Annual Monitoring Report

2022

Prepared in accordance with the
Upper Colorado River Wild & Scenic Stakeholders
Management Plan
FINAL

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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) 2022, from April 1, 2022 to March 31, 2023. 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 2022 year type for Segments 4-6 was Wet Typical while Segment 7 was Dry Typical.

During 2022, 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 late June and early July of 2022, various actions were taken by W&S Stakeholders in response to high stream temperatures and low streamflow.

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 2022, there was sufficient information to set the ORV Indicator values for Segment 5 in the wet typical year type and to evaluate the annual values for Segment 7 dry typical 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 2022 in Segment 7. The Not Likely to Return values of Segments 5 and 6 were compared to interim percentage values for informational purposes only. The percentage of people not likely to return in Segments 5 and 6 did not exceed the interim percentage values.

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). CPW performed biosurveys at State Bridge (Segment 6) in 2022, and the results indicate that both Quality Trout and Biomass exceeded the identified thresholds at this reach. State Bridge and Catamount will be surveyed in 2023. The 2022 intercept survey data collected by RRC indicates that CPUE at Radium fell short of the threshold value.

The 2022 monitoring results in relation to Recreational Fishing ORV indicators are summarized in Table 1, below.

Table 1. Summary of ORV Indicators in 2022.

ORV Indicator	Measure/Metric	2022 Status
Recreational Floatboating	Not likely to return	Met
Recreational Fishing	Biomass	Met
	Quality Trout	Met
	CPUE	Met, divergence at Radium in 2022

The SG also monitored the Resource Guides in 2022. Flows were within range for boatable floatboating days on Segment 7 and for the 700-1300 cfs and 4000-7400 cfs Opportunity ranges on Segments 5 and 6. For Segments 5 and 6, Boatable Days were below range for the 1300-4000 cfs Opportunities. There were 28 early-season boatable days. The 2022 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 2022, streamflow never exceeded 2,500 cfs and the instantaneous peak of 1,650 cfs occurred on June 14, 2022. The flushing flow resource guide was met for the 10-year period as it occurred in six of the ten years.

All sites within the W&S segments exceeded the chronic (MWAT) temperature standards in 2022. All sites from State Bridge downstream exceeded it for one or multiple weeks. The lower Blue River above the Colorado River confluence (BL-abvCOR) had a notable period of standards exceedances in May prior to the shift to summer standards. 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 developed RFPS and continued working on the 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 2022.

ORV Resource Guides	Measure/Metric	2022 Status
Recreational Floatboating	Boatable Days	Within range for 700-1300cfs and 4000-7400cfss Opportunities. Below range for 1300-4000cfs Opportunities Within range for all Opportunities in Segment 7
Recreational Floatboating	Early-Season Boatable Days	Within or above 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 2022, but flushing flows did occur based on a 10-year average
Recreational Fishing	Channel Maintenance Monitoring	CMF Monitoring Plan was refined in 2022 and RFPs were developed for Drones, Cross-Sectional Surveys and Substrate measures.
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	Per the 2019 Long-Term Macroinvertebrate Sampling and Analysis Protocol, sampling of macroinvertebrates will occur every other year. Because macroinvertebrate sampling was performed in 2021, it was not done in 2022.
Water Temperature	Daily Maximum (DM)	No exceedances.
	Maximum Weekly Average Temperature (MWAT)	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

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

through 2), which includes over 80 miles of the upper Colorado River (See Appendix A: Project Area Map). The purpose of the SG Plan is to "balance permanent protection of the ORVs, certainty for the Upper Colorado River Wild & Scenic Stakeholders (SG or "stakeholders"), water project yield, and flexibility for water users." The SG Plan includes provisions for protection of the ORVs and monitoring of the ORV Indicators and Resource Guides to assist in implementation of the SG Plan. In June of 2020, the 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.).

[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).*

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

Purpose

The purpose of this report is to provide a summary of monitoring activities and cooperative measures conducted by the SG in 2022. 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 2022 monitoring year began on April 1, 2022, and ended March 31, 2023.

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 2022 (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 2022 W&S Year.

All three hydrographs and all subsequent analyses use USGS data available as of January 19, 2023.

Table 3. USGS gages operated in Segments 4, 6, and 7 in 2022.

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

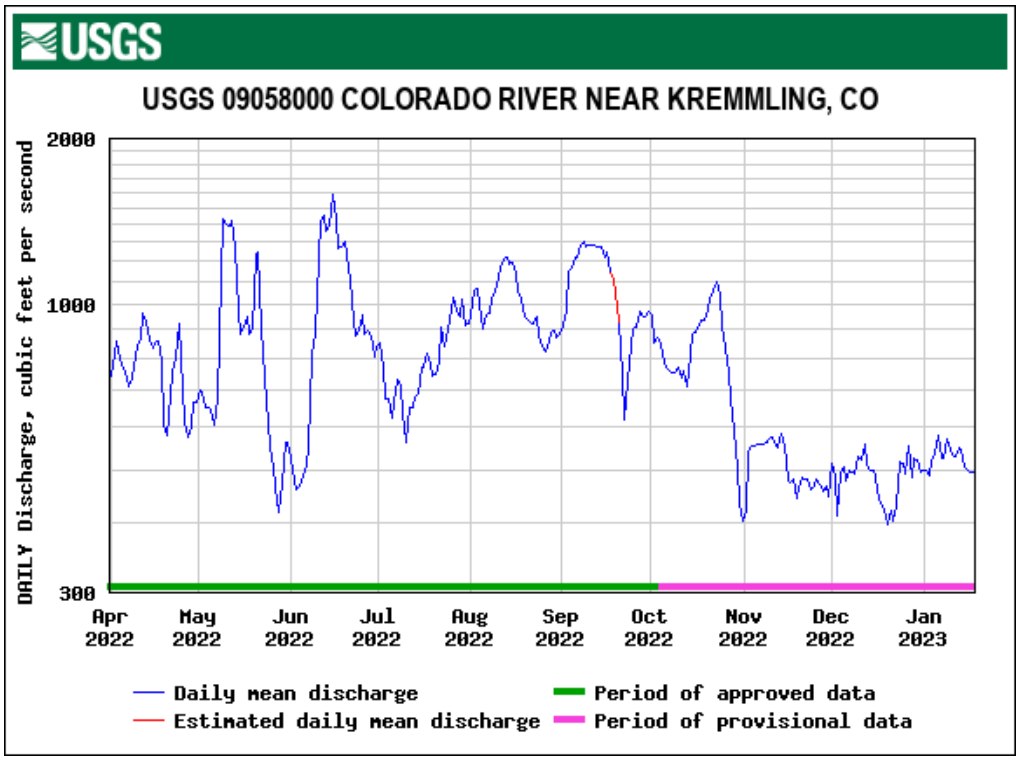


Figure 1. Mean daily streamflow in 2022 at the Colorado River near Kremmling, CO gage (USGS 09058000).

