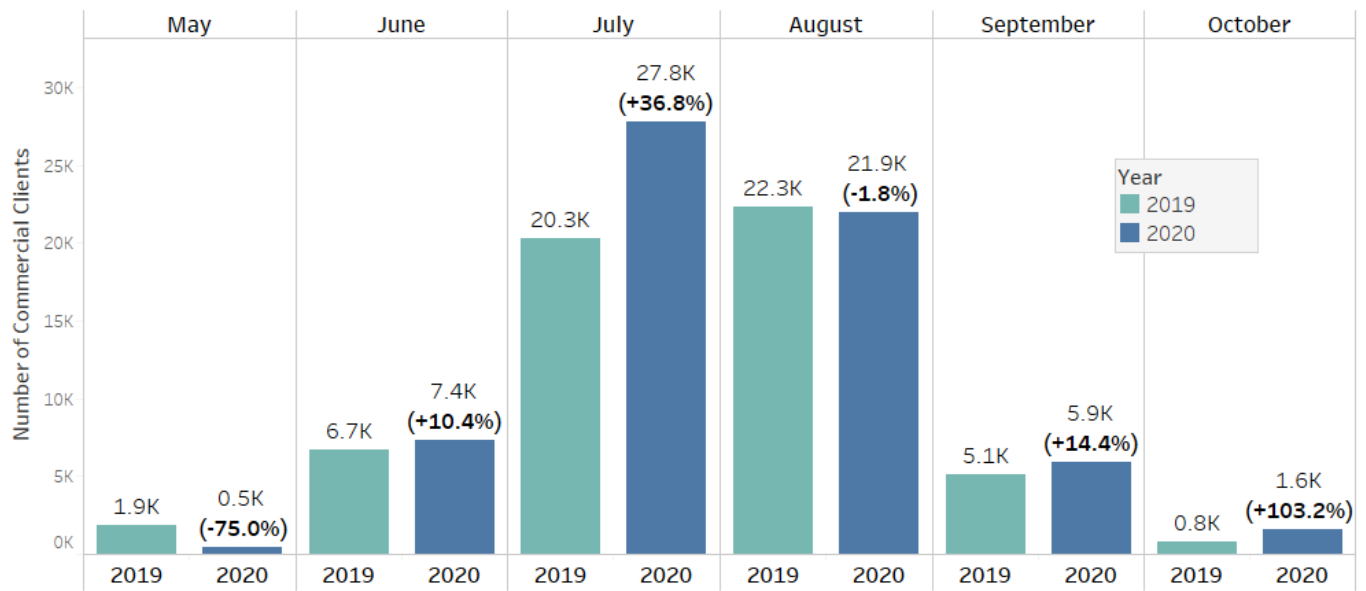


Sources: USFS and BLM (Kremmling and Colorado Field Office) Outfitter Logs Analysis, RRC Associates

Further analysis shows the commercial activity by month and by day of week as illustrated below. The data suggest that June, July, Sept. and Oct. were all up fairly dramatically over 2019. May was down but it is always a slow month in terms of activity, and August was relatively flat in terms of reported commercial clients. Viewed on a daily basis, the strength in July on both weekends and weekdays, is evident. Also, the big spike at the first of August (1st and 2nd) is notable, but then the decline the starting after the 10th when the Grizzly Creek fire broke out, is evident in the data. Clearly, the fires impacted performance over several weeks, and dampened

