Annual Monitoring Report

2021

Prepared in accordance with the
Upper Colorado River Wild & Scenic Stakeholders
Management Plan
October 19, 2022

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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
CMF	Channel Maintenance Flows
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." The year 2020 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) 2021, from April 1, 2021 to March 31, 2022. 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 2021 year type in Segments 4-7 was in the Driest 25% category.

During 2021, the Cooperative Measures Committee monitored streamflow and temperature in Segments 4-7 and participated in Historic User's Pool (HUP) calls as well as Learning by Doing operational calls to provide input on operations being discussed on the Colorado River. 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. In response to high stream temperatures and low streamflow in June of 2021, W&S Stakeholder water providers (River District, Denver Water and Northern Water) modified their operations which resulted in increased flows in the Kremmling area of over 200 cfs, combined.

The A&R SG Plan evaluates the Recreational Floatboating ORV in Segments 5, 6, and 7 based on the "Not Likely to Return" ORV Indicator. The ORV Indicator percentage values are to be defined for each segment based on the year type. In 2021, there was sufficient information to set the ORV Indicator values for Segments 5 and 6 in the driest year type and to evaluate the annual values for Segment 7 Driest 25% year type. Based on this information, the percentage of people not likely to return did not result in a divergence from the ORV indicator value in 2021.

Although the A&R SG Plan does not include threshold values for the Quality Trout or Biomass indicators at the State Bridge and Catamount biosurvey reaches, as of 2021, CPW completed the minimum number of fish monitoring surveys at all three W&S sampling reaches (Radium, State Bridge, and Catamount). The 2021 fish monitoring surveys

indicated that both Quality Trout and Biomass exceeded the identified thresholds at all three W&S biosurvey reaches. As of 2021, a CPUE threshold had only been established at Radium, as a sufficient number of valid intercept surveys is yet to be completed at State Bridge and Catamount. The 2021 data indicates that CPUE at Radium exceeded the threshold value.

The 2021 monitoring results in relation to Recreational Fishing ORV indicators are summarized in Table 1, below.

Table 1. Summary of ORV Indicators in 2021.

ORV Indicator	Measure/Metric	2021 Status
Recreational Floatboating	Not likely to return	Met for established thresholds
Recreational Fishing	Biomass	Met
	Quality Trout	Met
	CPUE	Met for established thresholds

The SG also monitored the Resource Guides in 2021. Resource Guides are summarized in **Error! Reference source not found.** Flows were within range for boatable floatboating days. There were zero early-season boatable days. The 2021 5-year rolling average seasonal flows was above the mid-point seasonal flow range for Seasons 1, 2, and 3. For Season 4, the 5-year rolling average was below that mid-point. In 2021, streamflow never exceeded 2,500 cfs and the instantaneous peak of 1,320 cfs occurred on September 2, 2021. The flushing flow resource guide was met for the 10-year period as it occurred in six of the ten years. One site exceeded the acute (DM) temperature standards in 2021: Catamount (09060799). All sites within the W&S segments exceeded the chronic (WAT) temperature standards in 2021 (Figure 10). Sites from Catamount (09060799) downstream exceeded the standard for extended periods of time. Blue River above the Colorado River confluence (BL-abvCOR) exceeded the MWAT standard in May prior to the seasonal standard shift. Regulatory-level assessment of additional criteria for warming events or other excursions may result in these exceedances being disqualified or excused.[1] The Channel Maintenance Flow workgroup continued developing an observational monitoring plan to better understand the effects that peak flows have on channel maintenance processes in Segments 4 through 6.

[1] 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)

Table 2. Summary of ORV Resource Guides in 2021.

ORV Resource Guides	Measure/Metric	2021 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	Desired fish observed*
Recreational Fishing	Seasonal Flows	The 5-year rolling average was above the mid-point for seasons 1, 2, and 3, but below the mid-point for season 4.
Recreational Fishing	Flushing Flows	Flow rate did not occur in 2021, but flushing flows did occur based on a 10-year average
Recreational Fishing	Channel Maintenance Monitoring	CMF Monitoring Plan approved at January 2021 SG meeting. Additional work needed to develop protocols.
Water Quality[2]	Water Quality Control Commission water quality standards	Temperature listed on the 303(d) list E.coli listed on the M&E list
Macroinvertebrates	Water Quality Control Commission aquatic life water quality standards	The MMI v4 indicated that all sites supported healthy macroinvertebrate communities and the overall health remained relatively stable.
Water Temperature	Daily Maximum (DM)	Exceedance of temperature threshold at Catamount
	Maximum Weekly Average Temperature (MWAT)	Potential exceedances of the temperature threshold at all sites within W&S segments

*Except Flannelmouth Sucker, Bluehead Sucker, and Colorado River Cutthroat Trout, which are not anticipated to be captured in every survey.

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 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

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

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 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 Program[3]. 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 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, page 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

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

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.)

Purpose

The purpose of this report is to provide a summary of monitoring activities and cooperative measures conducted by the SG in 2021. 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 2021 monitoring year began on April 1, 2021, and ended March 31, 2022.

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; 4) determine the year type which is associated with the Floatboating ORV Indicator and Resource Guides; and 5) evaluate Fishing Resource Guides.

Data for three streamflow gages were available in the W&S segments in 2021 (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 15 through November 15. In July 2021, the Catamount Bridge station was expanded, and it now measures 8 parameters: streamflow, gage height, water temperature, air temperature, specific conductance, dissolved oxygen, pH, and turbidity. Figure 1, Figure 2, and Figure 3 display the average daily streamflow from all gages during the 2021 W&S Year.

All three hydrographs and all subsequent analyses use USGS data available as of August 5, 2022.

Table 3. USGS gages operated in Segments 4, 6 and 7 in 2021.

Number	Gage Name	Parameters	W&S Segment
09058000	Colorado River near Kremmling	Streamflow, gage height, water temperature, and precipitation	4
09060799	Colorado River at Catamount	Streamflow, gage height, water temperature, air temperature, specific conductance, dissolved oxygen, pH, and turbidity	6
09070500	Colorado River near Dotsero	Streamflow, gage height, water temperature, specific conductance, dissolved oxygen, pH, and turbidity	7

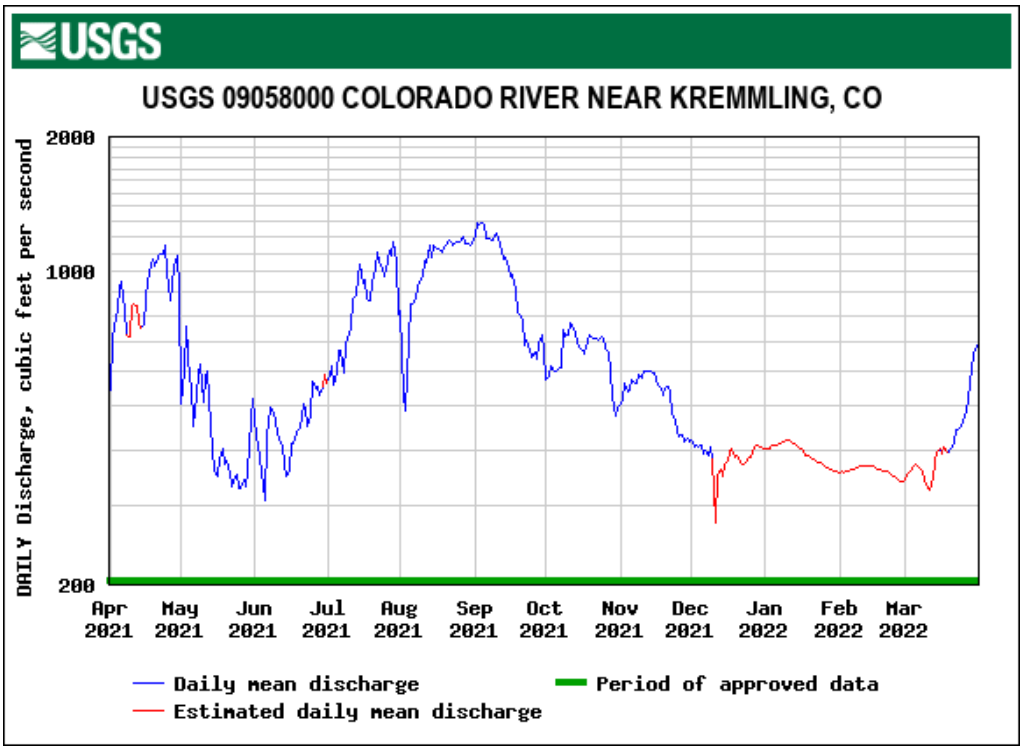


Figure 1. Mean daily streamflow in 2021 at the Colorado River near Kremmling, CO gage (USGS 09058000).

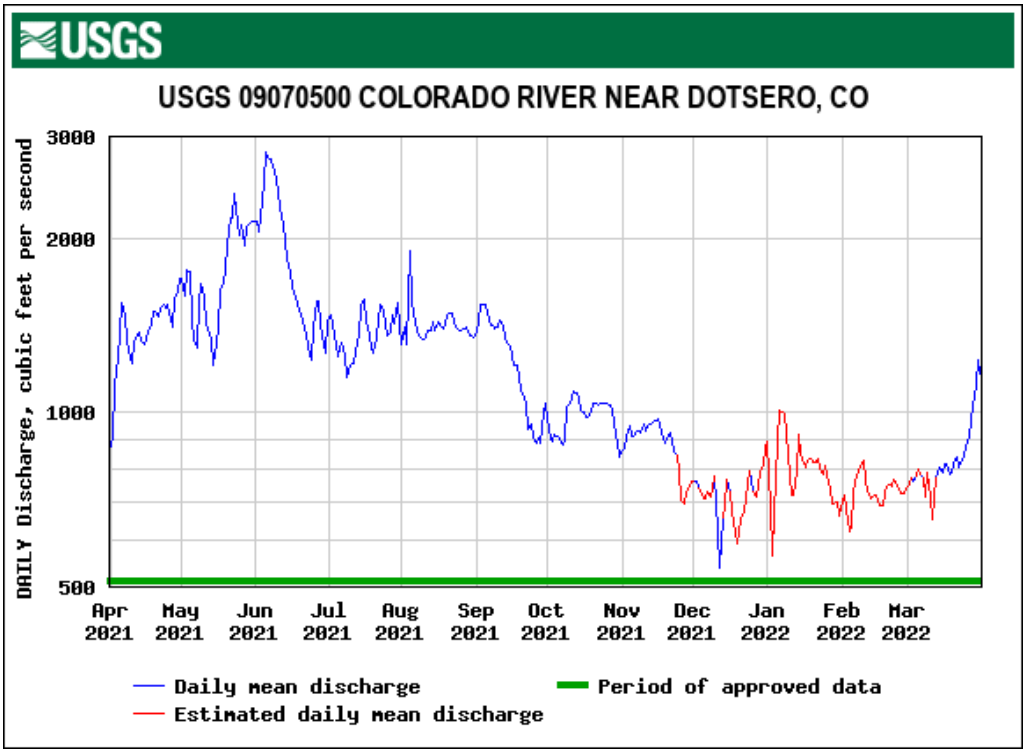


Figure 2. Mean daily streamflow in 2021 at the Colorado River near Dotsero, CO gage (USGS 09070500).

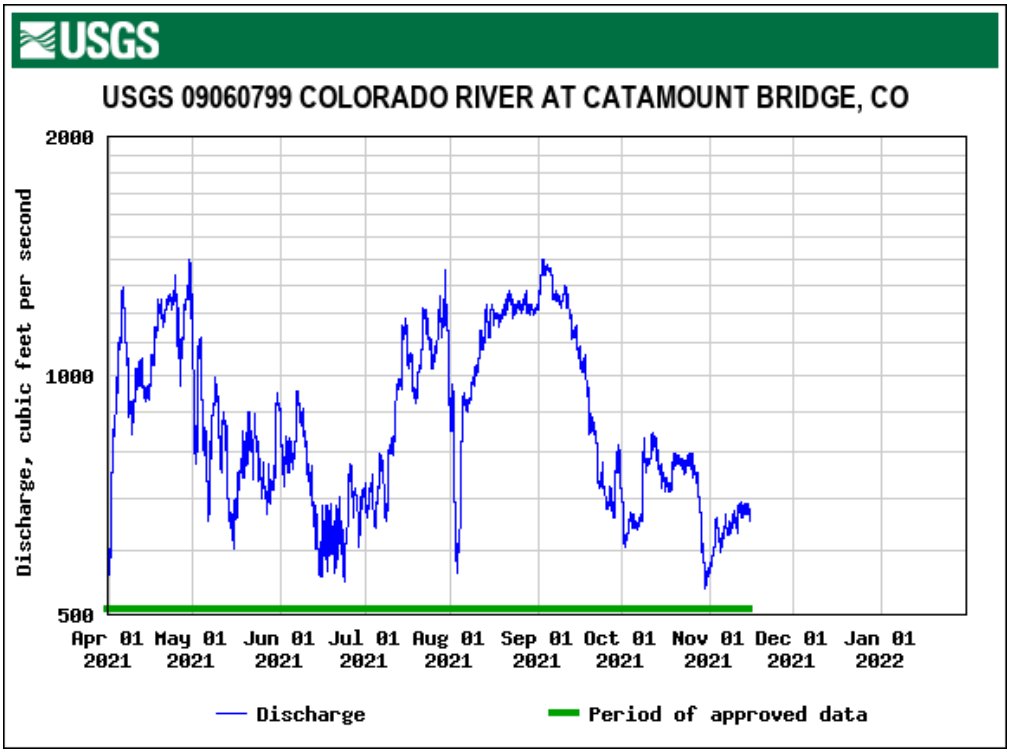


Figure 3. Mean daily streamflow in 2021 at the Colorado River at Catamount Bridge, CO gage (USGS 09060799).

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 1 through March 31. 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 2021 estimated that the undepleted flows would be 580,000 acre-feet (AF) for Kremmling and 910,000 AF at Dotsero (Table 6). Based on these volumes the predicted flows at both Kremmling and Dotsero were classified as a "Driest 25%" year type.

During W&S Year 2021, the total actual annual flow volume at the Kremmling gage was 448,309 AF which ranks in the "Driest 25%" category and the total volume at the Dotsero gage was 845,594 AF which also ranks in the "Driest 25%" category. It is worth noting that 6 of 10 years since 2012 have been classified as "Wettest 25%" or "Wet Typical" for Segments 4-6. 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, 2021 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 2021 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	1,116,528	Dry Typical
2021	Driest 25%	448,309	Driest 25%	Driest 25%	845,594	Driest 25%

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.

2021 Cooperative Measures

During 2021, the Cooperative Measures Committee continued to maintain web-based tools to aid in discussions on Resource Guides and potential cooperative efforts on the Colorado River. The floatboating boatable day tool, which is populated by preliminary streamflow data at the Kremmling and Dotsero gages was published on the Upper Colorado W&S website throughout the floatboating season. 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.

Representatives from the Cooperative Measures Committee participated in State of the River/Historic User Pool (HUP) weekly calls between March and October as well as Learning by Doing operational calls 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, streamflow and stream temperature graphs. This information was also discussed at numerous Cooperative Measures Committee meetings.

As described above, the 2021 W&S Water Year is "Driest 25%" category at the Kremmling gage[4] and at the Dotsero gage. No Coordinated Reservoir Operations (CROS) occurred in 2021. The Shoshone Power Plant was off-line for much of the year and therefore the Shoshone Outage Protocol (ShOP) was implemented in April (4/5-4/13), May (5/10-5/13), June and July (6/21-7/10).

June of 2021 was met with exceptionally warm stream temperatures and low streamflow conditions at the Kremmling, Catamount and Dotsero gages, particularly before ShOP operations began on June 21st and a Cameo call was placed on July 11th. Streamflow measured at the Kremmling gage in May and June were above the 10th percentile and below 25th percentile for the period of record of 1962 to current. The Cooperative Measures Committee met remotely several times during this period to try to address these conditions in the upper part of the Colorado River. W&S Stakeholder water providers (River District, Denver Water and Northern Water) responded to the river conditions by modifying their operations which resulted in increased flows in the Kremmling area of over 200 cfs, combined. These operations specifically included the Colorado River Water Conservation District making releases from Wolford Mountain Reservoir storage of an additional 50 cfs (in addition to bypasses), Denver Water releasing 350 acre-feet from Williams Fork Reservoir as well as bypassing flows from the Fraser River Collection System and Northern Water bypassing the Denver Water bypasses plus an additional 50 cfs at Windy Gap. Denver Water and Northern Water also varied the rate of their bypasses/releases in an

[4] Depending upon final values for the Wild & Scenic water year, there is a possibility that Kremmling will be in the "Driest 25%" category.

attempt to get a larger volume of water to the Kremmling area at times of the day when stream temperatures were expected to be highest.

In response to recommendations in the September 2021 BLM and USFS Annual Effectiveness Review, the Cooperative Measures Committee hosted a workshop on February 7, 2022 to begin discussing the potential for and feasibility of an SG-funded pool of water to be utilized in the W&S segments. This workshop covered topics such as potential sources of water, the mechanism for delivery, how such a pool(s) would be managed and anticipated costs. The Cooperative Measures Committee will continue this discussion for the remainder of 2022.