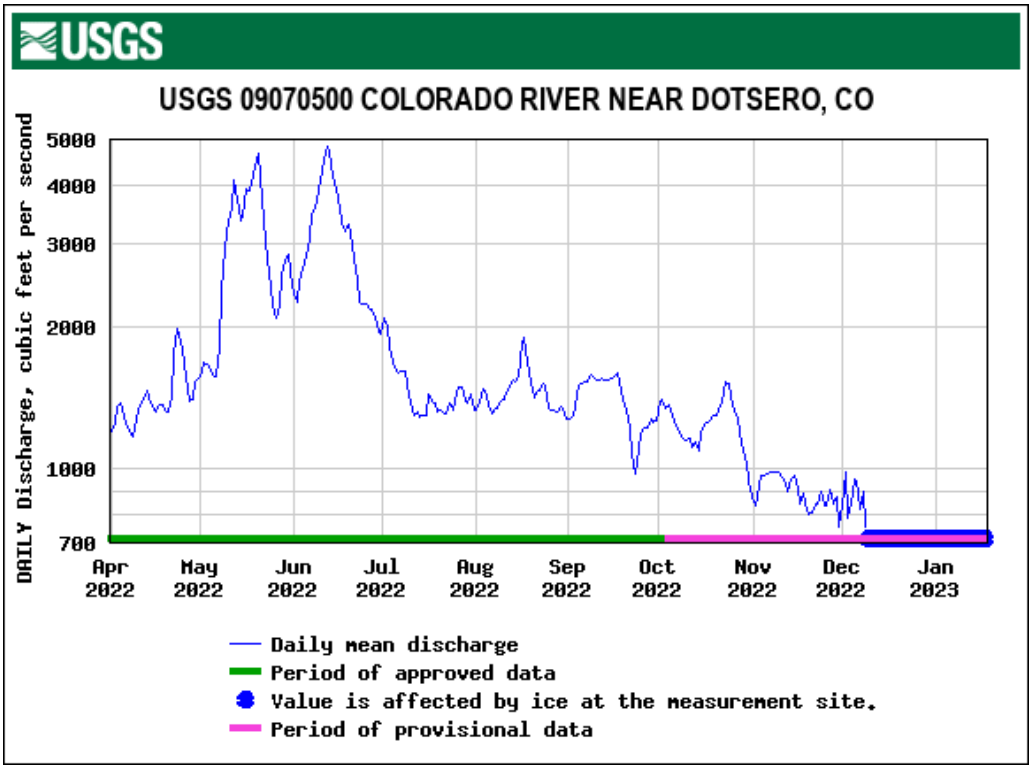


Figure 2. Mean daily streamflow in 2022 at the Colorado River near Dotsero, CO gage (USGS 09070500).

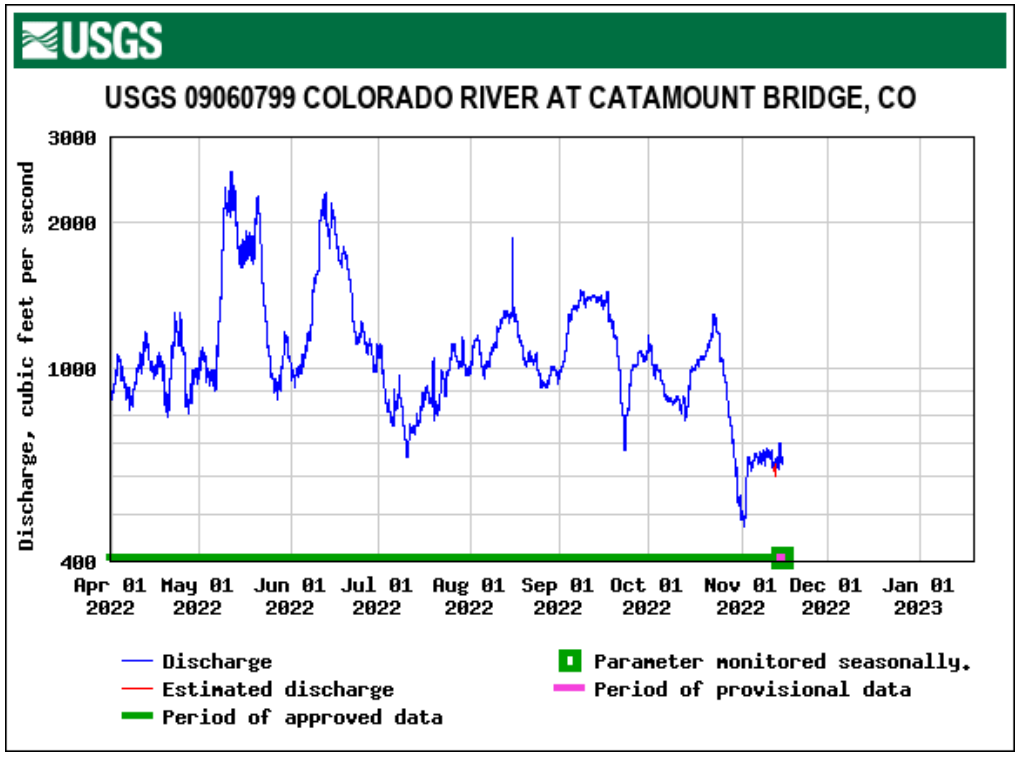


Figure 3. Mean daily streamflow in 2022 at the Colorado River at Catamount Bridge, CO gage (USGS 09060799).