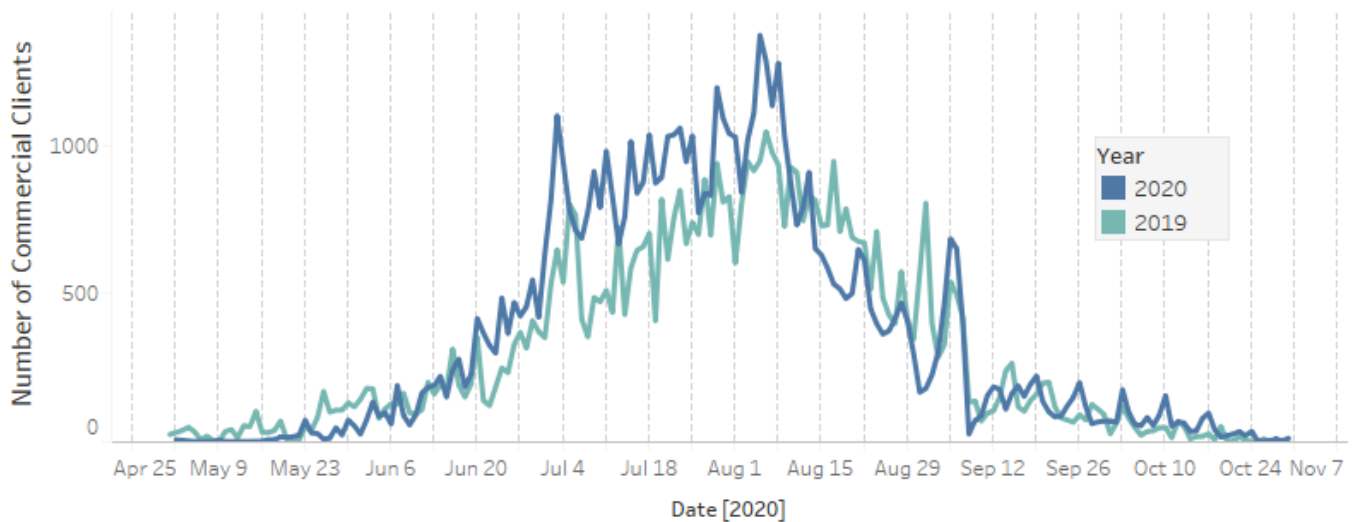
the overall results for August, but the weekend before the fire, and at the end of August showed just how robust commercial activity was in spite of COVID-19.

Commercial Clients by Month: 2019 and 2020



Sources: USFS and BLM (Kremmling and Colorado Field Office) Outfitter Logs Analysis, RRC Associates

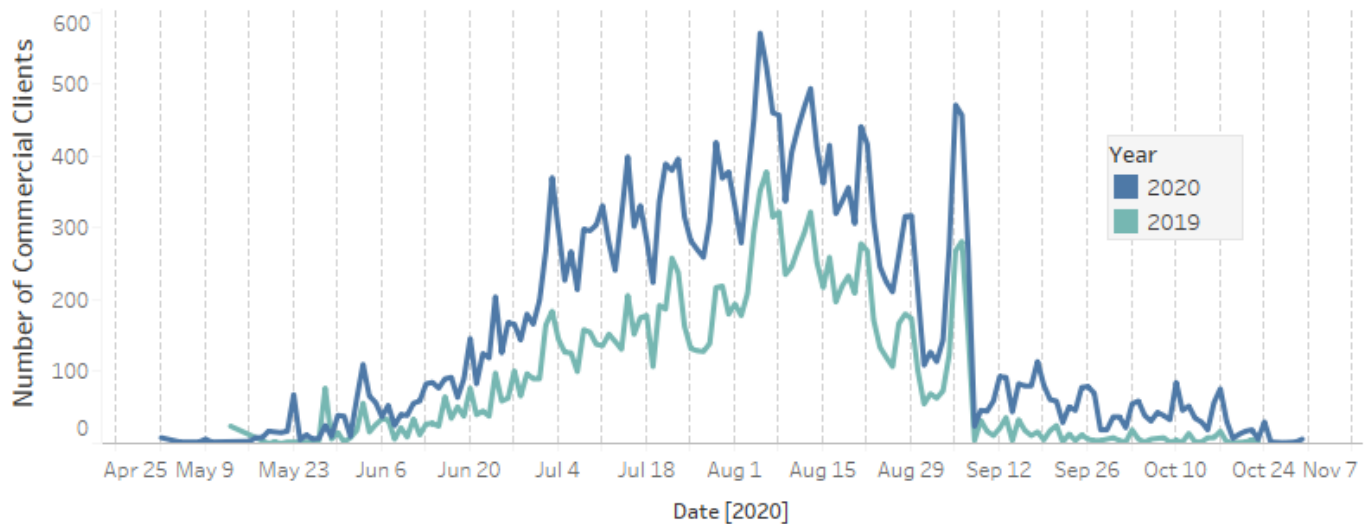
Commercial Clients by Day: 2019 and 2020



*Gray vertical lines represent Saturdays

Sources: USFS and BLM (Kremmling and Colorado Field Office) Outfitter Logs Analysis, RRC Associates

Commercial Clients by Day: Pumphouse 2020 and 2019



*Gray vertical lines represent Saturdays

Sources: USFS and BLM (Kremmling and Colorado Field Office) Outfitter Logs Analysis, RRC Associates

Additional analysis of the Commercial Data shows differences in use patterns in 2020 from those recorded in 2019. Launches were up sharply from Pumphouse. This finding is consistent with the strong growth in reported vehicular data at Pumphouse, as well as anecdotal reports of heavy use in general, and the tabulations of BLM fee payments for individual users and campgrounds. By all measures, use at Pumphouse was significantly higher than in previous years.