The annual Gore Canyon Festival took place on August 28, 2021, with SG sponsorship. Flows were within acceptable range for the race and no cooperative measures were needed.

2021 Monitoring Results

The Monitoring Committee assembled or collected information to evaluate the ORV Indicators and review the Resource Guides. During 2021, the SG conducted the following activities:

- Evaluated CPW biosurvey data.
- Funded boating and fishing intercept data.
- Determined Recreational Floatboating boatable and early seasonal boatable days.
- Evaluated Recreational Fishing seasonal flows and flushing flows.
- Evaluated and funded temperature readings at nine sites operated by USGS, BLM, and the SG.
- Funded displacement surveys, self-reporting kiosks, and user group surveys.
- Evaluated and funded macroinvertebrates monitoring.
- Funded assessment of traffic counter data and commercial outfitter activity logs.
- Developed the Channel Maintenance Flow Observational Monitoring Plan. This plan will be refined in 2022 and monitoring will start in 2023.

Recreational Floatboating

ORV Indicator for Recreational Floatboating

The A&R SG Plan evaluates the Recreational Floatboating ORV in Segments 5, 6, and 7 based on the "Not Likely to Return" ORV Indicator. This indicator uses visitor intercept survey responses to the question "Based on your experience today, how likely would you be to return to this section of river." Responses of "0% - will not return" and "25% - unlikely" are combined to determine the percent of people that are not likely to return. The Not Likely to Return percentage values for the ORV Indicator are based on the upper 95% confidence interval for floatboating survey responses (Table 7). Divergences occur when annual percentage values are greater than the ORV Indicator percentage values shown in the

Table 7 below. Failure to meet the ORV Indicator occurs when divergences exist in any three of the last five consecutive years. Divergences in one or more segments during a given year will be treated as a single year toward the three-out-of-five-year frequency criteria. The A&R SG Plan (Section III.B.2) provides details on the Recreational Floatboating ORV Indicator metric. The SG Memo titled, "Recommendation for on "Not Likely to Return" Floatboating ORV Indicator" contains additional information about the metric and the Intercept Survey Protocol specifies the field procedures used in this work.

Table 7. Recreational Floatboating ORV Indicator percentage values for Not Likely to Return for each year type. Indicator percentage values are based on the upper 95% confidence interval for floatboating survey responses that indicate "will not" or "unlikely" to return. [5]

Segment	Driest	Dry Typical	Wet Typical	Wettest
5	4.9%	6.1%	-	3.1%
6	2.2%	2.4%	-	1.6%
7	4.0%	2.7%	-	3.2%

The 95% confidence interval percentage values shown in red were later locked in 2022 based on reaching the requisite numbers of samples in 2021 (driest year type) and 2019 (wettest year type).

At the time the Plan was approved, there were not sufficient data to fill in the percentage values for all segments and year types. The requisite survey data to fill in missing percentage values for each year type requires a minimum survey effort per segment as described in the Intercept Survey Protocol, which may be amended and adopted by the SG independent of the SG Plan, or other survey methods as approved by the SG. Table 7 will continue to be filled in as sufficient data is collected for year type sand Segments.

2021 Floatboating ORV Indicator and Survey Response Information

In 2021, the SG retained RRC Associates to conduct user intercept surveys at 7 locations (Table 8) resulting in 1,684 total survey responses (including both Floating and Angler surveys). RRC collected and processed survey responses to evaluate the percentage values for the Not Likely to Return ORV Indicator. In 2021, the year type was in the Driest category for all three segments. The 2021 survey responses provided sufficient data to set the final ORV Indicator percentage values for Segment 5 and 6 in the Driest year type which are shown in Table 7. The percentage values were lower than the ORV Indicator value for all segments; therefore, there are no divergences in 2021. While the ORV Indicator was not approved until 2020, there have not been any divergences as of 2021 utilizing all of the data collected since 2013 (Table 9).

[5] Values in Table 7 reflect the current values in the A&R SG Plan. The data included in the SG Plan is under evaluation for accuracy.

Table 8. Number of completed user intercept surveys by location in 2021.

Segment	Location	Number of Boater Surveys
5	Radium	586
	State Bridge	174
	Total	**760**
6	Catamount	44
	Two Bridges	289
	Dotsero	159
	Total	**492**
7	Grizzly Creek	36
	Two Rivers	179
	Total	**215**

Table 9. Summary of the Recreational Floatboating Indicator percentage values.

Year	Segment	Year type	ORV Indicator % Value by year type	Annual % Values	Divergence?
2013	5	Dry	6.1	5.4	None
2013	6	Dry	Not locked	--	None
2013	7	Dry	Not locked	1.1	None
2014	5	Wettest	3.1	2.8	None
2014	6	Wettest	1.6	0	None
2014	7	Wettest	3.2	2.6	None
2015	5	Wettest	3.1	1.1	None
2015	6	Wettest	1.6	0	None
2015	7	Wettest	3.2	0.7	None
2018	5	Dry	6.1	2.8	None
2018	6	Dry	Not locked	1.0	None
2018	7	Driest	4.0	2.3	None

2019	5	Wettest	3.1	1.7	None
2019	6	Wettest	1.6	1.0	None
2019	7	Wettest	3.2	2.3	None
2021	5	Driest	4.9	3.6	None
2021	6	Driest	2.2	1.2	None
2021	7	Driest	4.0	0.9	None

No data was collected on the Floatboating ORV in 2020 due to the COVID-19 pandemic; however, based on reports from USFS and BLM and other anecdotal evidence, high recreational use of the river took place. The SG elected to move forward with collecting experiential data in 2021 but discussed ways to address the pandemic. The Monitoring Committee worked with RRC to identify additional questions to be added to the intercept and user group surveys. These questions were intended to help the SG understand whether COVID-19 was influencing users' decisions to visit or their experience on the Upper Colorado, see below:

Today, did COVID-19 influence your experiences or decision to boat on this section of river?

10% - Yes – This location was especially attractive in light of COVID considerations

0% - Yes – My day was negatively impacted by COVID-related experiences

In a word or two, what type experiences: _____

90% - No – COVID-19 did not influence my decisions or experiences today

Based on the survey input in 2021, COVID had little impact on the majority of boaters, 90% said the pandemic did not influence decisions or experiences on the day they were interviewed. As described further below, a Displacement Survey was conducted in 2021 and it contained a COVID question. Results from that survey indicated that for the majority (77%) COVID did not influence decisions or experience, while 15% said the Upper Colorado was "especially attractive" during COVID, and 8% said experiences were "negatively impacted." Consistent with the results from the intercept surveys, COVID had an impact on a small segment of boaters.

Visitor Displacement

The A&R SG Plan (Section III.B.2.) identifies the need to structure the collection of visitor data on the Not Likely to Return ORV Indicator to avoid potential survey methodology problems with "visitor displacement." Visitor displacement occurs when some visitors do not return because they are dissatisfied with the quality and range of the recreational experience, and then those users are replaced by newcomers who have different expectations and are satisfied with the lower quality experience. To avoid "displacement" bias, the SG, at its discretion and subject to budgetary limitations, may gather displacement information to further explain intercept survey findings.

The adopted Displacement Survey Protocol identifies the surveying effort would be conducted once every three years. The SG elected to conduct a web-based Displacement Survey using all available emails previously collected through Intercept Surveys. The

Displacement Survey was conducted in 2021; it measured multiple descriptive statistics as reported by past Colorado River visitors including "likelihood to return to the river."

In general, responses from 2021 are very similar to 2018 when a previous Displacement Survey was conducted. Responses In 2021 showed 58% of respondents were floating only, with 38% fishing, and 3% "couldn't recall."

On the key ORV-related survey question in the Displacement Survey, 97% of respondents are "likely to return" (rated 3 out of 5 or higher) to the Upper Colorado. No respondents indicated they "would not return" and 3% said they were "unlikely- 25%." This question had a follow-up asking "Why?" Among the 3% not likely to return, none of the comments suggested that the actual river experience was the reason for not returning to the Upper Colorado.

A Displacement Survey question asks about "expectations of boaters being met?" About 79% of respondents said their expectations were exceeded or met, 18% had their expectations somewhat met, 3% did not have their expectations met. Thus for 97% of all boaters responding to the Displacement Survey, expectations are being met.

Resource Guides for Recreational Floatboating

Resource Guides for Recreational Floatboating are based on assessing the number of boatable days at different opportunity levels based on the year type as compared to Table 10. Early-season boatable days identified on Segments 4-6 are applicable across all year types.

W&S Segments 4-6

The Floatboating Resource Guides for boatable days in Segments 4-6 are shown in Table 11. In 2021, there were 104 total boatable days in these segments during the floatboating season (April 1 to September 30), which was above the Resource Guide range for boatable days in a Driest 25% Year-Type. The number of boatable days for each opportunity category was within the range for the 2021 year type (Table 11). Figure 4 illustrates mean daily streamflow and the range of floatboating opportunities in these segments during the 2021 floatboating season.

Table 10. 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 11. Summary of boatable days in Segments 4-6 from 2012 through 2021.

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
2021	Driest 25%	104	104	0	0

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

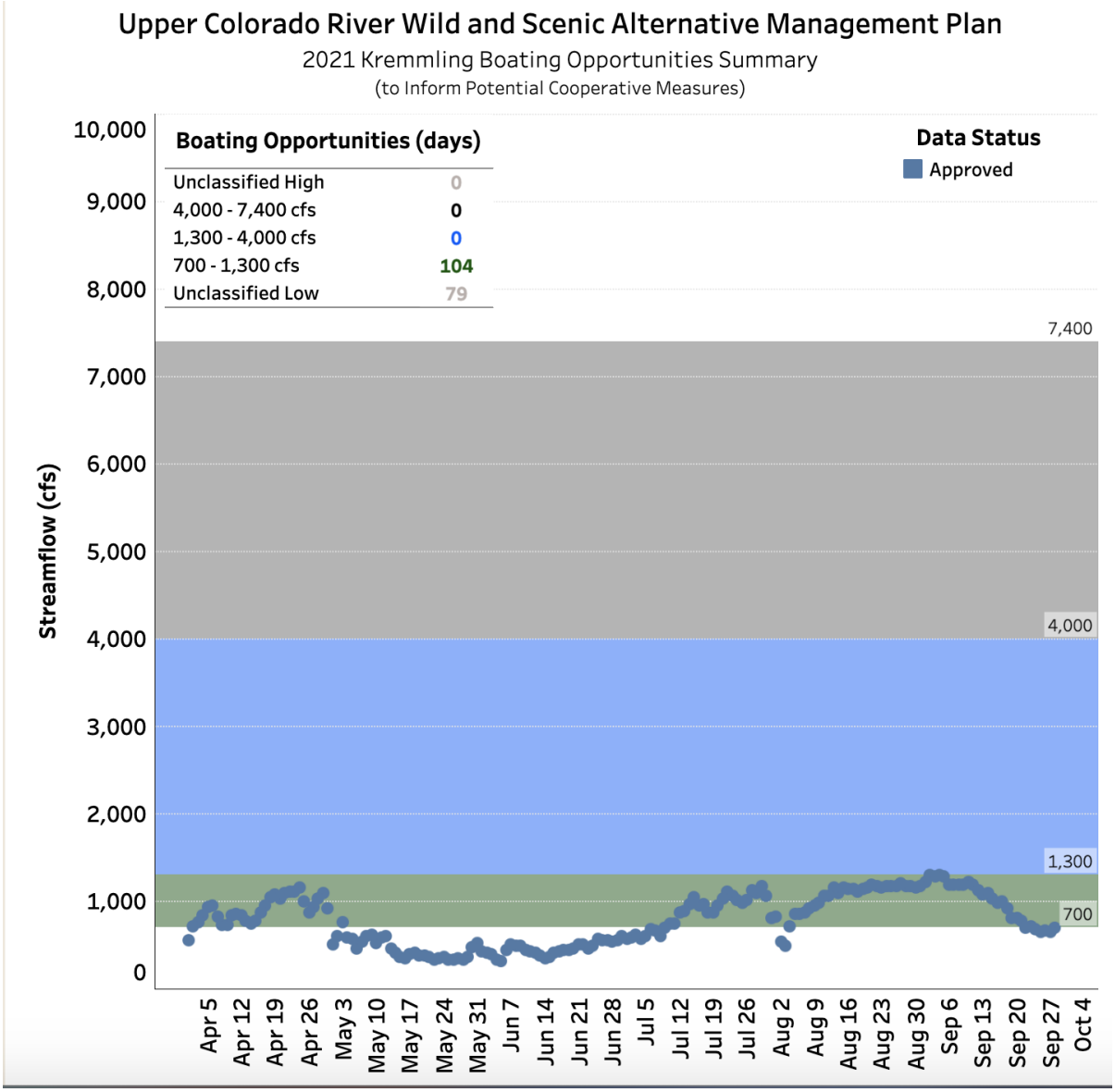


Figure 4. Hydrograph from the Colorado River near Kremmling, CO gage (USGS 0905800) demonstrating the floatboating opportunities in 2021 in Segments 4-6.

The Resource Guide for early season boatable days is shown in Table 12. During 2021, streamflow at the Kremmling gage was below 860 cfs for all days during both time periods.

Table 12. 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 2021.

	Early Season Boatable Days	
Early-Season Periods	May 15-31	June 1-30
Boatable Day above 860 cfs	0 (4) 10	0 (9) 17
2020	17	30
2021	0	0

W&S Segment 7

The Resource Guides for Segment 7 are shown in Table 13. In 2021, there were 157 total boatable days in this segment during the floatboating season (April 1 to September 30), which was within the range in the Driest Year Type. The total number of boatable days was within the range for the 2021 year type. All opportunity categories were within the range for the 2021 year type (Table 14). Figure 5 illustrates mean daily streamflow and the range of floatboating opportunities in this segment during the 2021 floatboating season.

Table 13. 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 14. Summary of boatable days in Segment 7 from 2012 through 2021.

Year	Year Type	Total Boatable Days	Opportunities (1,250 - 1,800 cfs)	Opportunities (1,800-5,500 cfs)	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
2021	Driest 25%	157	130	27	0

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

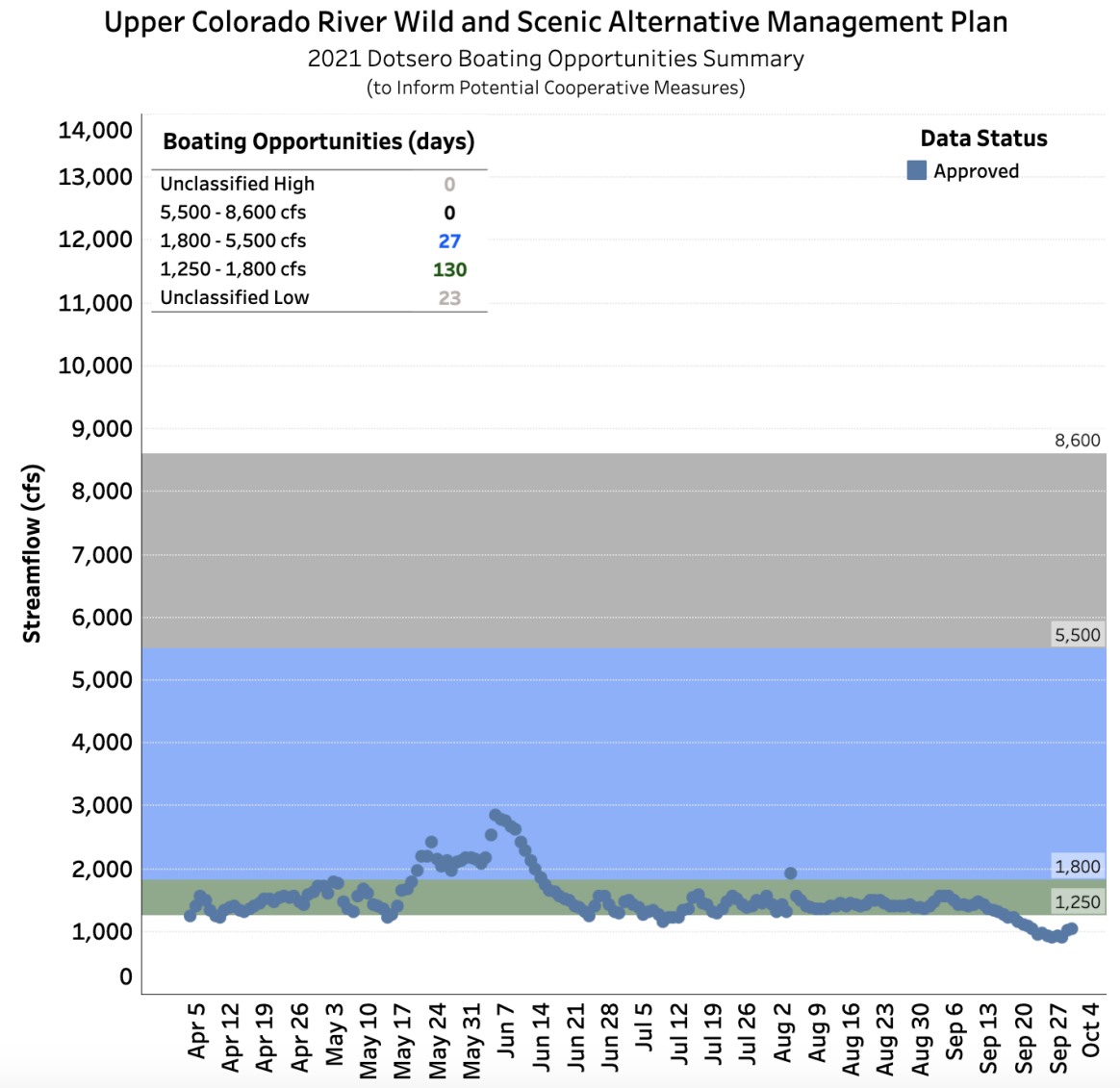


Figure 5. Hydrograph from the Colorado River near Dotsero, CO gage (USGS 09070500) demonstrating the floatboating opportunities in 2021 in Segment 7.