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 flow volumes from April to July. The April 1 prediction in 2022 estimated that the undepleted flows would be 730,000 acre-feet (AF) for Kremmling and 1,150,000 AF at Dotsero (Table 6). Based on these volumes the predicted flows at both Kremmling and Dotsero were classified as a "Dry Typical" year type.

For the W&S Year 2022, the total estimated annual flow volume at the Kremmling gage is 534,756 AF which ranks in the "Wet Typical" category and the total volume at the Dotsero gage is 1,058,663 AF which ranks in the "Dry Typical" category. It is worth noting that 7 of 10 years since 2013 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	525,500 - 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 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 2013 through 2022 for all segments.[4]

Year	Segment 4-6 Kremmling Gage			Segment 7 Dotsero Gage		
	April 1 Prediction	Actual AF	Actual Type	April 1 Prediction	Actual AF	Actual Type
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	Dry Typical	790,942	Wet Typical	Wet Typical	1,439,400	Wet Typical
2018	Wet 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	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%
2022	Dry Typical	534,756	Wet Typical	Dry Typical	1,058,663	Dry Typical

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.

2022 Cooperative Measures

During 2022, 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 2022 W&S Year is in the "Wet Typical" category at the Kremmling gage[5] and in the "Dry Typical" category at the Dotsero gage[6]. No Coordinated Reservoir Operations (CROS) occurred in 2022. The Shoshone Power Plant was off-line at various times during the year and therefore the Shoshone Outage Protocol (ShOP) was implemented in April (4/4-4/18), July (7/8-7/20), and October into November (10/24-11/3) for a total of 39 days.

Similar to 2021, high stream temperatures and low streamflow conditions were observed at the Kremmling, Catamount, and Dotsero gages during late June and early July of 2022. There was a chronic temperature standard exceedance at Kremmling from July 9th through approximately July 23rd, as well as at Catamount starting July 6th and extending to August 6th. The Cooperative Measures Committee met remotely several times during this period

[4] Values highlighted yellow are based on USGS approved date until October, provisional data until January 18th and estimated date from January 18th through end of March.
[5] Depending upon final values for the Wild & Scenic Year, there is a possibility that Kremmling will be in the "Dry Typical" category.
[6] Depending upon final values for the Wild & Scenic Year, there is a possibility that Dotsero will be in the "Driest 25%" category.

to try to address these conditions in the upper part of the Colorado River. Various events and W&S Stakeholder actions occurred throughout this time, as described below.

- CPW implemented several voluntary fishing closures on the Colorado River within the W&S reaches starting on July 15th.
- The River District responded to high water temperatures in late June by bypassing 30 cfs at Wolford Mountain Reservoir. They also released 50 cfs from Wolford Mountain Reservoir from July 15th through 17th to assist with high temperatures.
- 50 cfs of 5412 water was released from Granby Reservoir from approximately July 19th through July 21st. The 5412 releases from Granby began again at a rate of 35 cfs around August 24th and then were increased to 55 cfs into September.
- Windy Gap Reservoir was drawn down for construction needs at a rate of approximately 50 cfs for several hours per day for about 10 days beginning around July 21st, totaling between 400 and 480 AF.
- The Upper Colorado River area received meaningful precipitation around the end of July which helped to increase streamflow and decrease stream temperatures.
- Grand County's 1,300 AF of Windy Gap water in Granby Reservoir (half of Middle Park Water Conservancy District's remaining allocation from the previous Windy Gap Water year, per the Windy Gap IGA) was released beginning around August 11th at a rate of 25 cfs to help with high stream temperatures between Lake Granby and the Colorado River confluence with the Williams Fork.

In response to recommendations in the September 2021 BLM and USFS Annual Effectiveness Review, the Cooperative Measures Committee continues researching and discussing the potential for and feasibility of an SG-funded pool of water to be utilized in the W&S segments. A lease from Green Mountain Reservoir may be the preferred option but additional research regarding the mechanics of acquiring and funding such a program needs to be completed. The Cooperative Measures Committee will continue this discussion and work toward grant applications as is possible during the remainder of 2023.

American Whitewater's annual Gore Canyon Festival ("Gore Fest"), including downriver stand-up paddle board and freestyle events took place on August 27, 2022, with SG sponsorship. The Gore Race event of the festival did not take place due to insurance concerns. Paddle board and freestyle events were still held. While there was no need to meet insurance mandated flows for the Gore Canyon race, flows were within acceptable range for the race and no cooperative measures were needed.

2022 Monitoring Results

The Monitoring Committee assembled or collected information to evaluate the ORV Indicators and review the Resource Guides. During 2022, the SG conducted the following activities:

- Evaluated CPW biosurvey data.
- Funded boating and fishing intercept data collection.
- 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 assessment of traffic counter data and commercial outfitter activity logs.
- Refined the Channel Maintenance Flow Observational Monitoring Plan and developed RFPs for Drones, Cross-Sectional Surveys and Substrate measures. 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 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. [7]

Segment	Driest	Dry Typical	Wet Typical	Wettest
5	4.9%	6.1%	4.2%	3.1%
6	2.2%	2.4%	-	1.6%
7	4.0%	2.7%	-	3.2%

The ORV Indicator percentage value shown in red was locked in 2022 based on reaching the requisite numbers of samples) to calculate the 95% confidence interval.

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 types and segments. Sufficient surveys in Segment 5 during a wet typical year-type were collected in 2022. A final locked threshold value of 4.2% has been added to Table 7.