APPENDIX E: 2021 MONITORING PLAN

Upper Colorado River Wild & Scenic Alternative Management Plan

2021 Monitoring Plan Proposal

The Wild & Scenic Monitoring Committee (the Committee) has developed this proposal for 2021 monitoring based on the long-term monitoring plan and input from committee members and consultants, and in conjunction with the Fishing and Floatboating Recommendations Committee. The proposal covers boating and fishing user surveys, stream temperature monitoring and analysis, biennial macroinvertebrate monitoring and analysis, and channel maintenance flow monitoring plan design and implementation. COVID-19 dramatically impacted our ability to conduct monitoring in 2020, and its impacts on 2021 have yet to be determined.

RECREATION MONITORING

For 2021, RRC Associates has submitted a \$54,500 work plan that builds on previous efforts, continues support for the Stakeholder Group (SG) and committees, and refines methods for warehousing and accessing data. Based on anticipated data needs, this plan includes the Angling and Floatboating Intercept surveys, User Group surveys, and Displacement surveys as well as processing the BLM's commercial data logs and vehicle counts. The Committee will work with RRC, the SG's committees and agency representatives to develop RRC's final scope of work for 2021. Details of the proposed RRC program are shown in Table 1, below.

Table 1 Summary of Proposed 2021 RRC Work Program

	2020 <i>(Completed)</i>	2021 <i>(Proposed)</i>
Data Collection		
Intercept Surveys / Observational Data Collection	\$0	\$28,000
Displacement Survey(s)	N/A	\$3,000
Self-reporting Kiosk Data Collection	\$0	\$3,000
User Group Survey(s)	\$0	\$3,000
Commercial Data Logs	\$3,000	\$3,000
Vehicle Counters*	\$2,500	\$3,500
User Day Information	N/A	N/A
Data Processing, Consolidation, and Management**		
Database Management	\$1,000	\$2,500
Warehousing of SG Data	\$1,000	\$2,500
Stakeholder Support**		
Committee Participation & Attendance	\$6,000	\$6,000
TOTAL	\$13,500	\$54,500

*Assumes BLM Field Offices take primary responsibility for data collection.

**These categories will be billed hourly to a “not to exceed” budget as shown.

TEMPERATURE MONITORING

The Committee is proposing to continue the W&S-sponsored time-series temperature monitoring program through 2021, which includes three time-series temperature loggers deployed at established study sites (highlighted in orange in Table 2, below). The W&S SG is a dues-paying member of GCWIN and will contract with GCWIN to administer the three W&S temperature sites during 2021. GCWIN has been maintaining W&S temperature data in its database for several years.

In addition to the W&S temperature sites, time-series temperature data will be collected at three BLM temperature sites (COR-abvPump, COR-Rad, BL-abvCOR). Additional time-series temperature data will continue to be collected at three USGS sites located within W&S segments, as shown in Table 2, below.

Upon recommendation of the Committee, the SG approved weekly evaluation of stream temperature data, to be conducted by the Committee. The objectives for these weekly evaluations are to identify periods of thermal stress on W&S segments; provide the Committee and Stakeholder Group with timely

data to make informed decisions; and assess stream temperatures against Colorado’s stream temperature standard thresholds, using the computational averaging methods that were intended to accompany such assessments. Weekly evaluations will access data from the two USGS sites with telemetry (09058000 Colorado River at Kremmling and 09060799 Colorado River at Catamount). Data from the two sites will be downloaded, processed, plotted, and distributed to the Committee on a weekly basis from June – September.

The Committee anticipates continued contracting with Lotic Hydrological to generate end-of-season thermographs and temperature standards analyses for all nine W&S sites of interest shown in Table 2.