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 for Quality Trout and Biomass. A metric for Quality Trout identifies the abundance of trout 14 inches or longer per acre that characterize an angler's recreational fishing experience in Segments 5 and 6. Trout Biomass (pounds of trout >6 inches per acre), is a gage for both productivity and recruitment that supports 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. Therefore, in 2021, CPW conducted fish monitoring surveys in all of the established W&S biosurvey reaches instead of alternating, as per its standard survey protocol. RRC also performed intercept surveys in 2021.

Quality Trout and Biomass

Quality Trout abundance and trout Biomass varies naturally in rivers and can be influenced by a variety of factors inherent to river systems. ORV Indicator thresholds established during the baseline monitoring period allow for expected natural variability in the trout populations at different monitoring reaches.

Per the Recreational Fishing ORV Indicator, both Quality Trout and Biomass should be equal to or greater than the threshold values identified in the 2020 A&R SG Plan. If a single biosurvey indicates that either value falls below said threshold at a given location, these ORV Indicators will be deemed to not have been met at that location. Of note, the 2020 A&R SG Plan did not establish threshold values for Quality Trout or Biomass at the State Bridge and Catamount biosurvey reaches, since the minimum number of six (6) biosurveys that were necessary to establish baseline conditions had not been completed. In 2021, however, CPW completed the required number of biosurveys to establish thresholds at all three Recreational Fishing ORV biomonitoring reaches (Radium, State Bridge, and Catamount).

In

Table 15, established Fishing ORV Indicator thresholds for each of the three biosurvey reaches in W&S Segments 5 and 6 are compared to the results of 2021 fish monitoring surveys. In 2021, the ORV Indicators for Quality Trout and Biomass exceeded the thresholds defined at all three W&S biomonitoring reaches.

Table 15. 2021 Monitoring Results Compared to Quality Trout and Biomass Thresholds.

Biosurvey Reach	Quality Trout (QT) Threshold (#>14" per acre)	Biomass (BM) Threshold (Pounds per acre)	2021 Monitoring Results (QT / BM)
Radium (Segment 5)	43	125	92 / 177
State Bridge (Segment 6)	22	63	32 / 82
Catamount (Segment 6)	14	43	16 / 63

The abundance of larger quality-sized trout (14-inches or greater) is highest in the upstream monitoring reach and decreases moving downstream due to diversity in habitat and river conditions between the reaches. Within the monitoring reaches, annual trends in Quality Trout abundance differ during the monitoring period (Figure 6). In 2021, Quality Trout abundance was documented at its highest at Radium since surveys began in 2010 (92 Quality Trout/acre), far exceeding the ORV Indicator of 43 QT/acre. At Radium, a long-term trend of increasing Quality Trout abundance has been documented during the baseline monitoring period. State Bridge's Quality Trout abundance (32 QT/acre) fell well within the range of variability observed during the baseline period, meeting the ORV Indicator of 22 QT/acre. At Catamount in 2021, Quality Trout abundance (16 QT/acre) was the lowest documented during the baseline period. However, not only did it meet the ORV Indicator (14 QT/acre), but Catamount's estimates also vary only minimally, thus it continues to be considered by CPW as the most stable trout population.

In Figure 7, the results of CPW's biosurveys at Radium, State Bridge and Catamount can be reviewed back to 2010.

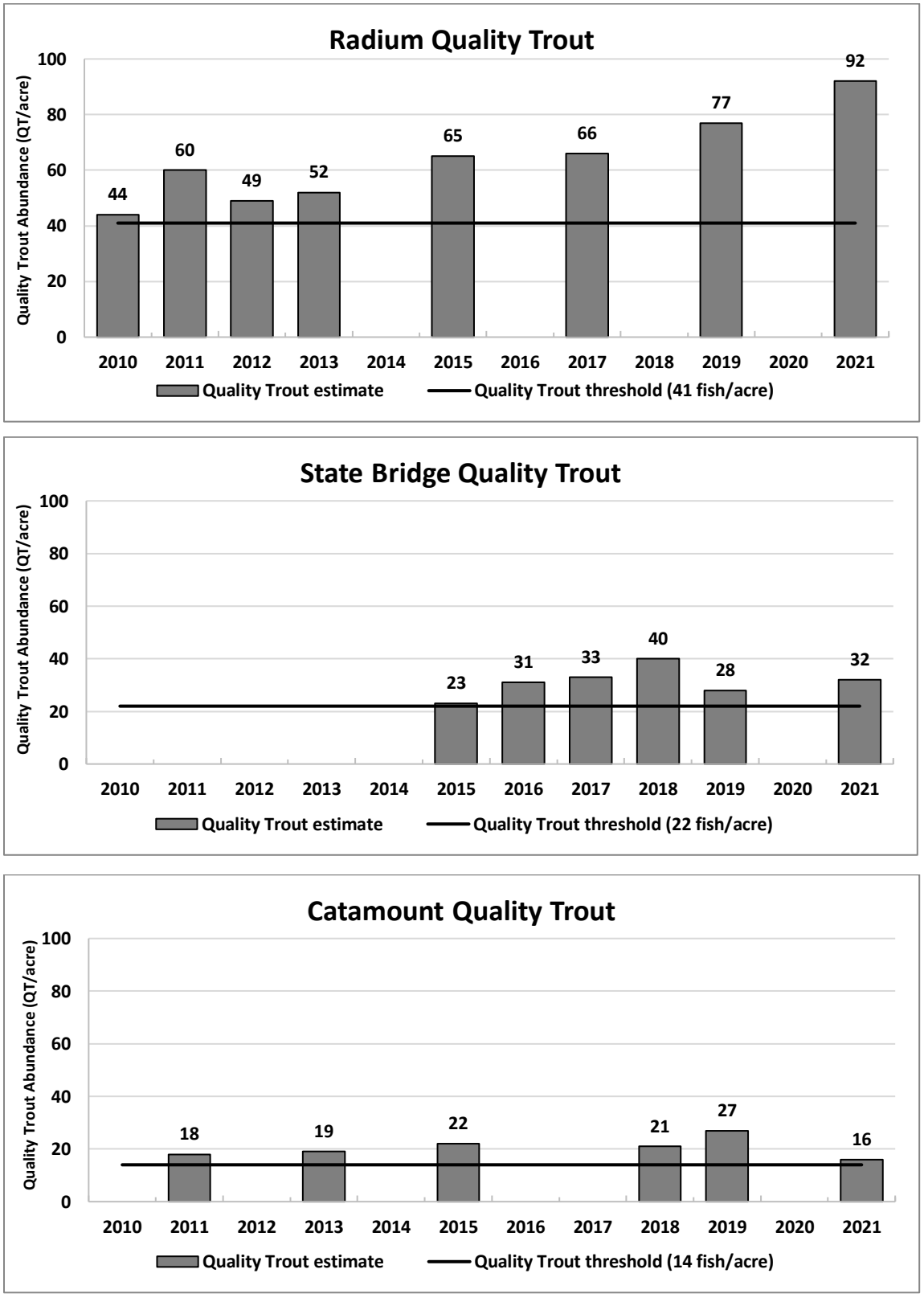
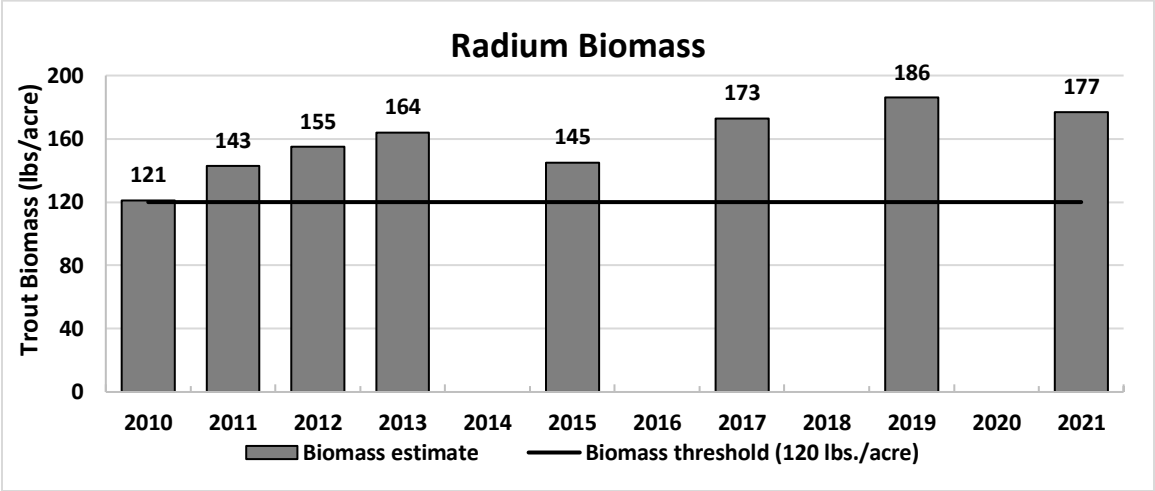
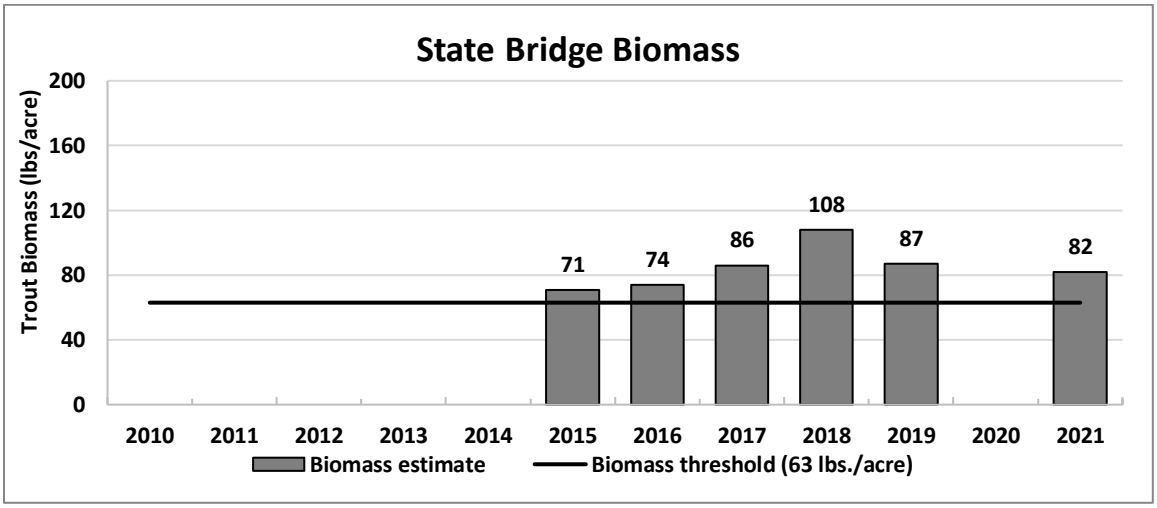


Figure 6: Quality Trout abundance (QT/acre) estimated during CPW surveys from 2010 – 2021 at Radium, State Bridge, and Catamount in the Colorado River below Gore Canyon.

Trout Biomass estimates vary annually within each monitoring reach (Figure 6) and do not always correspond to trends documented in Quality Trout abundance. At Radium in 2021, the highest abundance of larger quality-sized trout, Biomass (177 lbs/acre) was lower than

the previous year (186 lbs/acre) – indicating a lower abundance of smaller size classes of fish despite the great abundance of larger fish. While Quality Trout abundance is steadily increasing annually, Biomass is variable. At State Bridge and Catamount, Biomass was 82 and 63 lbs/acre, respectively, which was also lower than the previous surveys (87 and 81 lbs/acre, respectively). Annual variability in both Quality Trout and Biomass do not clearly identify population trends at these two locations. Notwithstanding, all survey locations exceeded the established thresholds (Table 15) as Biomass estimates fell within an accepted range of natural variability expected at each monitoring reach. Overall, the thresholds established both for Quality Trout and Biomass during the baseline monitoring period provide metrics that encompass the natural variability of the populations at the three diverse monitoring locations.





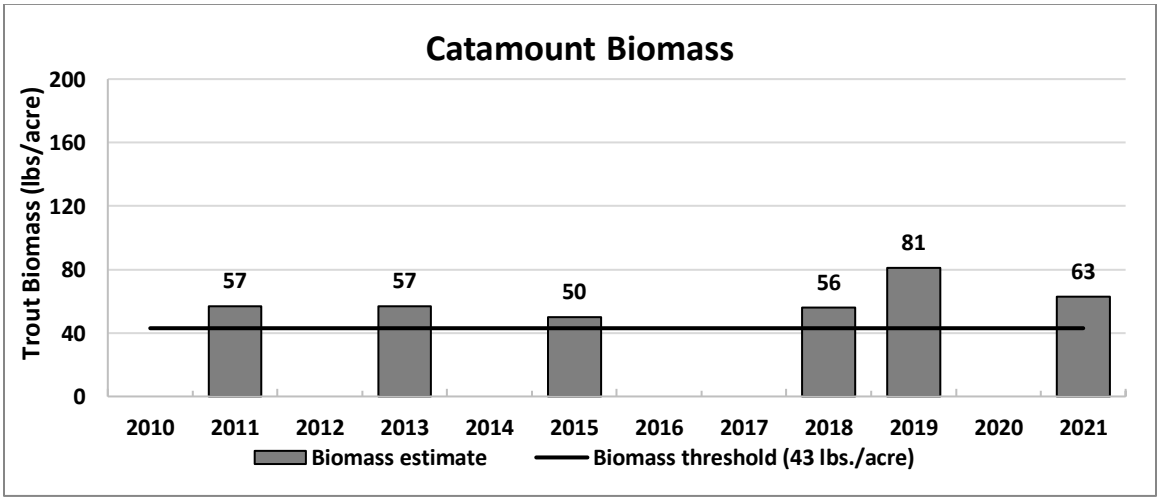


Figure 7: Pounds of trout per acre, Biomass (lbs/acre), estimated during CPW surveys from 2010 – 2021 at Radium, State Bridge, and Catamount in the Colorado River below Gore Canyon.

Catch Per Unit Effort (CPUE) Evaluation

Per the Recreational Fishing ORV Indicator, the Fishing ORV will be deemed to be protected at a specific location if angler surveys indicate that CPUE values are equal to or greater than the established threshold values for each monitoring location.

As of 2021, a CPUE threshold has only been established at Radium, as a sufficient number of valid intercept surveys is yet to be complete at State Bridge and Catamount. At Radium, the CPUE was met in 2021.

Table 16. Catch-Per-Unit-Effort: 2021 Monitoring Results.

Intercept Survey Location	CPUE Threshold	2021 Monitoring Results
Radium (Segment 5)	0.70	0.74
State Bridge (Segment 5)	TBD	--
Catamount (Segment 6)	TBD	--

Resource Guides for Recreational Fishing

Seasonal Flows

The Resource Guides shown in Table 17 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.[6]

Table 17. Resource Guides for Recreational Fishing in Segments 4-6.