2022 Floatboating ORV Indicator and Survey Response Information

In 2022, the SG retained RRC Associates to conduct user intercept surveys at 7 locations (Table 8) resulting in 1,357 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 2022, the year type was in the wet typical category for Segments 5 and 6 and Dry Typical for Segment 7. The 2022 survey responses provided sufficient data to set the final ORV Indicator percentage values for Segment 5 in the Wet Typical year type which is shown in Table 7. The percentage values were lower than the ORV Indicator value and interim threshold values, as defined in the Intercept Survey Protocol, for all segments; therefore, there are no divergences in 2022. While the ORV Indicator was not approved until 2020, there have not been any divergences as of 2022 utilizing all the data collected since 2013 (

[7] Not all values in this table were set using the 380-sample size or the 95% confidence interval. Please refer to "Process to Deliberate and Address Failure to Reach Consensus – Floatboating ORV Indicator" memo from March 23, 2023.

Table 9).

Table 8. Number of completed user intercept surveys by location in 2022.

Segment	Location	Number of Boater Surveys
5	Radium	420
	State Bridge	126
	Total	**546**
6	Catamount	45
	Two Bridges	87
	Cottonwood	2
	Dotsero	145
	Total	**279**
7	Grizzly Creek	19
	Two Rivers	366
	Total	**385**

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
2022	5	Wet Typical	Not locked	2.8	None
2022	6	Wet Typical	Not locked	0.0	None
2022	7	Dry typical	2.7	1.1	None

In 2021, the Monitoring Committee worked with RRC to identify additional questions to be added to the intercept and user group surveys to address the COVID-19 pandemic. Those questions were included again on intercept surveys in 2022. 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 2022, COVID had little impact on the majority of boaters, 95% said the pandemic did not influence decisions or experiences on the day they were interviewed. The other 5% said COVID made travelling to this location particularly attractive.

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 measures multiple descriptive statistics as reported by past Colorado River visitors including "likelihood to return to the river." Visitor Displacement surveys were not conducted in 2022, and are next scheduled for 2024.

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 2022, there were 142 total boatable days in these segments during the floatboating season (April 1 to September 30), which was within the Resource Guide range for boatable days in a Wet Typical Year-Type. The number of boatable days for each opportunity category was within the range for the 700-1300 cfs and 4000-7400 cfs Opportunity ranges. Boatable Days were below range for the 1300-4000 cfs Opportunities. (Table 11). Figure 4 illustrates mean daily streamflow and the range of floatboating opportunities in these segments during the 2022 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 2013 through 2022.

Year	Year Type	Total Boatable Days	Opportunities (700-1,300 cfs)	Opportunities (1,300-4,000 cfs)	Opportunities (4,000-7,000 cfs)
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
2022	Wet Typical	142	130	12	0

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

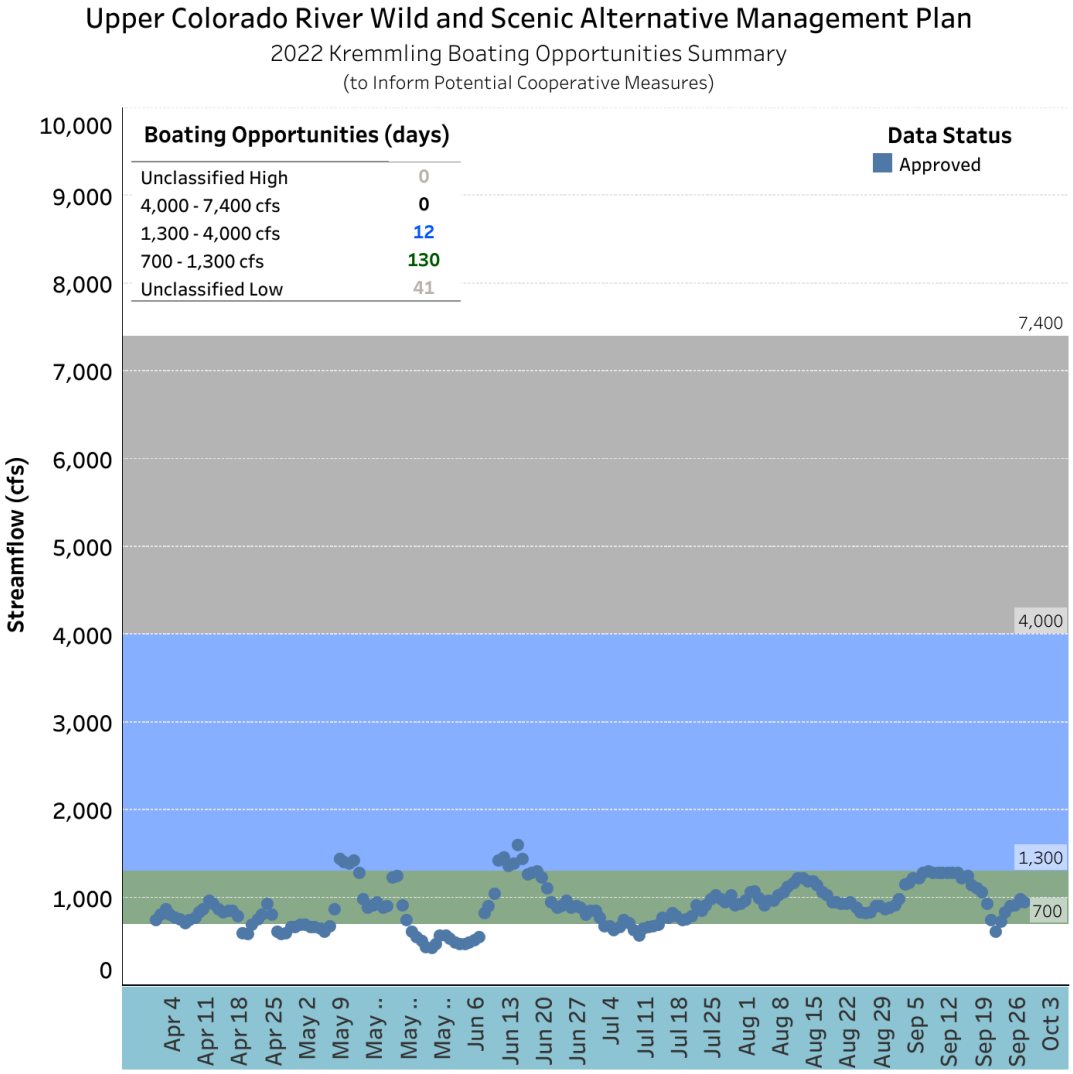


Figure 4. Hydrograph from the Colorado River near Kremmling, CO gage (USGS 0905800) demonstrating the floatboating opportunities in 2022 in Segments 4-6.