Table 2 Stream temperature stations for 2021

Site ID	Station Description	Collecting / Data Storage Agencies	Latitude	Longitude
UPCO_DOT	Upper Colorado River above Dotsero	W&S/GCWIN	39.648	-107.063
UPCO_RD	Upper Colorado River below Red Dirt Creek	W&S/GCWIN	39.8	-106.974
UPCO_SB	Upper Colorado River above State Bridge	W&S/GCWIN	39.855	-106.644
9058000	Colorado River near Kremmling, CO	USGS/USGS	40.037	-106.439
9060799	Colorado River at Catamount Bridge, CO	USGS/USGS	39.891	-106.832
9071750	Colorado River above Glenwood Springs, CO	USGS/USGS	39.559	-107.29
COR-abvPump	Colorado River above Pumphouse	BLM/GCWIN	39.99	-106.508
COR-Rad	Colorado River at Radium	BLM/GCWIN	39.954	-106.55
Blue-abvCOR	Blue River above Colorado River Confluence	BLM/GCWIN	40.041	106.394

MACROINVERTEBRATE MONITORING

The SG has approved a long-term plan to conduct macroinvertebrate monitoring on a biennial basis. Monitoring will occur during odd years at the five sites shown in Table 3, below. Consistent with the long-term monitoring plan, the Committee anticipates contracting with Timberline Associates to conduct macroinvertebrate sampling in 2021.

Table 3 W&S macroinvertebrate monitoring sites for 2021.

Site Location	County	Latitude	Longitude
Pumphouse	Grand	39.98471	-106.514
Radium	Grand	39.94985	-106.558
State Bridge	Eagle	39.85783	-106.647
Above Catamount	Eagle	39.91239	-106.785
Below Red Dirt	Eagle	39.70996	-107.047

CHANNEL MAINTENANCE FLOW MONITORING PLAN DEVELOPMENT AND IMPLEMENTATION

Upon recommendation of the Committee, the SG selected Stillwater Sciences Inc. as the consulting team to develop the channel maintenance flow (CMF) observational monitoring plan. The SG approved a Scope of Work developed by Stillwater and the CMF Workgroup. The kickoff meeting for CMF monitoring plan development was held on 12/20/2020. The proposed CMF monitoring plan will be presented during the June SG meeting, with the possibility of CMF monitoring activities to be considered for implementation in 2021.

STREAMFLOW MONITORING

The River District and the U.S. Geological Survey (USGS) cover operations and maintenance (O&M) costs for the USGS stream gage 09058000 Colorado River near Kremmling. The Kremmling gage operates year-round. The Bureau of Land Management (BLM), White River National Forest, and USGS cover O&M costs for the USGS stream gage 09060799 Colorado River at Catamount Bridge. The Catamount gage operates for eight months annually (March 15th – November 15th).

OTHER MONITORING EFFORTS

As per the SG Plan, the Committee is charged with gathering data collected by others. Starting during the Pre-Provisional Period, the Committee has maintained collaborative relationships with a host of entities who are actively monitoring parameters of interest to the SG. Some of these agencies (and the data they collect) include: USGS (Hydrology, Temperature, Water Quality (above Glenwood)), CPW (Biosurveys, Research Projects), BLM (User Data, Commercial logs, Traffic counters, Temperature), and USFS (User Data, Commercial Logs). Because these data serve an important role in the Committee's ability to help

inform SG decisions, the Committee intends to maintain and expand relationships with other organizations collecting data in the Wild & Scenic segments.

In addition, a number of new data collection activities have started in areas that overlap with W&S efforts. Due to the Grizzly Creek fire, the USGS started collecting additional water quality parameters at a number of sites. The Upper Colorado River and Gunnison Rivers were also selected for the USGS Next Generation Water Observing System (NGWOS) which will intensively monitor a broad range of metrics over the next 10 years. Both of these endeavors may result in additional data that is of interest to the W&S SG.

2021 MONITORING PLAN – COST SUMMARY

The proposed monitoring plan for 2021 will cost \$107,087. The breakdown for each element is shown in Table 4, below.

Table 4 Monitoring Budget for 2021.

Category	2021 Cost
Recreation Monitoring (RRC Associates)	\$54,500
Stream Temperature	
– Data analysis at 9 sites (Lotic)	\$600
– Monitoring of 3 W&S temp sites (GCWIN)	\$1,000
– Purchase of 3 new temperature sensors (GCWIN)	\$487
– USGS stream temperature gauge at Kremmling (River District, in-kind)	\$0
– BLM stream temperature gauges (3 sites; in-kind)	\$0
– GCWIN membership dues	\$500
Macroinvertebrate Monitoring	\$15,000
Hydrology & Flow-Related Monitoring	
– USGS stream gauges at Kremmling and Catamount (River District & BLM in-kind)	\$0
Other Monitoring Activities ¹⁸	\$35,000
Channel Maintenance Flows	
– CMF Monitoring Plan Implementation ¹⁹	\$TBD
Total:	\$107,087

¹⁸ These funds were previously approved by the SG and included in the 2020 purchase orders.

¹⁹ Implementation costs are expected to vary on an annual basis, with year one higher than subsequent years.