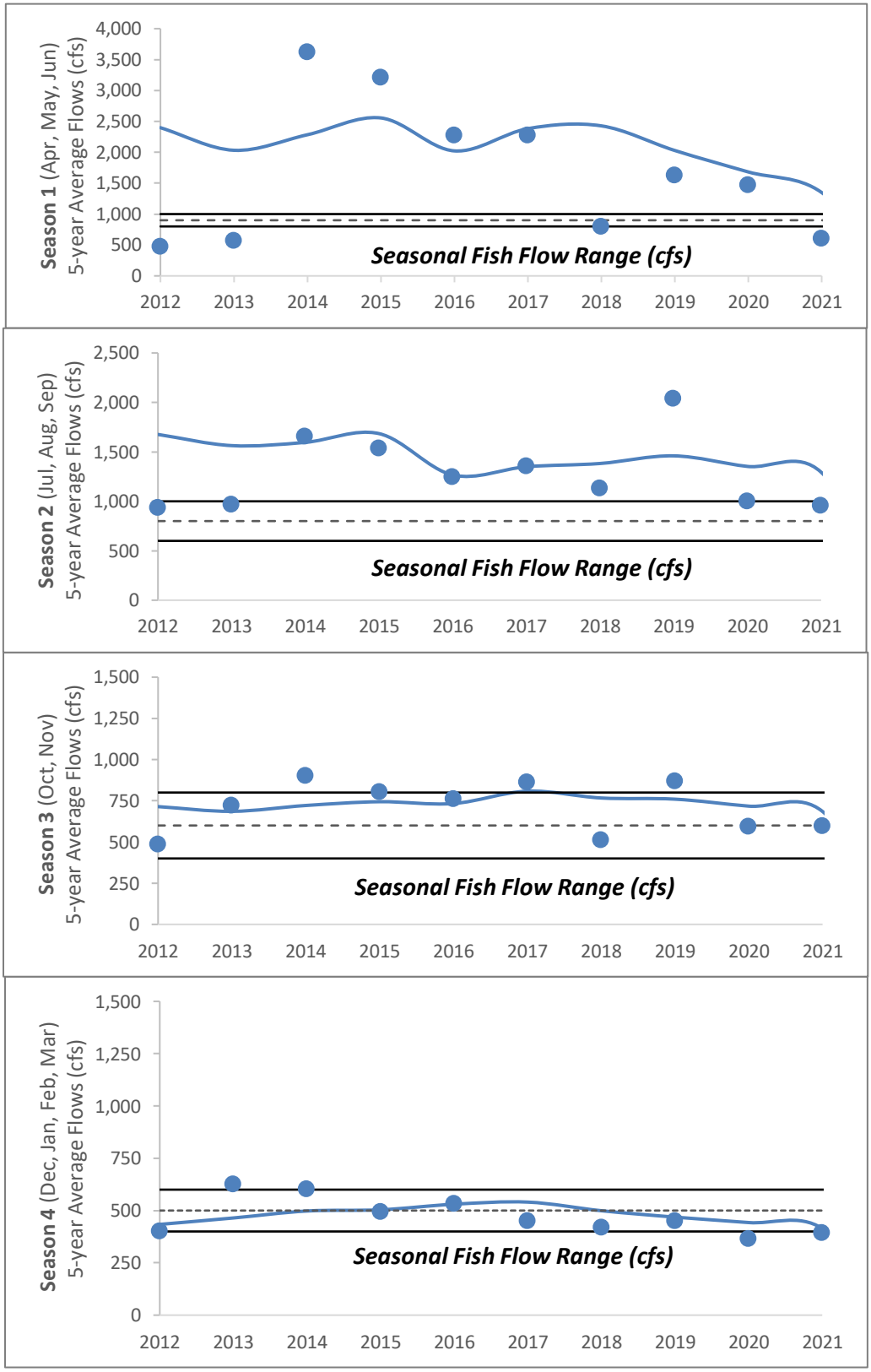
Season	Number of Days	Months	Seasonal Fish Flow Range, low to high cfs	Midpoint, cfs
1	91	April, May, June	800-1,000	900
2	92	July, August, September	600-1,000	80
3	61	October, November	400-800	600
4	121	December, January, February, March	400-600	500

Calculations of the seasonal average flow and rolling 5-year average flows are based on daily mean discharge data from April 1, 2017 to March 31, 2022 at the Kremmling gage (USGS 09058000).

Figure 8 provides a comparison of 5-year average seasonal flows and annual average seasonal flows at the Kremmling gage for the Resource Guides between 2012 and 2021. The 2021 5-year rolling average is above the mid-point Seasonal Flow range for Seasons 1, 2, and 3. For season 4, the 5-year rolling average is below that mid-point. This is not the first year this has occurred for season 4.

[6] The 5-year rolling average includes data from the previous 4 years.

Figure 8. Annual (dots) and five-year rolling average (blue line) for 2012-2021 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 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 18 summarizes peak stream flows, or "Flushing Flows" from 2012 through 2021 based on the Colorado River near Kremmling, CO gage (USGS 09058000). In 2021, streamflow never exceeded 2,500 cfs. The instantaneous peak of 1,320 cfs occurred on September 2, 2021. The flushing flow streamflow and duration occurred in 60% of years based on a 10-year rolling average between 4/1/2012 and 3/31/2022.

Table 18. 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
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
2021	Driest 25%	1,320	1,290	No	0

Desired Species

The A&R SG Plan includes eight "Desired Species" of fish as a Resource Guide. These species are tracked at Radium, State Bridge, and Catamount through annual CPW biosurveys. CPW reports them as either "present" or "absent". Note: CPW acknowledges that bluehead suckers, flannelmouth suckers, and Colorado River cutthroat trout are rare and are not anticipated to be captured in every survey each year.

Table 19: Desired Species present (x) in fish biosurveys at Radium, State Bridge, and Catamount sampling locations.

	Brown Trout	Rainbow Trout	Mountain Whitefish	Speckled Dace	Flannelmouth Sucker	Bluehead Sucker	Mottled Sculpin	CO River Cutthroat Trout
2010	x	x	x	x			x	x
2011	x	x	x	x	x	x	x	x
2012	x	x	x		x	x	x	x
2013	x	x	x	x	x	x	x	x
2015	x	x	x	x		x	x	
2016	x	x	x	x			x	
2017	x	x	x	x	x	x	x	
2018	x	x	x	x		x	x	
2019	x	x	x				x	x
2021	x	x	x	x			x	

Bluehead suckers, flannelmouth suckers, and Colorado River cutthroat trout are native species that are considered rare and are not anticipated to be detected annually. In 2021, CPW reported the presence of brown trout, rainbow trout, mountain whitefish and mottled sculpin in all biosurveys reaches. Speckled dace were present at Radium. Flannelmouth suckers, bluehead suckers, and Colorado River cutthroat trout were not detected in any of the biosurvey reaches in 2021 (Table 19).

Channel Maintenance Flows

The Channel Maintenance Flow Observational Monitoring Plan was developed in 2021 and approved in the January 2022 SG meeting. The Technical Guidance for Observational Monitoring for Channel Maintenance Flows along the Colorado River, prepared by Stillwater Sciences for the SG in 2021, was an important resource in the development of the Observational Monitoring Plan. In 2022, the methodologies, monitoring sites' locations and costs will be refined. Additionally, scopes of work for the Drone-Based Aerial Imagery/Photogrammetry, Cross-Sectional Channel Surveys, and Substrate Measures will be developed, and outside experts will be hired per the SG Contractor Protocols. Monitoring activities will start in 2023.

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 August 14, 2021, lists Segments COUCUC03_C (578 Road Bridge to Gore Canyon), COUCUC03_D (Gore Canyon to Derby Creek), 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 COUCUCO3_E is on the Monitoring & Evaluation list for E. coli.

Appendix A shows the locations of the relevant W&S segments. Regulation 93 listings 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 cycles. The last Colorado Basin review was in Spring 2018, and the next one is Fall 2022 which will look at the previous 5 years. In May 2023, the assessments from the review will be incorporated in the 303(d) listing process.

Table 20. 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
COUCUCO3_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 COUCUC03 [7] 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."[8]

Table 21 shows the currently adopted numeric temperature standards for the segment COUCUCO3 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 21. 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	24.3
	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	9.0	13.0

In 2021 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 22 and Figure 9).

[7] Colorado Department of Public Health and Environment, Water Quality Control Commission *5 CCR 1002-31*, 01/31/2018.
[8] Colorado Department of Public Health and Environment, Water Quality Control Commission *5 CCR 1002-33*, 12/31/2019.

Table 22. 2021 Temperature stations, responsible agencies, and locations.

Site ID	Description	Segment	Latitu	Longitud	Operato
09058000	COLORADO RIVER NEAR KREMMLING,	4	40.036	-106.4400	USGS
COR-	Colorado River at Pumphouse	5	39.989	-106.5084	BLM
COR-Rad	Colorado River at Radium	5	39.954	-106.55	BLM
UPCO-SB	Upper Colorado River upstream of State	6	39.855	-106.6445	WSSG
09060799	COLORADO RIVER AT CATAMOUNT	6	39.891	-106.8317	USGS
UPCO-DOT	Upper Colorado River upstream of	6	39.647	-107.0629	WSSG
UPCO-RD	Upper Colorado River downstream of	6	39.800	-106.9740	WSSG
09071750	COLORADO RIVER ABOVE GLENWOOD	7	39.558	-107.2909	USGS
BL-abvCOR	Blue River above Colorado Confluence	*NA*	40.033	-106.3924	BLM

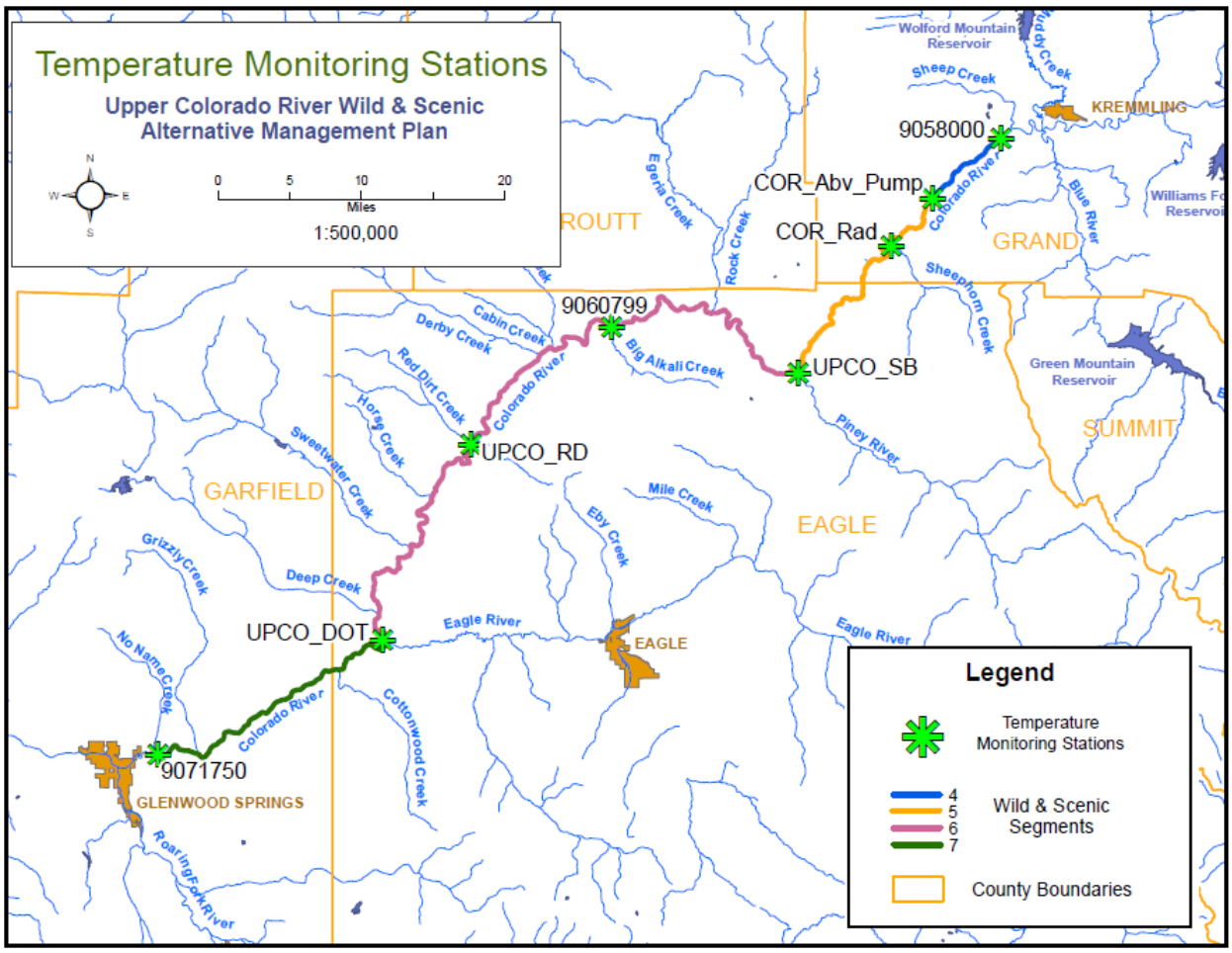


Figure 9. 2021 Time-series temperature monitoring station locations.

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 2021 is shown in Table 23. 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 December 2021.

Table 23. Time-series water temperature data availability from 2012 to 2021 in Segments 4 – 7 (in downstream order).

Site ID	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
9058000	X	X	X	X	X	X	X	X	X	X
COR-Pump	X	X	X	X	X	X		X	X	X
COR-Rad	X	X	X	X	X	X	X	X	X	X
UPCO_SB	X	X	X	X	X			X	X	X
9060799					X	X	X	X	X	X
UPCO_RD		X	X	X	X		X		X	X
UPCO_DOT	X		X	X	X				X	X
9071750	X	X	X	X	X	X	X	X	X	X

In 2021 water temperature data was analyzed by Lotic Hydrological. The 2021 temperature data shows the typical natural downstream warming trend between Kremmling and Glenwood Springs (Figure 10 and Figure 11). 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.

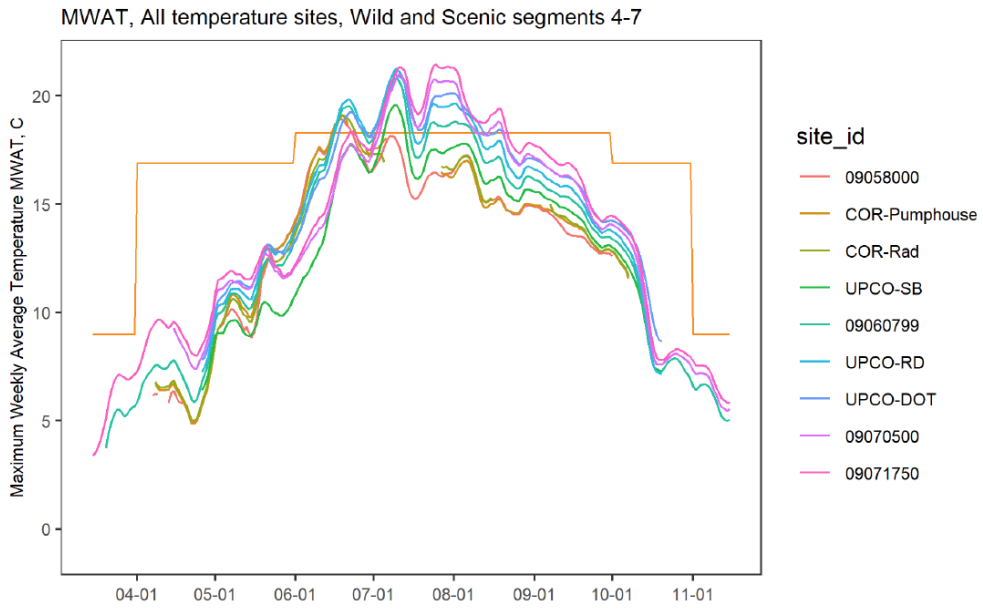


Figure 10. Weekly average temperatures (WAT) in 2021 and the applicable WQCC summer, shoulder, and winter season Maximum Weekly Average Temperature (MWAT) standards.

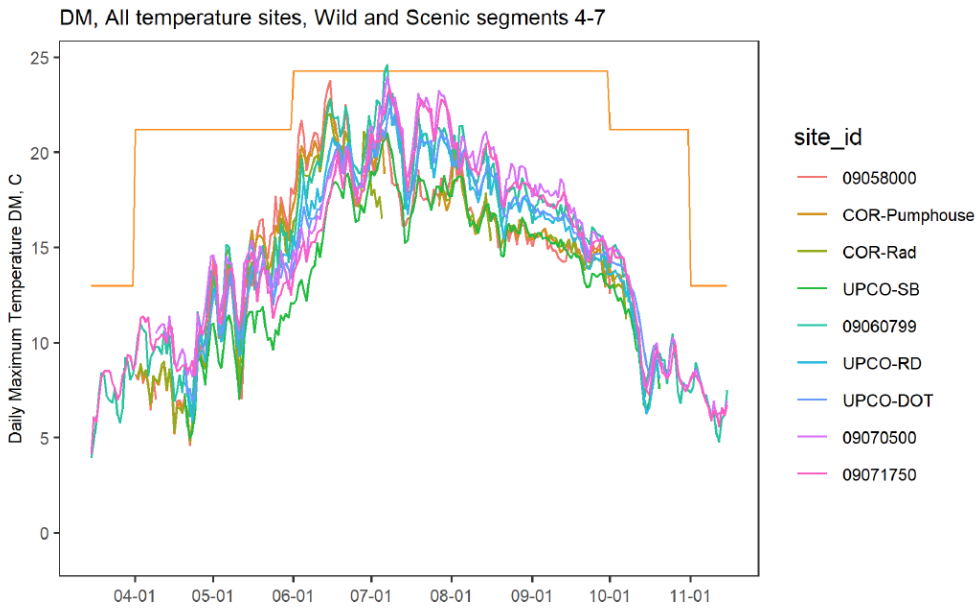


Figure 11. Daily maximum (DM) temperatures in 2021 and applicable WQCC summer, shoulder, and winter season DM standards.