The Resource Guide for early season boatable days is shown in Table 12. During 2022, the number of early season boatable days was within range for May 15-31 and above the range for June 1-30 for Segments 4-6.

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 2022.

	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
2022	8	20

W&S Segment 7

The Resource Guides for Segment 7 are shown in Table 13. In 2022, there were 170 total boatable days in this segment during the floatboating season (April 1 to September 30), which was within the range in the Dry Year Type. All opportunity categories were within the range for the 2022 year type (Table 14). Figure 5 illustrates mean daily streamflow and the range of floatboating opportunities in this segment during the 2022 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	80 (118) 130	10 (32) 63	0 (0) 6

Table 14. Summary of boatable days in Segment 7 from 2013 through 2022.

Year	Year Type	Total Boatable Days	Opportunities (1,250 - 1,800 cfs)	Opportunities (1,800-5,500 cfs)	Opportunities (5,500-8,600 cfs)
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
2022	Dry Typical	170	108	62	0

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

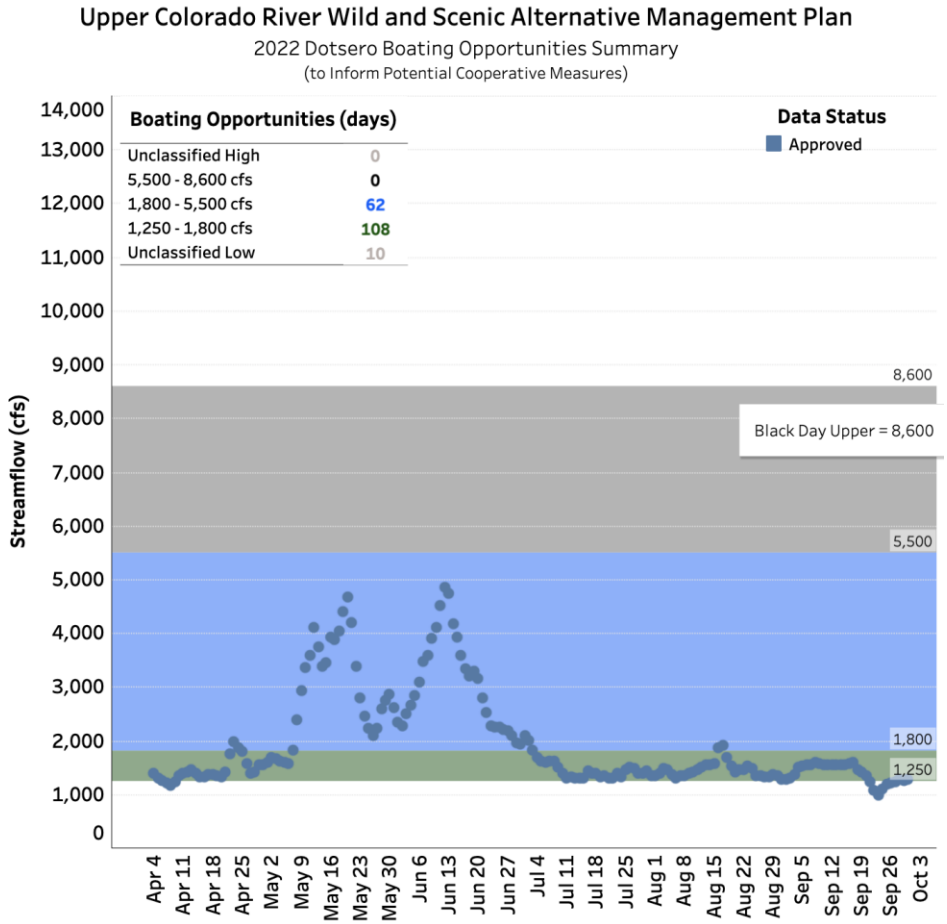


Figure 5. Hydrograph from the Colorado River near Dotsero, CO gage (USGS 09070500) demonstrating the floatboating opportunities in 2022 in Segment 7.

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 surface acre of water 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.

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 2022 biosurveys. CPW performed its 2022 biosurveys at State Bridge and Lyons Gulch (note: Lyons Gulch is a CPW monitoring location but not an ORV Indicator location identified in the SG Plan). Radium and Catamount are scheduled to be surveyed in 2023. In 2022, the ORV Indicators for Quality Trout and Biomass at State Bridge exceeded the established thresholds.

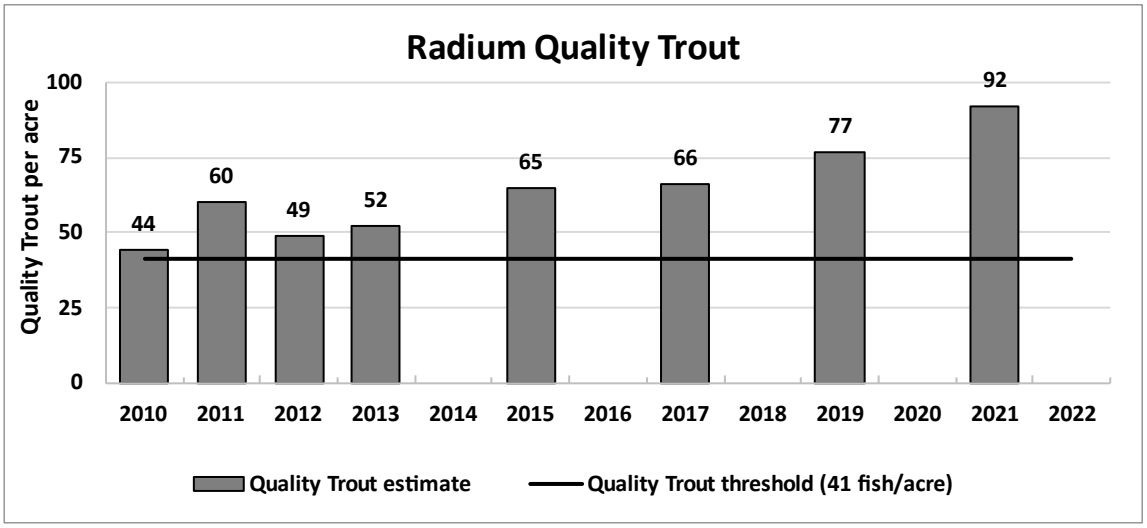
Table 15. 2022 Monitoring Results Compared to Quality Trout and Biomass Thresholds.