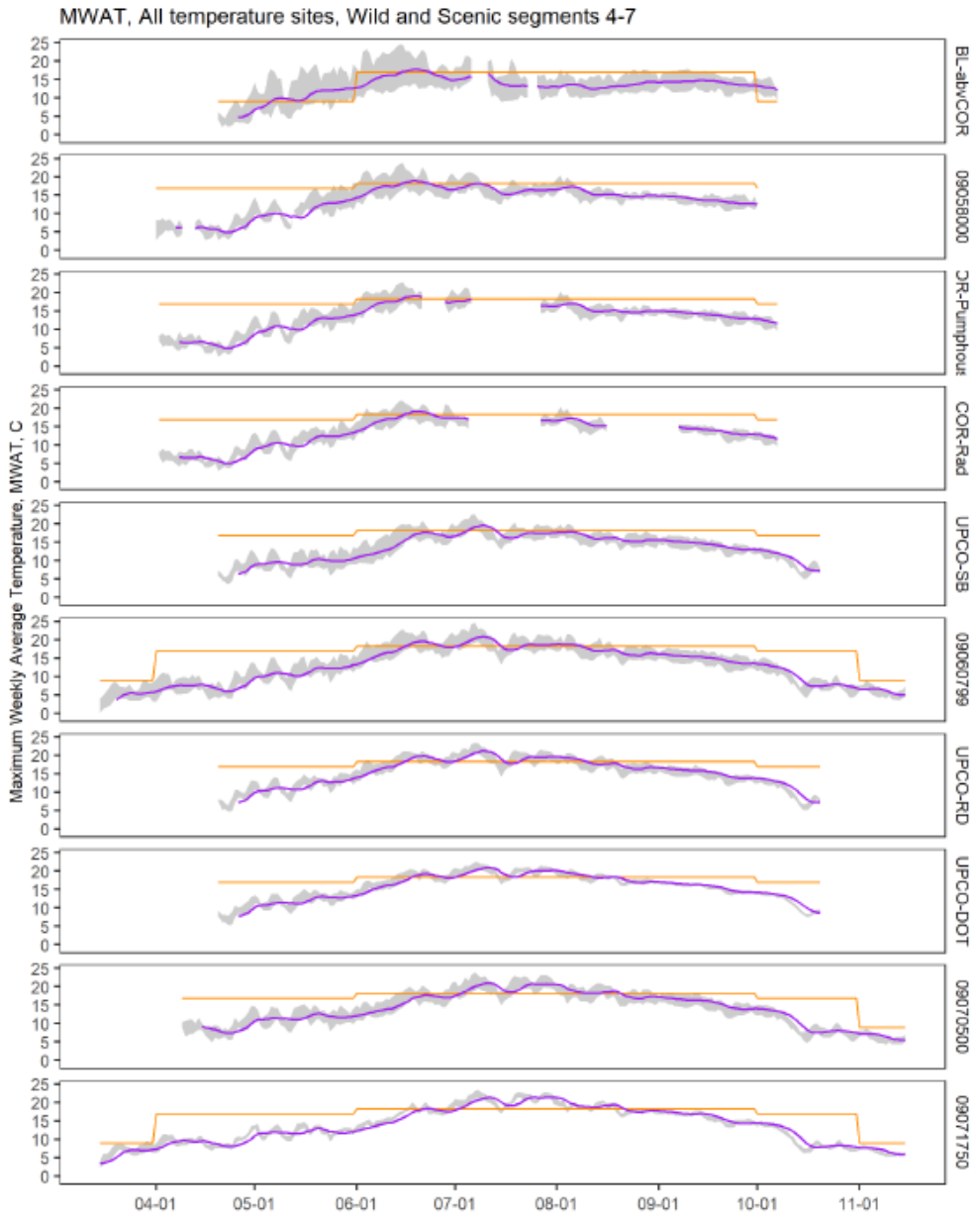


Figure 12. Maximum Weekly Average Temperatures (MWAT) temperatures in 2021 and applicable WQCC standards at all sites.

Based on comparison to State standards[9] one site exceeded the acute (DM) temperature standards in 2021: Catamount (09060799). All sites within the W&S segments exceeded the chronic (MWAT) temperature standards in 2021 (Figure 12). Sites from Catamount (09060799) downstream exceeded it for extended periods of time. Blue River above the Colorado River confluence (BL-abvCOR) exceeded the MWAT standard in May prior to the seasonal standard shift.

[9] 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)

The Blue River had a notable period of standards exceedances in May (Figure 12, 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 2021, a natural runoff ascension and recession pattern was practically absent with reservoir operations holding the Blue River below 100cfs until late June. (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 2021 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 all segments of W&S, and on July 7th CPW issued a voluntary closure because of warm stream temperatures and low flow levels. On July 14th, CPW dropped the voluntary fishing closure between Kremmling and State Bridge, primarily due to upstream reservoir releases. The peak temperatures at all sites occurred in the period from July through August. This period also coincided with relatively sustained warm air temperatures. The peak seasonal temperatures in 2021 occurred on July 9th. MWAT potential exceedance summaries by site for 2013-2021 are shown in Table 24 below.

Table 24. MWAT potential exceedances at W&S temperature sites from 2013 – 2021.

Site	Segme	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
9058000	4	n	y	n	n	n	y	n	n	n	y
COR-Pump	4/5	n	y	n	n	n	n	*	n	n	y
COR-Rad	5	n	y	n	n	n	n	n	n	n	y
UPCO_SB	5/6	n	y	n	n	n	nd	n	n	n	y
9060799	6	nd	nd	nd	nd	nd	y	y	n	n	y
UPCO_RD	6	nd	y	n	y	y	nd	y	n	y	y
UPCO_DOT	6	y	y	n	*	y	nd	nd	n	y	y
9071750	7	y	y	y	y	y	y	y	n	y	y

**Not reported due to data issues such as incomplete record or QAQC 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 2021. The mean Snow Water Equivalent (SWE) value for NRCS remote snowpack monitoring stations in Colorado Basin headwaters peaked at 14.2 inches in April 2021 - approximately 87% of the 30-year median peak of 15.9 inches.[10] With the exception of heavy monsoon events midsummer that triggered landslide events in Glenwood Canyon, the majority of the summer once again experienced a relatively weak monsoon season that brought very little rain and warm air temperatures. At the statewide level, the state Climate Center at CSU ranked the 2021 Water Year as Colorado's 35th driest and 11th warmest year in the 127-year period of record[11]. Due to cumulative effects of very low soil moisture levels from preceding dry years, 2021 runoff and streamflows in the Colorado River headwaters are likely to rank among the lowest on record. Northwest portions of the state had a record hot summer, while northeast Colorado had a record dry one. The Upper Colorado Basin lies between these two regions. 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 the Kremmling gauge had no natural peak this season. During the rising/ascending limb of the spring hydrograph, reservoir operators engaged in fill operations to secure summer storage while senior rights lower in the basin could be met by natural flows from lower tributaries like the Eagle and Roaring Fork. Streamflow rose to approximately 1200 cfs in late April prior to this period. The peak flow for the season of approximately 1280 cfs occurred on July 29th during the period that reservoirs were releasing augmentation water to meet senior calls. 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 2021.

Fishing and Floatboating Additional Use Data

In addition to the intercept surveys conducted for Floatboating and Fishing, the SG retained RRC Associates (RRC) to collect additional data to test other survey methods, better understand use patterns, and assist in determining whether divergences are outside of SG control. Additional data collection efforts included self-reporting kiosks, user group surveys, and displacement surveys as well as processing the BLM's commercial data logs and vehicle counts. These other survey research techniques are all identified in Section III.B.2.a, page 22 of the A&R SG plan as methods to collect relevant experiential and use data to understand the intercept survey results. While these data are not used in calculating the percentage values defined in the ORV Indicator, they provide valuable context for the SG to analyze the factors that potentially affect likelihood to return. Additional details are available in the report prepared by RRC included in the appendix.

User Group Surveys

The User Group survey gathered information from the floatboating community. With assistance from American Whitewater, invitations to participate in this online survey were

[10] https://www.nrcs.usda.gov/wps/portal/nrcs/main/co/snow/

[11] https://www.ncdc.noaa.gov/sotc/national/202013

sent to Colorado members, and the survey was advertised on Mountain Buzz, and sharing the survey link was encouraged among interested boaters. The outreach efforts resulted in 403 responses. While robust, responses to the 2021 survey were down from the 546 surveys obtained in 2019 when the User Group survey was last conducted.

The User Group Survey responses skew heavily toward private boaters, and particularly toward residents in counties closest to the Upper Colorado including Grand, Garfield, Eagle and Summit. The survey includes the same "likelihood to not return" question that represents the ORV indicator from the Intercept survey. In 2021 2% of respondents indicated a 25% or less likelihood to return to the same segment of the Upper Colorado. This compared to 1% in 2019. This metric remains low and overall satisfaction with the river experience was generally positive this season. However, the User Survey includes questions that probe topics like frequency of encounters with other boaters, impacts of encounters, and the overall river experience; these measures have showed some declines in ratings of experience compared to results in 2019. Further, a large number of open-ended comments from respondents provide additional insights related to experiences during the 2021 season.

The User Survey has been identified as a "proof of concept" approach to determining whether this method could be used as a cost-effective means of augmenting data obtained from Intercept Surveys. With respect to this question, User Survey results suggest that a large sample of responses from interested and experienced boaters can be obtained from this type of survey. However, the skew toward private boaters, and especially those that live proximate to the river, limit the application of results to describing all boaters. Nevertheless, these results do provide a large body of survey input from boaters that are experienced and knowledgeable about the Upper Colorado, and their input on experiences represent a source of information on conditions at a point in time, e.g. summer 2021.

Self-Reporting Kiosk Surveys

Kiosk survey data was collection was continued in 2021 to further evaluate the "proof of concept" of whether self-administered surveys at selected take-outs could provide a cost-effective means of augmenting or relacing intercept surveying in the future. Results from 2021 suggest that kiosks are not a viable data collection technique for the Upper Colorado. One kiosk was vandalized in 2021 (Dotsero) and the other three locations that were used in 2021 (Radium, Catamount and Pinball) resulted in less than 15 completed forms each over the entire summer. Surveys were damaged, and attention to the survey questions was poor resulting in data that was not comparable to what was received from the Intercept surveys and was generally unusable. RRC has recommended not to use this survey collection method in the future.

Outfitter Surveys

No Outfitter Surveys were conducted in 2021.

Wade Fishing Surveys—Special Angler Survey

A form designed to collect information from wade anglers hiking into Gore Canyon above Pumphouse was again administered in 2021. These forms were contained in a metal kiosk

set on the hiking trail in a visible location. This kiosk has been in place for a number of years and was not constructed by RRC or the W&S Stakeholders. The self-administered paper form at the Pumphouse site resulted in a cross-section of responses from anglers and hikers. Results from this survey were tabulated by RRC and are available upon request.

Commercial Log Data

RRC tabulated 2021 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 11 sites during the 2021 season. A map showing these site locations is included in Appendix D. RRC compiled and analyzed the results from 2021. Vehicle counters were monitored and downloaded by BLM periodically from May through October. The 2021 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 2021, as in prior years, USFS and participating outfitters supported interviews of river users in Segment 7 by USFS River Rangers. However, in 2021 the River Ranger program was largely curtailed by the landslides that occurred in Glenwood Canyon. Daily tabulations of boaters were recorded including observations of user patterns at the sites, but these data were collected on a very limited number of days in 2021. Data from 2021 were compiled by RRC and along with data from previous years, 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.

The Resource Guides for macroinvertebrates, which includes sampling for macroinvertebrates every other year starting in 2021, subject to funding, are the Colorado WQCC aquatic life standards for water quality. The 2021 Bioassessment study was conducted using an approach consistent with CDPHE's Aquatic Life Bioassessment methodology (assessment methodology).[12] 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 45.2 and 33.7, 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 69 in 2021.

2021 Biomonitoring

As per the sampling and analysis protocol, during October 2021 Timberline Aquatics, Inc. collected macroinvertebrate samples at five sites in the segments from Pumphouse to below Sweetwater[13] (

Table **25**, Figure 13). 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 2021, MMI scores (Table 26) 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 2019. In their full 2021 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

[12] 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.

[13] In 2022, the Monitoring Committee elected to change the name of the macroinvertebrate monitoring site to better correlate to its actual location and reduce confusion in relation to the stream temperature monitoring site.

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 the full Bioassessment report from Timberline Aquatics for an explanation of these additional metrics.[14]

Table 25. 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-bSW	Colorado River below Sweetwater[15]	39.70996	-107.047	1914

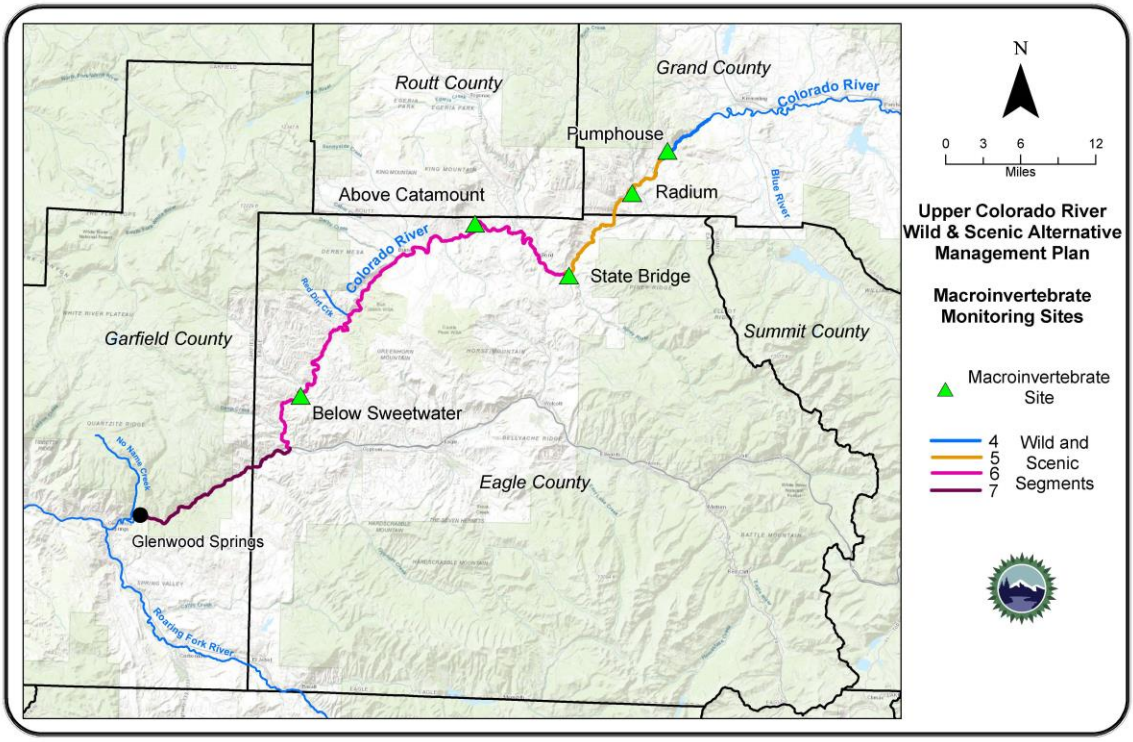


Figure 13. Bioassessment monitoring site locations.

[14] Rees, D., and Fenske, K., 2022. *Benthic Macroinvertebrate Biomonitoring Study, Upper Colorado River, 2021*, Timberline Aquatics, Inc.

[15] In 2022, the Monitoring Committee elected to change the name of the macroinvertebrate monitoring site from Below Red Dirt to Below Sweetwater to better correlate to its actual location and reduce confusion in relation to the stream temperature monitoring site at Below Red Dirt.

Table 26. Individual metrics and MMI v4 scores from benthic macroinvertebrate samples collected in the Colorado River Wild & Scenic study area during October 2021. All metric scores based on MMI v4 subsampling process.

Metric	Station ID				
	CR-PH	CR-Rad	CR-SB	CR-aC	CR-bSW
EPT taxa	79.6	78.4	90.8	82.6	95.3
% Non-Insect individuals	96.2	97.6	96.9	97.0	96.7
% EPT individuals, no *Baetidae*	53.2	47.5	84.0	64.8	26.5
% *Coleoptera* individuals	5.5	3.1	22.3	10.7	18.1
% Intolerant Taxa	87.5	93.4	89.1	73.3	71.9
% Increasers, Mid-Elevation	97.5	98.8	100.0	100.0	98.7
Clinger taxa	87.0	87.7	100.0	90.8	98.1
Predator/Shredder taxa	64.3	50.0	71.4	42.9	57.1
MMI	**71.4**	**69.5**	**81.8**	**70.2**	**70.3**
	Auxiliary Metrics				
Diversity	2.90	3.02	3.65	3.18	2.56
HBI	3.86	4.08	2.80	3.66	4.64

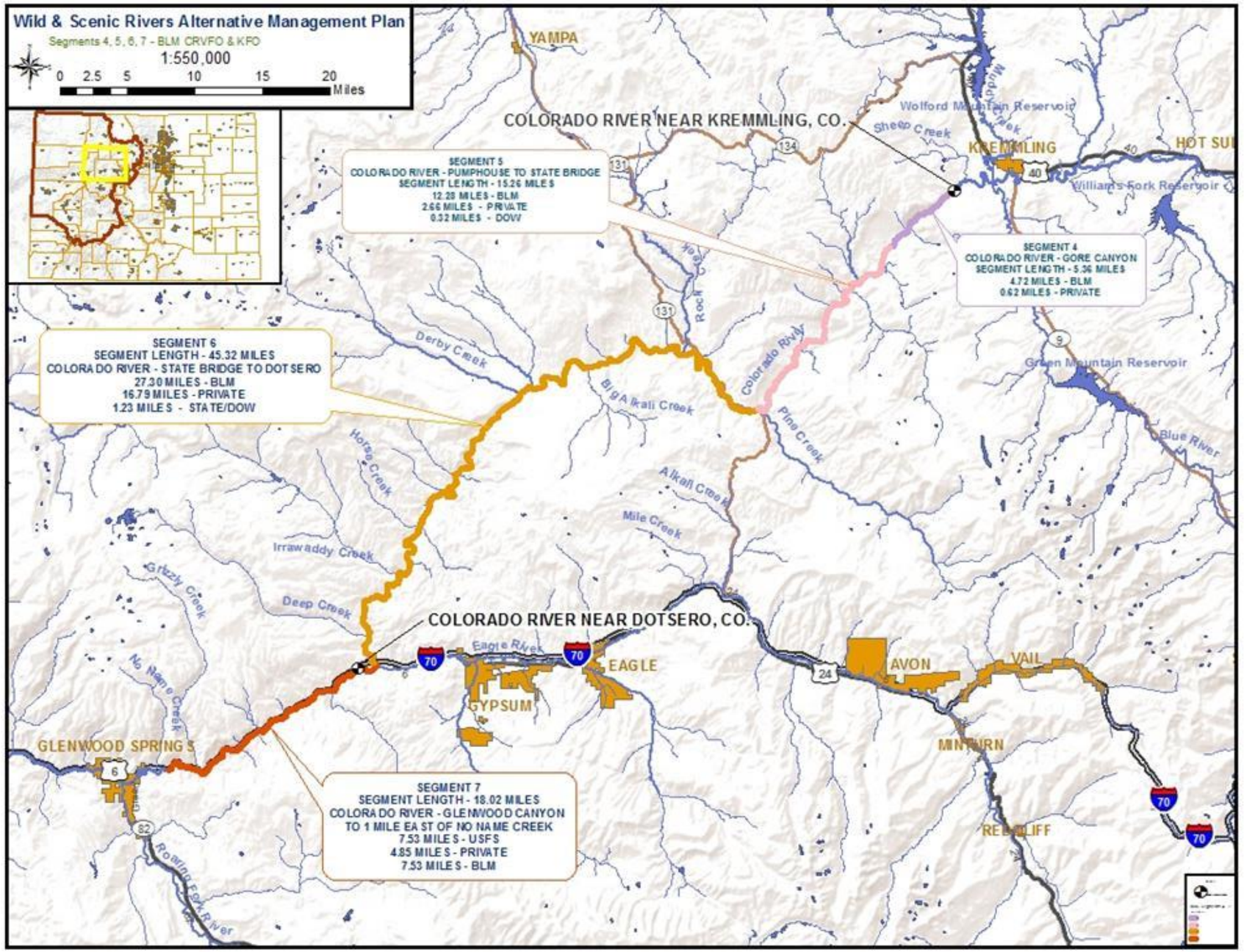
2022 Monitoring Plan

The SG approved its fiscal year 2022 Monitoring Plan at the March 2022 SG meeting. The 2022 Monitoring Plan is attached as Appendix E. This year's monitoring plan includes provisions for intercept surveys, commercial data logs, monitoring for water temperature, streamflows, and assessment of data collected by others.

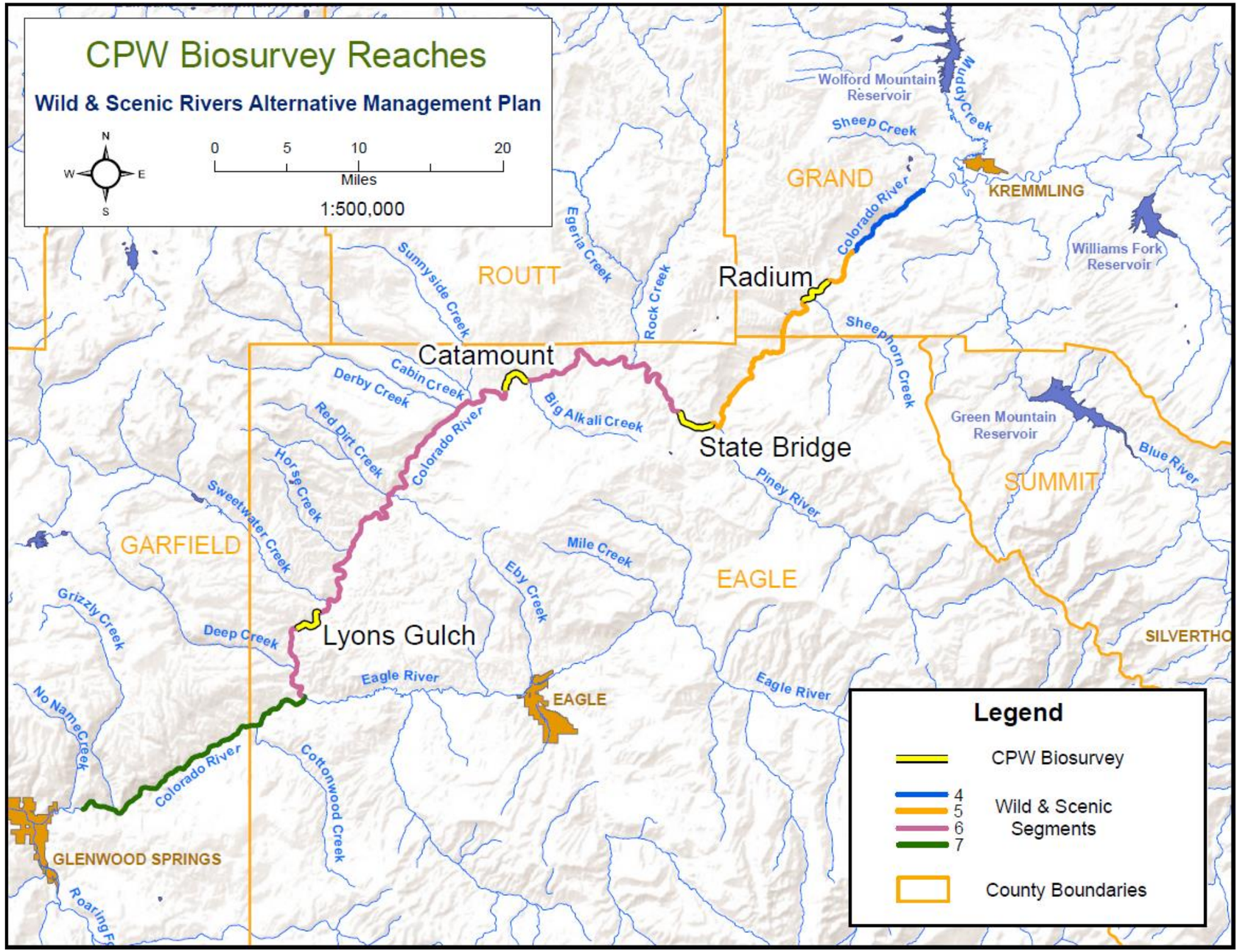
Appendices

Appendix A: Project Area Map
Appendix B: CPW Biosurvey Sample Sites
Appendix C: Monitoring by Other Entities
Appendix D: RRC Selected Summary Graphs
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: RRC Selected Summary Graphs

Intercept Survey Overview

Sample Size by Location and Year/Year Type - Boater Intercept Survey

		2021 - Driest	2019 - Wettest	2018 - Dry Typical (Seg. 4-6)	2018 - Driest (Seg. 7)	2015 - Wettest	2014 - Wettest	2013 - Dry Typical
Segment 5	Radium	586	307	137		125	445	466
	State Bridge	174	60	119		342	537	402
	Total	**760**	**367**	**256**		**467**	**982**	**868**
Segment 6	Catamount	44	8			15	9	
	Two Bridges	289	190	77		8		
	Dotsero	159	108	124		57		
	Total	**492**	**306**	**201**		**80**	**9**	
Segment 7	Grizzly Creek	36			5	102	68	175
	Two Rivers	179	263		313	52	125	
	Total	**215**	**263**		**318**	**154**	**193**	**175**
Grand Total		**1,474**	**936**	**457**	**318**	**701**	**1,185**	**1,043**

Source: RRC Associates

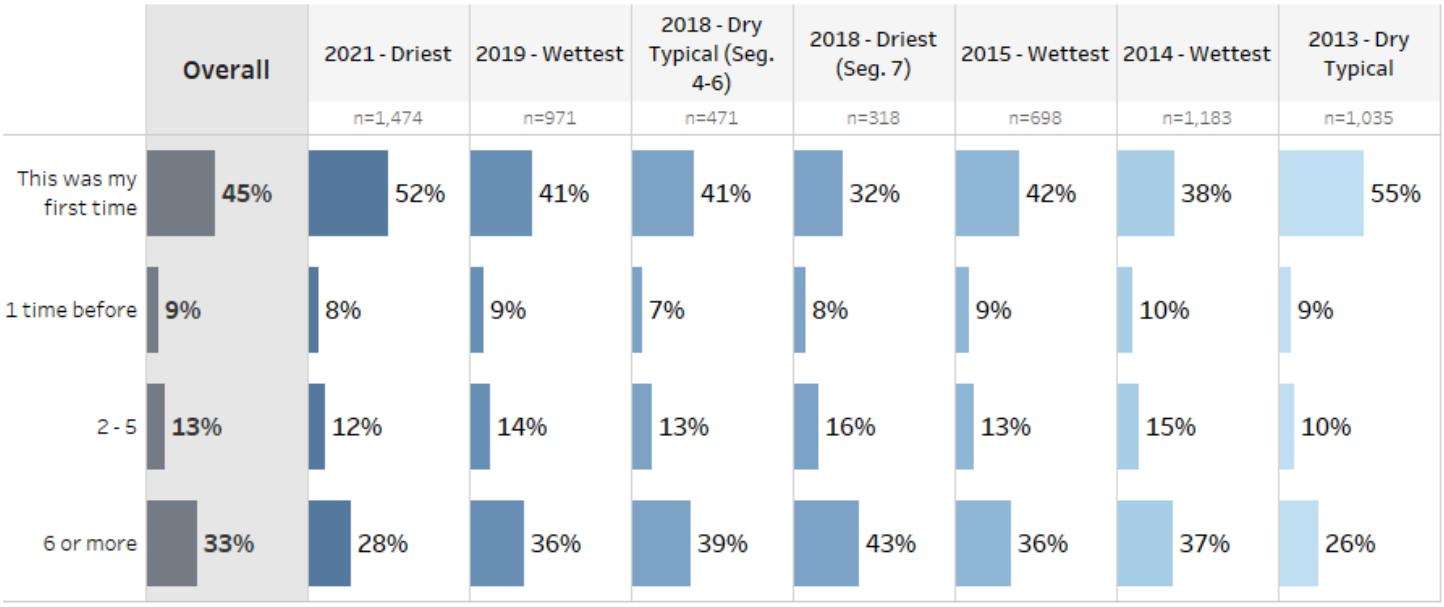
Note: Sample sizes vary slightly by question – not all respondents answer all questions.

Were you boating with a commercial company, outfitter or guide today?

	Overall	2021 - Driest	2019 - Wettest	2018 - Dry Typical (Seg. 4-6)	2018 - Driest (Seg. 7)	2015 - Wettest	2014 - Wettest	2013 - Dry Typical
	n=1,481	n=974	n=468	n=317	n=698	n=1,174	n=1,034	
No	**53%**	45%	61%	59%	66%	54%	55%	48%
Yes	**47%**	55%	39%	41%	34%	46%	45%	52%

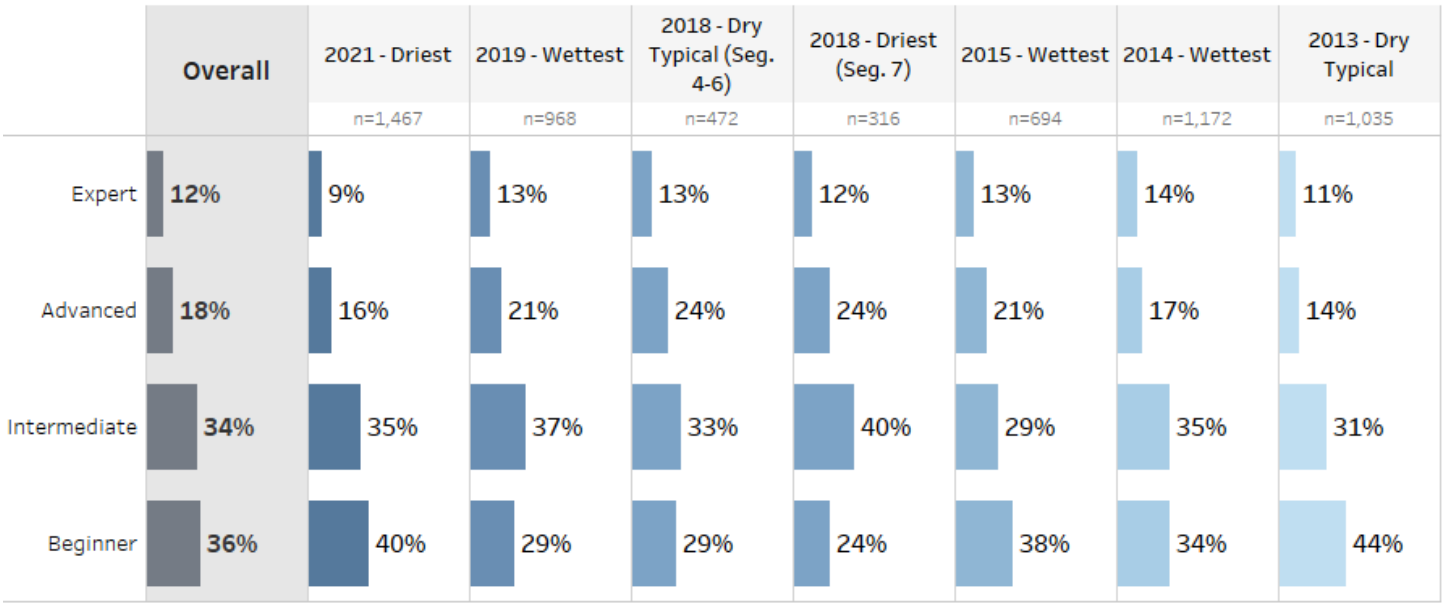
Source: RRC Associates

Prior to today, how many times have you floated this section of river?



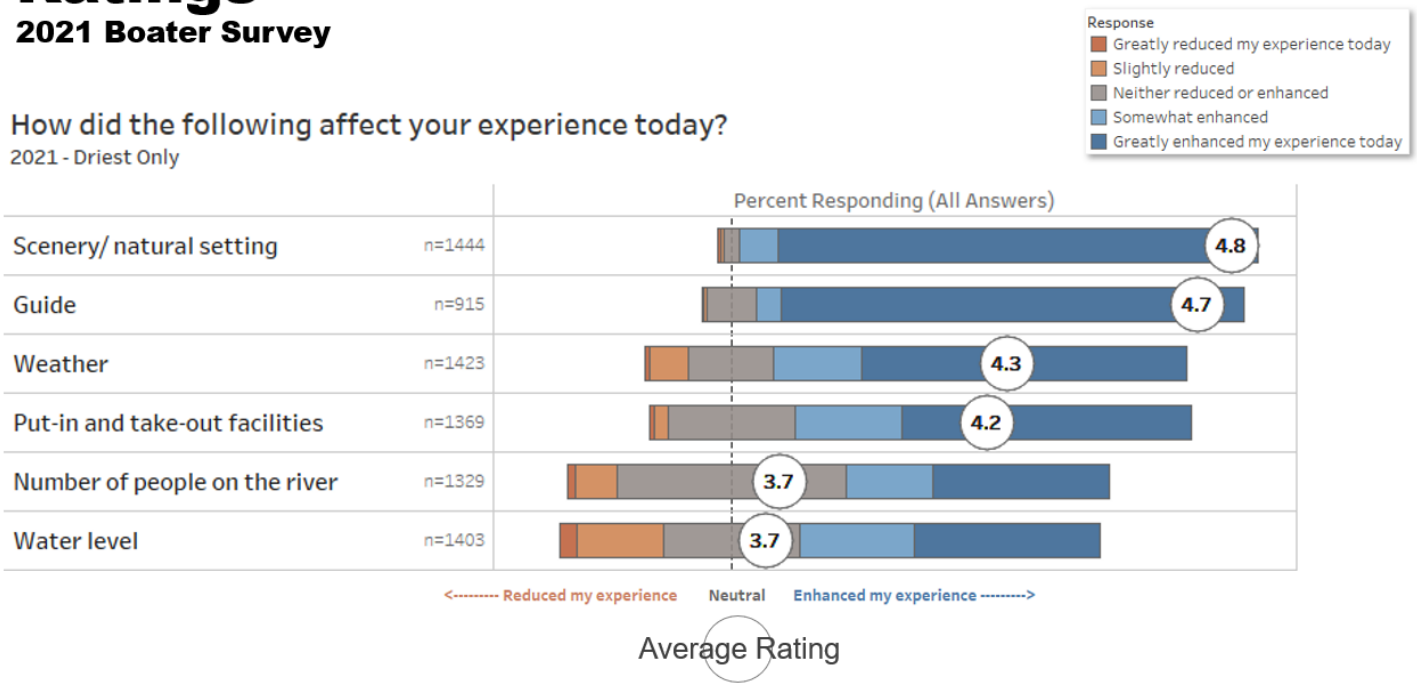
Source: RRC Associates

Please rate your boating skill level on the type of craft you were in today?