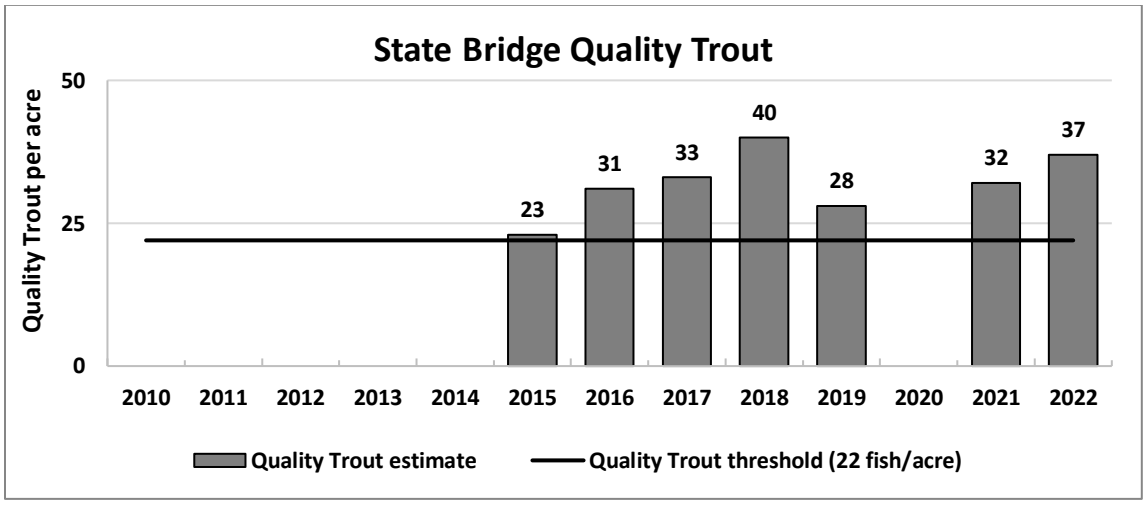
Biosurvey Reach	Quality Trout (QT) Threshold (#>14" per acre)	Biomass (BM) Threshold (Pounds per acre)	2022 Monitoring Results (QT / BM)
Radium (Segment 5)	43	125	N/A
State Bridge (Segment 6)	22	63	37/87
Catamount (Segment 6)	14	43	N/A

The abundance of larger quality-sized trout (14-inches or greater) is highest in the upstream monitoring reach (Radium) and decreases moving downstream due to changes in habitat diversity and river conditions between the reaches. Within the monitoring

reaches, annual trends in Quality Trout abundance differ during the monitoring period (Figure 6).

Trout Biomass estimates vary annually within each monitoring reach (Figure 6) and do not always correspond to trends documented in Quality Trout abundance. At State Bridge in 2022, both Quality Trout (37/acre) and Biomass (87 lbs/acre), were higher than the 2021 surveys (82lbs/acre). Annual variability in both Quality Trout and Biomass do not clearly identify population trends at this location. Notwithstanding, State Bridge exceeded the established thresholds (Table 15) as Quality Trout and Biomass estimates fell within an accepted range of natural variability expected at this 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. In Figures 6 and 7Figure 7, the results of CPW's biosurveys at Radium, State Bridge and Catamount can be reviewed back to 2010.





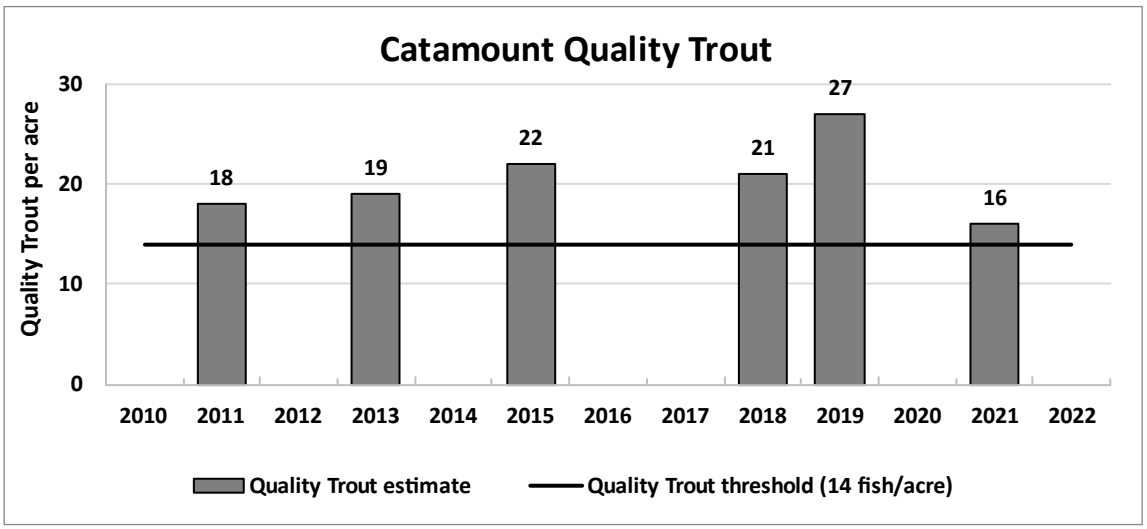


Figure 6: Quality Trout abundance (QT/acre) estimated during CPW surveys from 2010 – 2022 at Radium, State Bridge, and Catamount in the Colorado River below Gore Canyon.

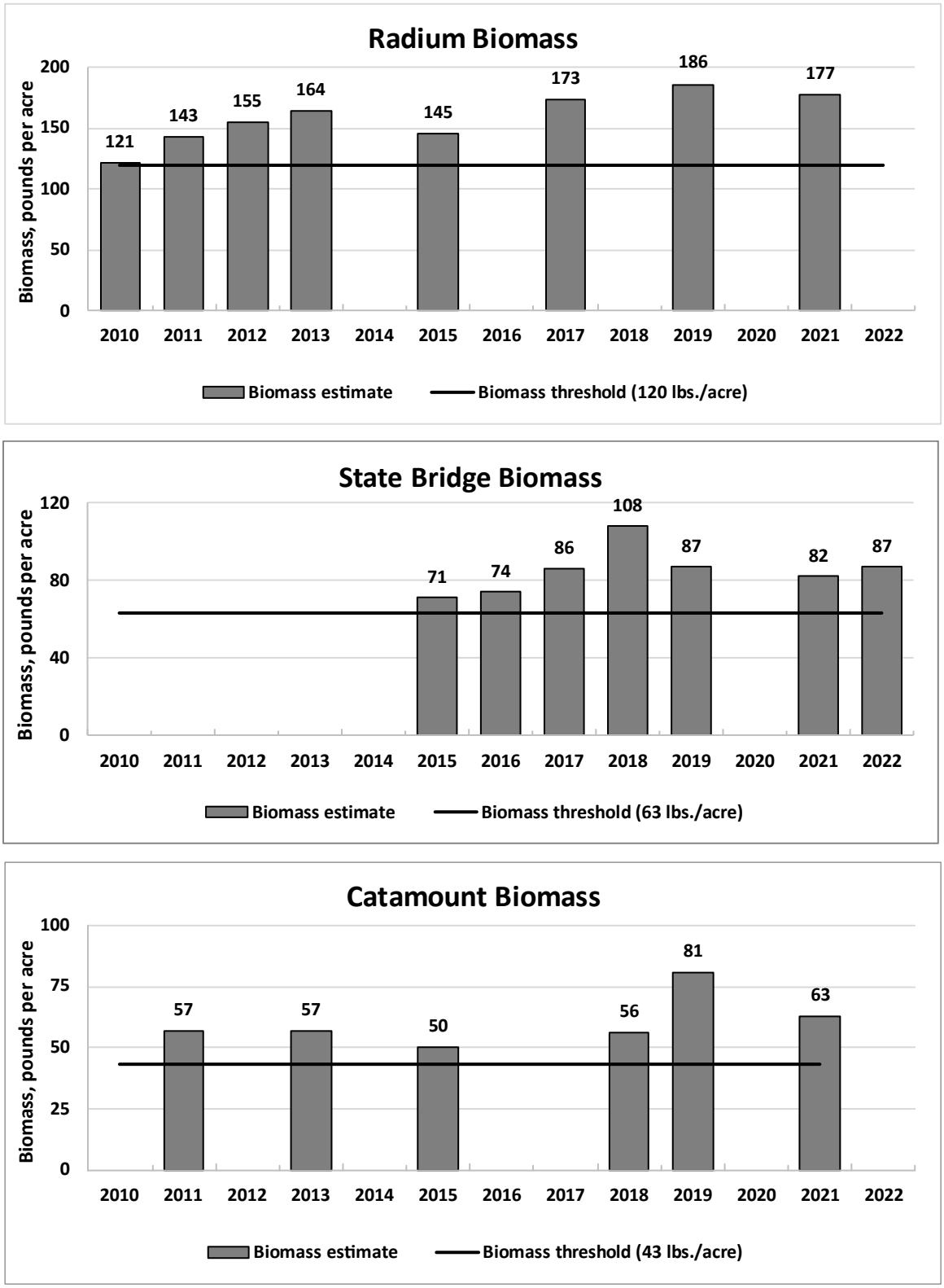


Figure 7: Pounds of trout per acre, Biomass (lbs/acre), estimated during CPW surveys from 2010 – 2022 at Radium, State Bridge, and Catamount in the Colorado River below Gore Canyon.

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 2022, 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 2022 CPUE (0.53) was lower than the established threshold (0.70). Refer to Table 16 to compare 2021 and 2022 CPUE data for Radium to the established threshold. However, per the SG Plan: "*If surveys indicate that the value falls below said threshold at a given location in any three out of five years (emphasis added), this ORV Indicator will be deemed to not have been met at that location.*" Thus, the CPUE ORV Indicator was met, and the Monitoring Committee will continue to track and report on CPUE at Radium, given that this is the first instance of this number falling below the established threshold in a given year.

Table 16. Catch-Per-Unit-Effort: 2021 and 2022 Monitoring Results.

Year	Location	Segment	CPUE Threshold	Annual Values	Divergence?
2021	Radium	5	0.70	0.74	None
2021	State Bridge	5	Not locked	--	N/A
2021	Catamount	6	Not locked	--	N/A
2022	Radium	5	0.70	0.53	Yes
2022	State Bridge	5	Not locked	--	N/A
2022	Catamount	6	Not locked	--	N/A

Discussions with CPW indicate that the lower catch rate at Radium in 2022 could be attributed to high turbidity related to upstream wildfires. Also, due to increased water temperatures, CPW enacted multiple, voluntary fishing closures in July and August 2022 at various locations across the W&S Segments:

- Kremmling to State Bridge (W&S Segments 4 and 5): July 15 – July 27
- State Bridge to top of Glenwood Canyon (W&S Segments 6 and 7): July 15 – August 24
- State Bridge to Red Dirt Creek (W&S Segment 5): July 20 – August 3

Voluntary fishing closures likely affected angling patterns across the W&S Segments 4, 5 and 6 throughout the summer, and the combination of high water temperatures and high turbidity may have contributed to the lower catch rate at Radium.

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.[8]

Table 17. Seasonal flow Resource Guide 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, 2018 to January 18, 2023 at the Kremmling gage (USGS 09058000). Data is provisional starting in October 2022.