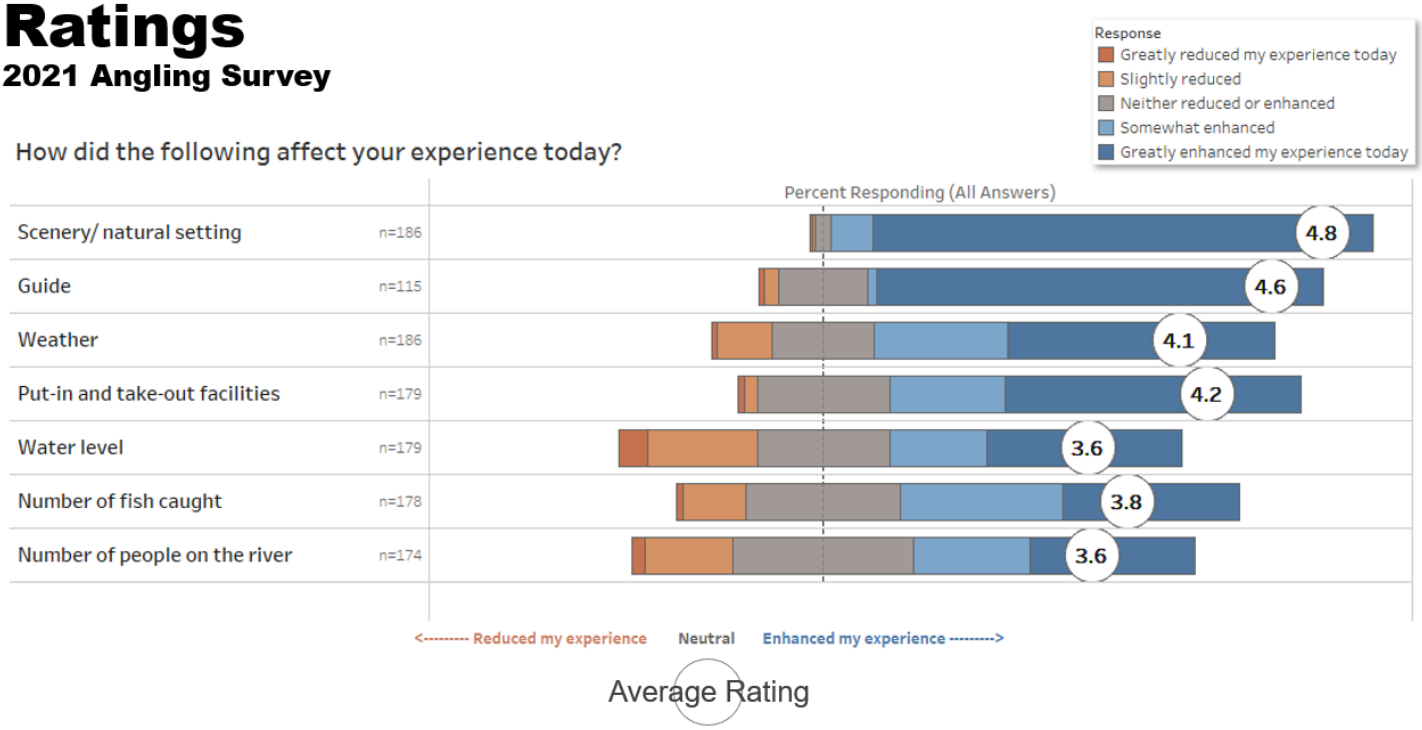


Source: RRC Associates

Ratings
2021 Boater Survey



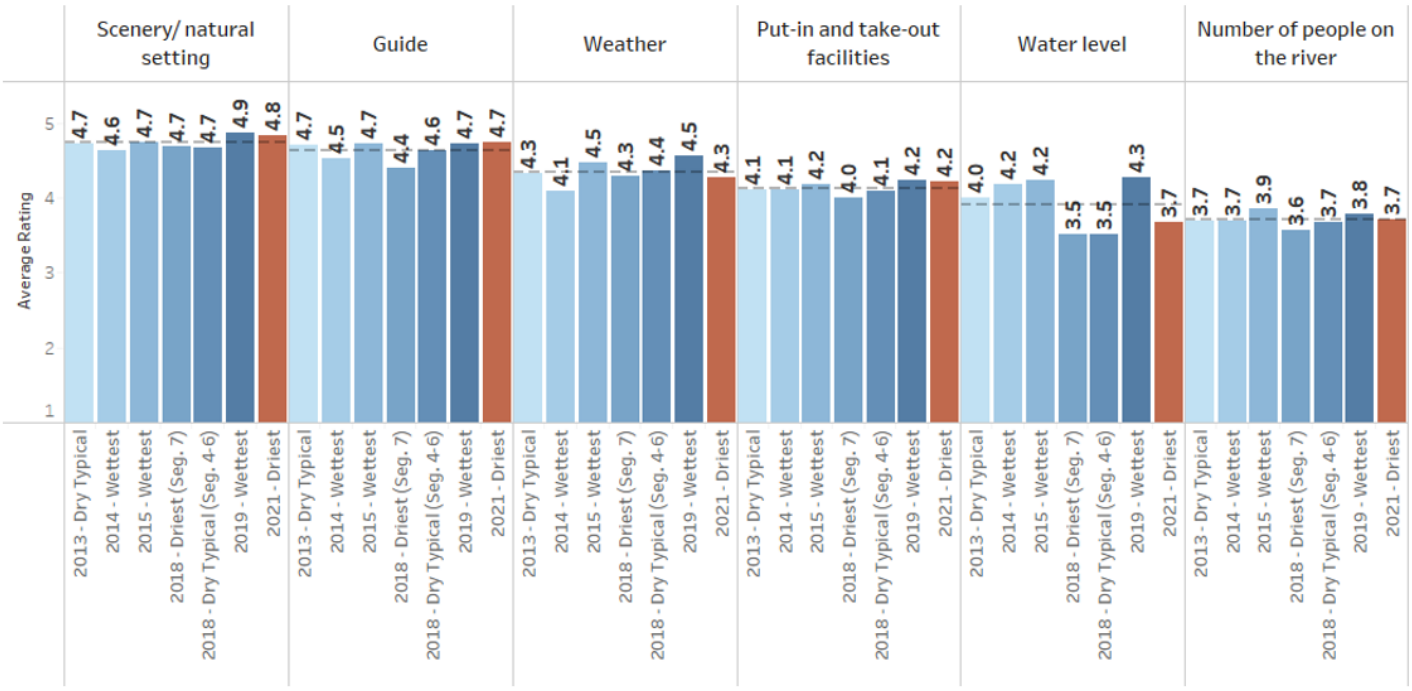
Ratings
2021 Angling Survey



Ratings

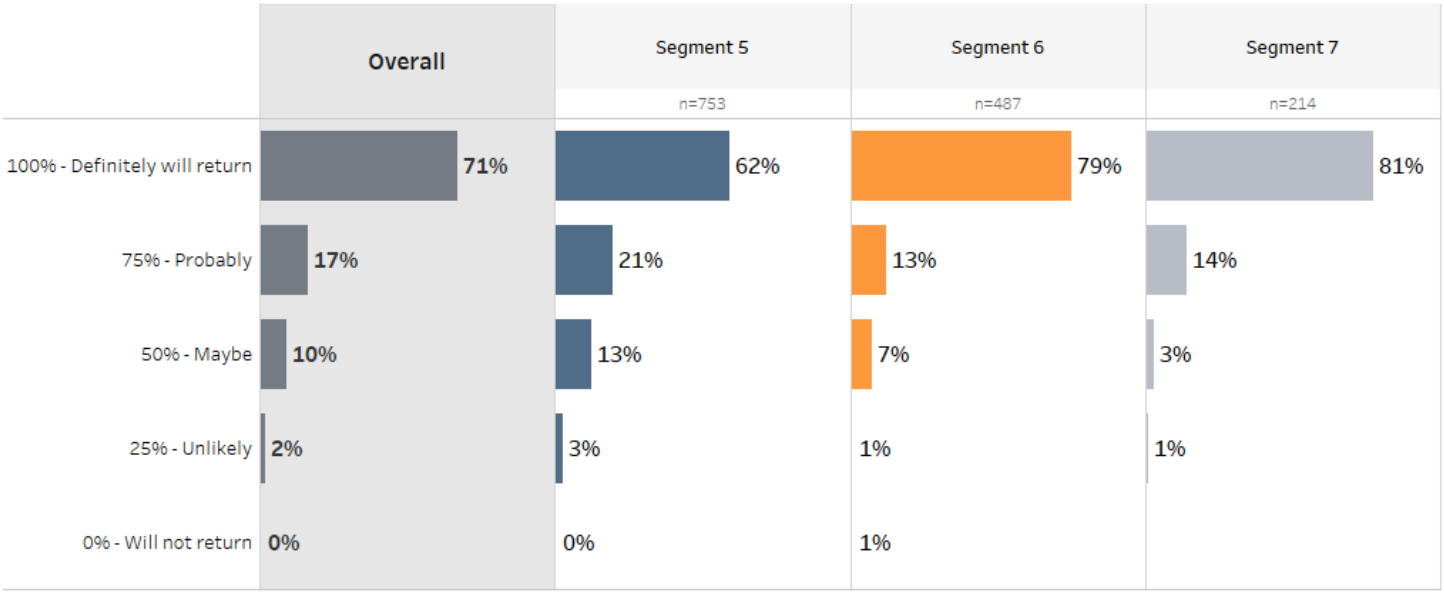
All Years Boater Survey

How did the following affect your experience today?



Based on your experience today, how likely are you to return to this section of river?

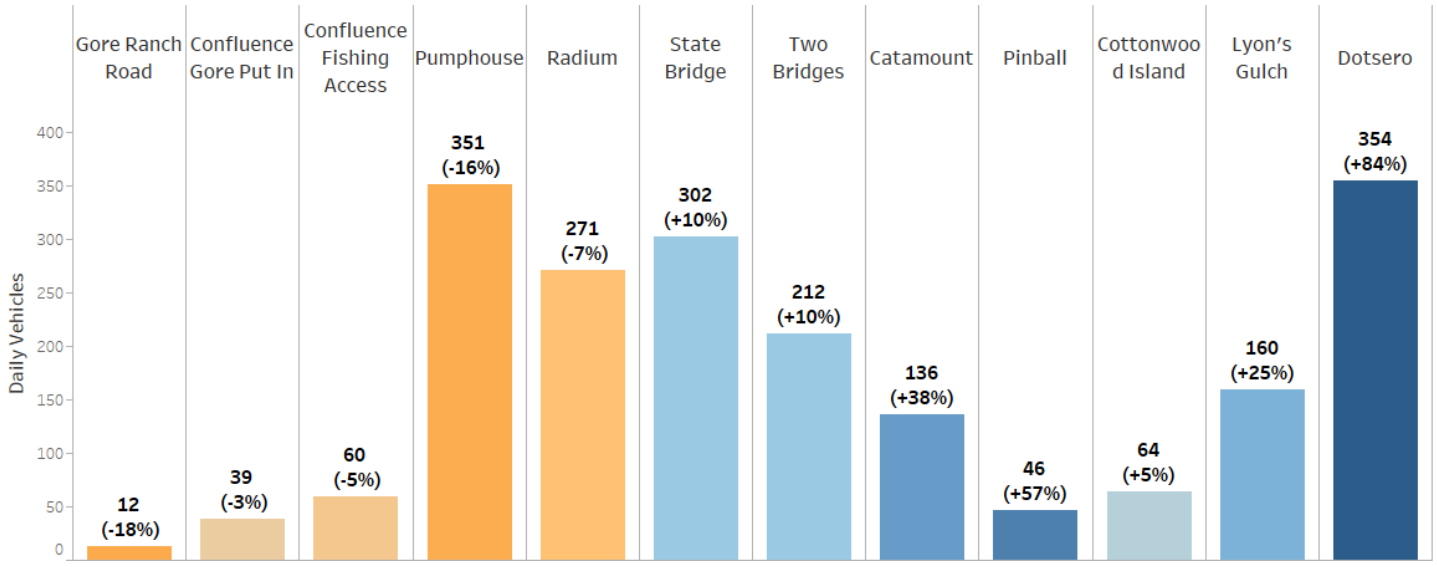
2021 by Segment



Source: RRC Associates

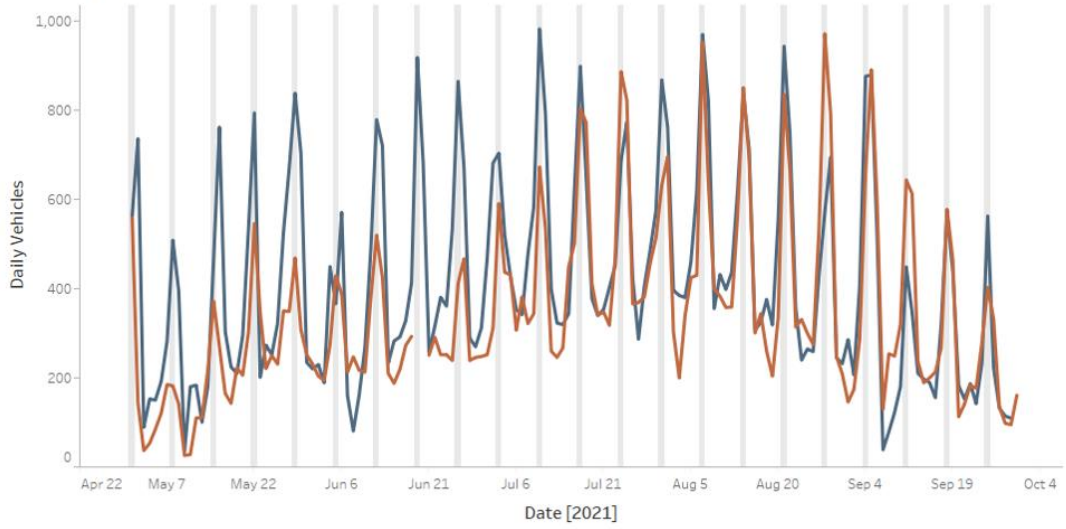
Vehicle Counter Data

Average Daily Vehicles
May 1 - September 30, 2021



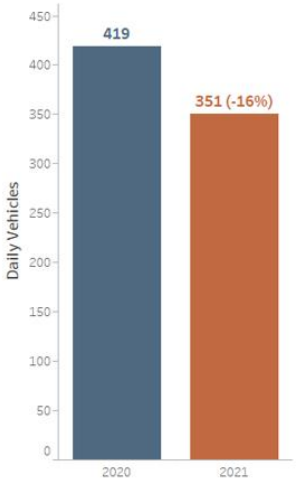
Traffic Counter Data - Pumphouse

Pumphouse Vehicle Counts by Day
May 1 - September 30

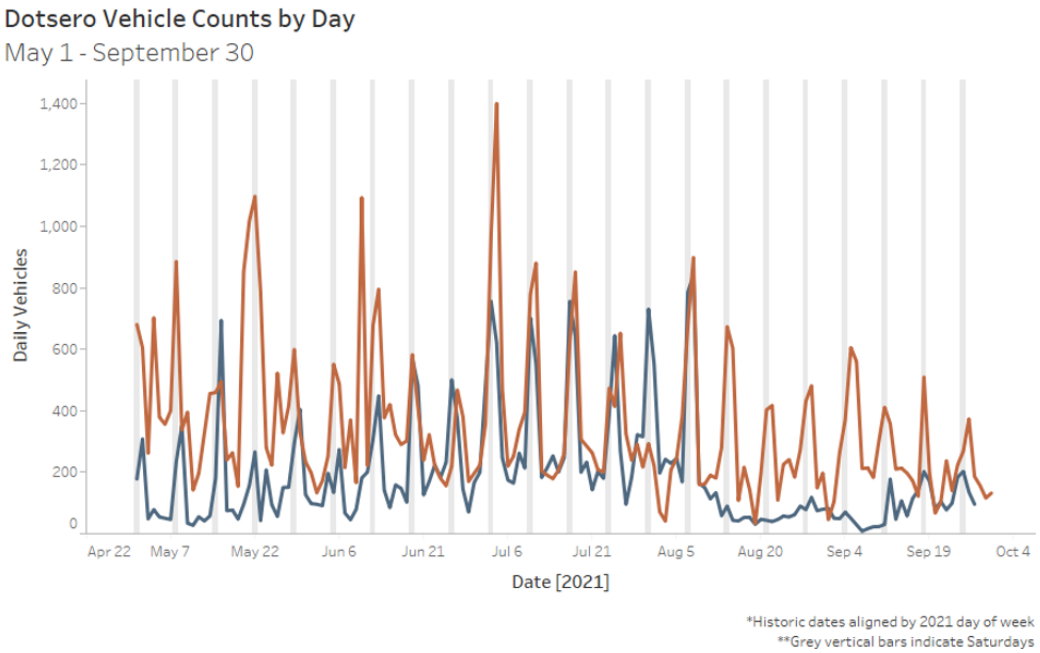


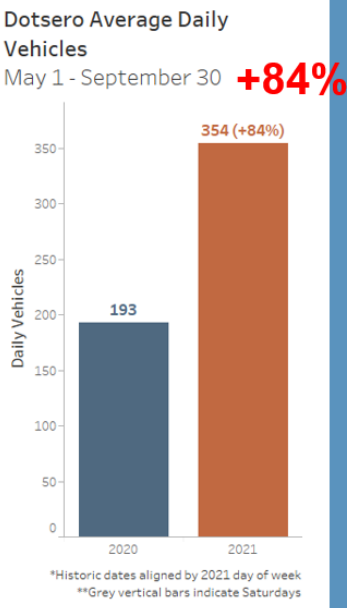
*Historic dates aligned by 2021 day of week
**Grey vertical bars indicate Saturdays

Pumphouse Average Daily Vehicles
May 1 - September 30 **-16%**



Traffic Counter Data – Dotsero





Displacement Survey

How likely are you to return to the Upper Colorado River in the future?

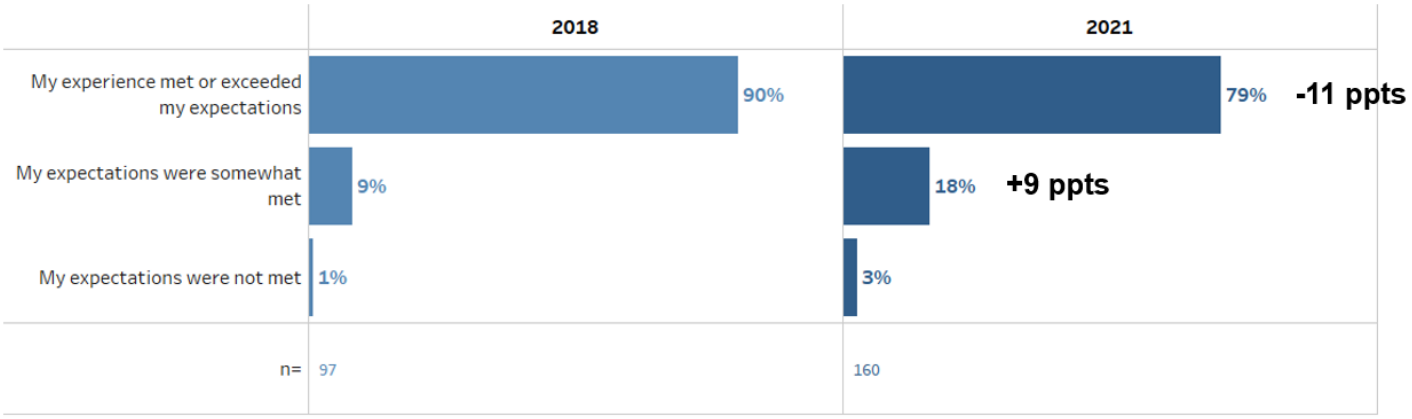
	2018	2021
100% - Definitely will return	81%	81%
75% - Probably	7%	12%
50% - Maybe	8%	5%
25% - Unlikely	4%	2%
0% - Will not return	1%	1%
n=	103	170

How likely are you to return to the same section of the the Upper Colorado River where you were interviewed in the future?

	2018	2021
100% - Definitely will return	74%	79%
75% - Probably	11%	13%
50% - Maybe	10%	5%
25% - Unlikely	4%	3%
0% - Will not return	1%	
n=	100	149

Source: RRC Associates

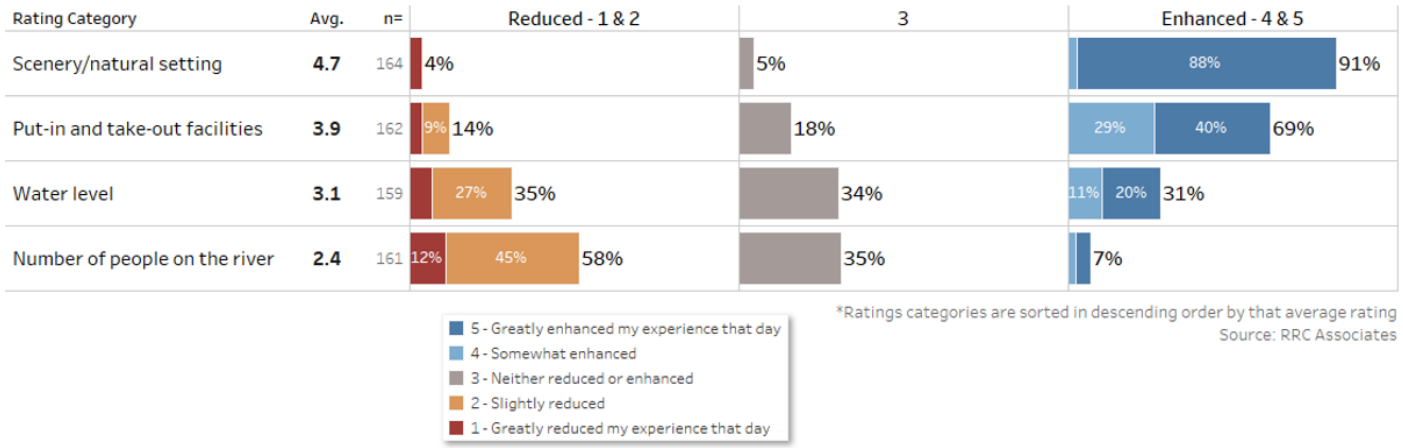
Thinking back to that most recent trip on the Upper Colorado River, to what extent did your experience meet your expectations?



Source: RRC Associates

How did the following affect your experience on the Upper Colorado River?

2021 Only

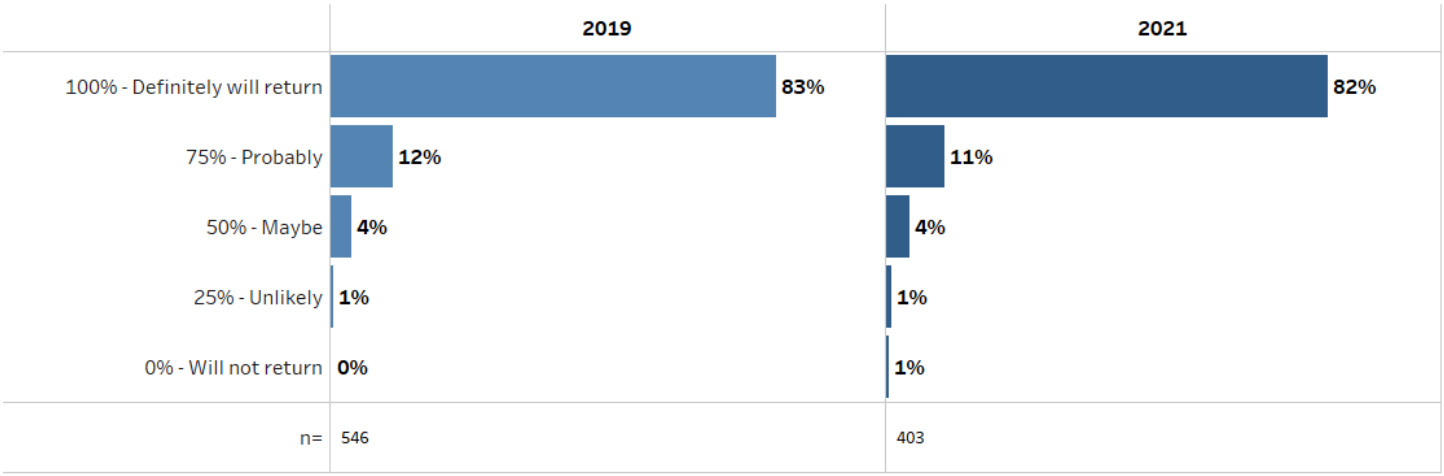


*Ratings categories are sorted in descending order by that average rating

Source: RRC Associates

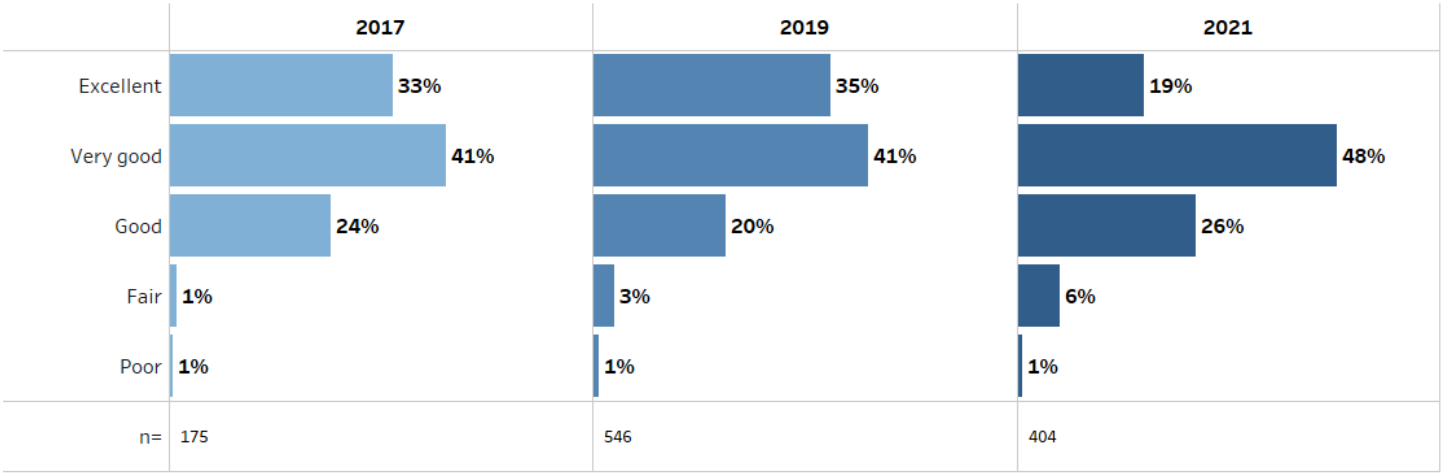
User Survey – Preliminary Results

Q 25: Based on your experience that day, how likely would you be to return to that section of river in the future?



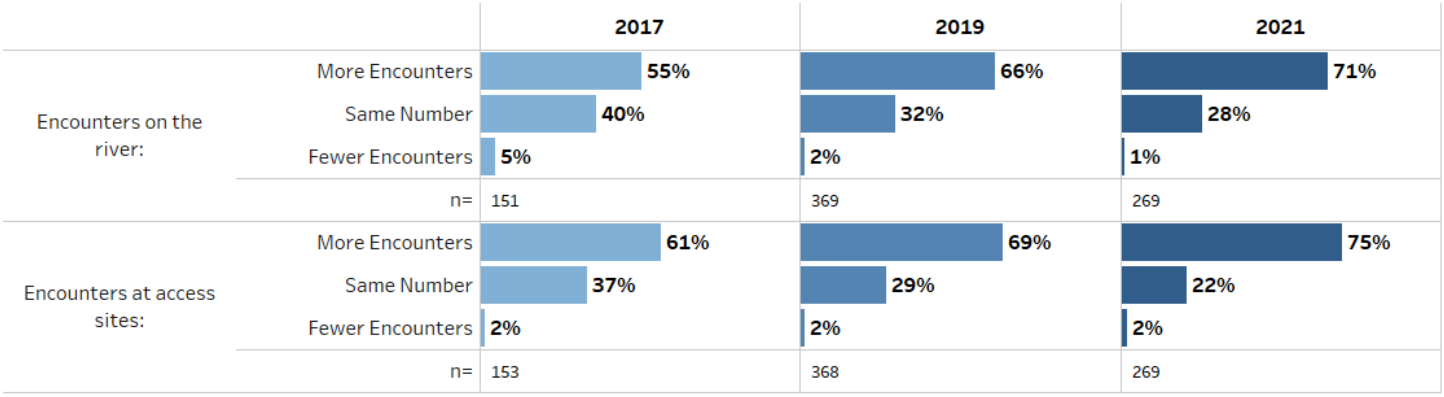
Source: RRC Associates

Q 22: How would you rate your OVERALL experience on your most recent Upper Colorado River boating trip?



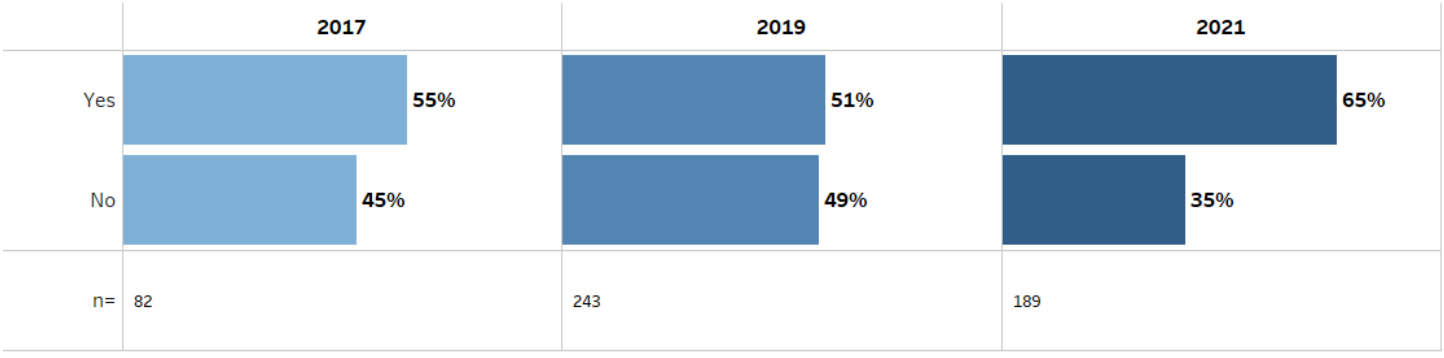
Source: RRC Associates

Q 38: How would you describe the number of encounters you've had with other river users over time at the following locations?



Source: RRC Associates

Q 39: You indicated that you experienced more encounters on the river over time. Would you say that changes your overall enjoyment of the experience?



Source: RRC Associates

APPENDIX E: 2022 Monitoring Plan

The Wild & Scenic Monitoring Committee (the Committee) has developed this proposal for 2022 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 intercept surveys, stream temperature monitoring, and in-kind contributions.

Recreation Monitoring

For 2022, RRC Associates has submitted a $51,700 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, 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 2022. Details of the proposed RRC program are shown in the table below.

Summary of 2022 RRC Program

	2021 (Completed)	2022 (Proposed)
Data Collection		
Intercept Surveys / Observational Data Collection	$28,000	$35,000
Displacement Surveys	$3,000	N/A
Self-reporting Kiosk Data Collection	$3,000	N/A
User Group Surveys	$3,000	N/A
Commercial Data Logs	$3,000	$3,000
Vehicle Counters*	$3,500	$2,000
User Day Information	N/A	N/A
Data Processing, Consolidation, and Management**		
Database Management	$2,500	$3,000
Warehousing of SG Data	$2,500	$2,000

Stakeholder Support**		
Committee Participation & Attendance	$6,000	$6,700
TOTAL:	**$54,500**	**$51,700**

*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 2022, which includes three time-series temperature loggers deployed at established study sites (highlighted in orange in the table 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 2022. 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 the table 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 the table below.

Stream temperature locations for 2022

Site ID	Station Description	Collecting / Data Storage Agencies	Latitude	Longitude
UPCO_DOT	Upper Colorado River above Dotsero	W&S/GCWIN	39.647917	-107.062861
UPCO_RD	Upper Colorado River below Red Dirt Creek	W&S/GCWIN	39.800583	-106.974028
UPCO_SB	Upper Colorado River above State Bridge	W&S/GCWIN	39.855556	-106.644528
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 at Catamount Bridge, 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 the table

below. Consistent with the long-term monitoring plan, the Committee anticipates contracting with Timberline Associates to conduct macroinvertebrate sampling in 2023.

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 (CMF) Monitoring Plan Implementation

During 2022, the CMF Work Group will continue to fine tune the Channel Maintenance Flow Observational Monitoring Plan. The SG is planning three field trips during 2022 and requests $5,000. Data collection is anticipated to start during fall 2023.

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.

2022 Monitoring Plan – Cost Summary

The proposed monitoring plan for 2022 will cost $59,360. The breakdown for each element is shown in the table below. In-kind contributions related to stream temperature and hydrology and flow-related monitoring are shown in the table below.

Monitoring budget for 2022

Category	2022 Cost
Recreation Monitoring (RRC Associates)	$51,700
Stream Temperature	
- Data analysis at 9 sites (Lotic Hydrological)	$700
- Monitoring of 3 W&S temp sites (GCWIN)	$1,435
- GCWIN membership dues	$525
Macroinvertebrate Monitoring	$0
Channel Maintenance Flows	
- CMF Monitoring Plan Implementation	$5,000
TOTAL:	**$59,360**

Monitoring in-kind contributions for 2022/2023

Category	2022 In-Kind
Stream Temperature	
- USGS stream temperature gage at Kremmling (River District)	$2,276

- BLM stream temperature gages (3 sites)	Donated staff time
- Grand County stream temperature weekly analysis	Donated staff time
Hydrology & Flow-Related Monitoring	
- USGS stream gages at Kremmling and Catamount (River District & BLM)	$17,829
- Cross section and pebble counts (USFS/USGS)	$4,907
TOTAL:	**$25,012**