Error! Reference source not found. provides a comparison of 5-year average seasonal f lows and annual average seasonal flows at the Kremmling gage for the Resource Guides between 2013 and 2022. The 2022 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.

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

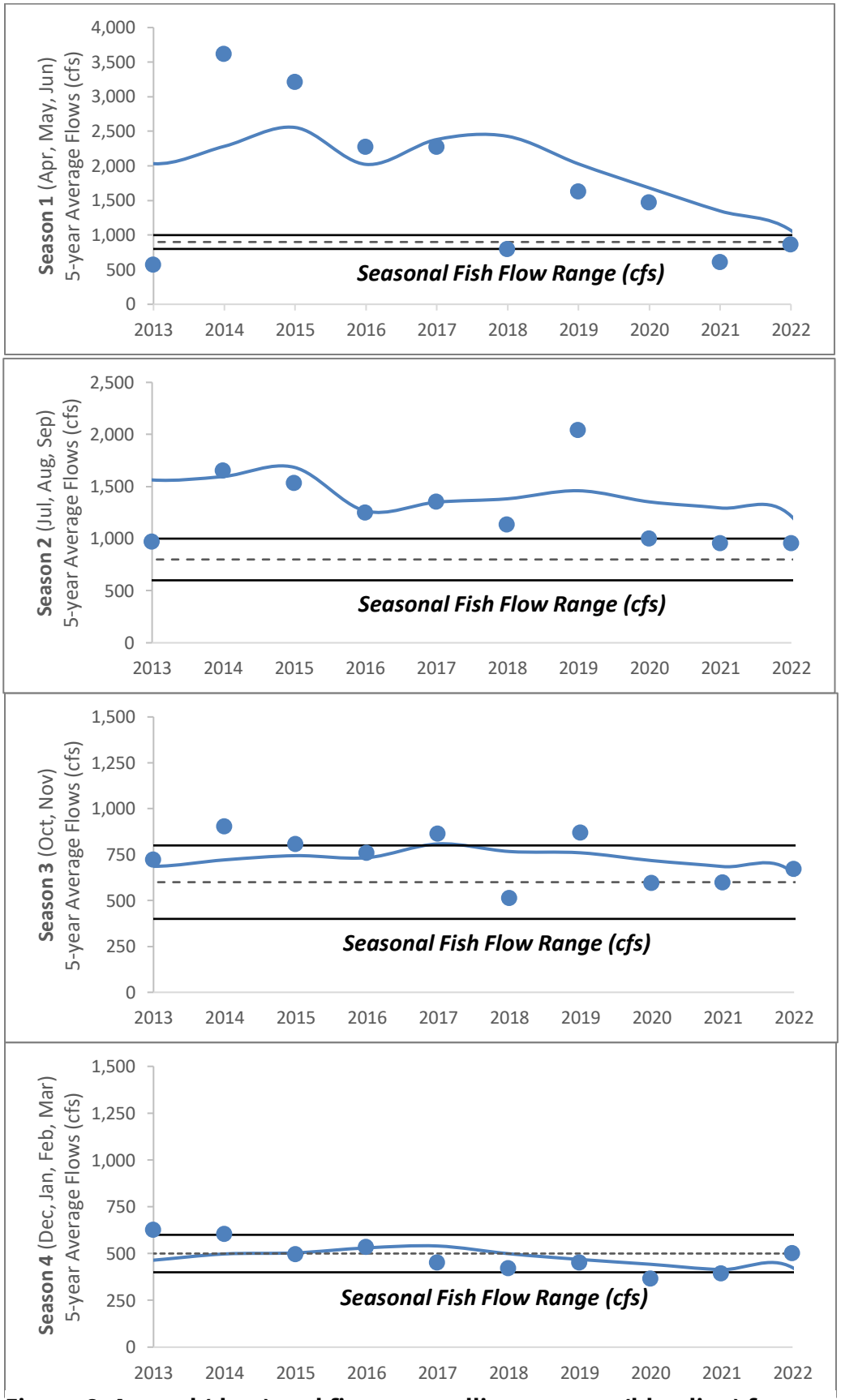


Figure 8. Annual (dots) and five-year rolling average (blue line) for 2013-2022 compared to the Seasonal Flow Resource Guide (black lines indicate upper and lower, dashed grey line shows the midpoint). Note that y-axis changes on graphs.

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 streamflows, or "Flushing Flows" from 2013 through 2022 based on the Colorado River near Kremmling, CO gage (USGS 09058000). In 2022, streamflow never exceeded 2,500 cfs. The instantaneous peak of 1,650 cfs occurred on June 14, 2022. The flushing flow streamflow and duration occurred in 60% of years based on a 10-year rolling average between 4/1/2013 and 3/31/2023.

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
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
2022	Wet Typical	1,650	1,590	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	
2022	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 2022, CPW reported the presence of brown trout, rainbow trout, mountain whitefish and mottled sculpin at State Bridge.

Channel Maintenance Flows

The Channel Maintenance Flow Observational Monitoring Plan was developed in 2021 and approved at 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 were refined. Additionally, scopes of work for the Drone-Based Aerial Imagery/Photogrammetry, Cross-Sectional Channel Surveys, and Substrate Measures were developed. The plan is that outside experts will be hired per the SG Contractor Protocols by the summer of 2023 and monitoring activities will start in the fall of 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 was Fall 2022 which looked 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 [9] 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."[10]

Table 21 shows the currently adopted numeric temperature standards for the Segment COUCUCO3 for Cold Stream Tier II temperature standards, with a site specific standard providing additional shoulder season criteria due to the presence of Mountain Whitefish spawning and early life stages. 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 by taking the maximum value of a seven-day moving mean of observations . 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

[9] Colorado Department of Public Health and Environment, Water Quality Control Commission *5 CCR 1002-31*, 01/31/2018.
[10] Colorado Department of Public Health and Environment, Water Quality Control Commission *5 CCR 1002-33*, 9/30/2022.

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 2022 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).

Table 22. 2022 Temperature stations, responsible agencies, and locations.

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

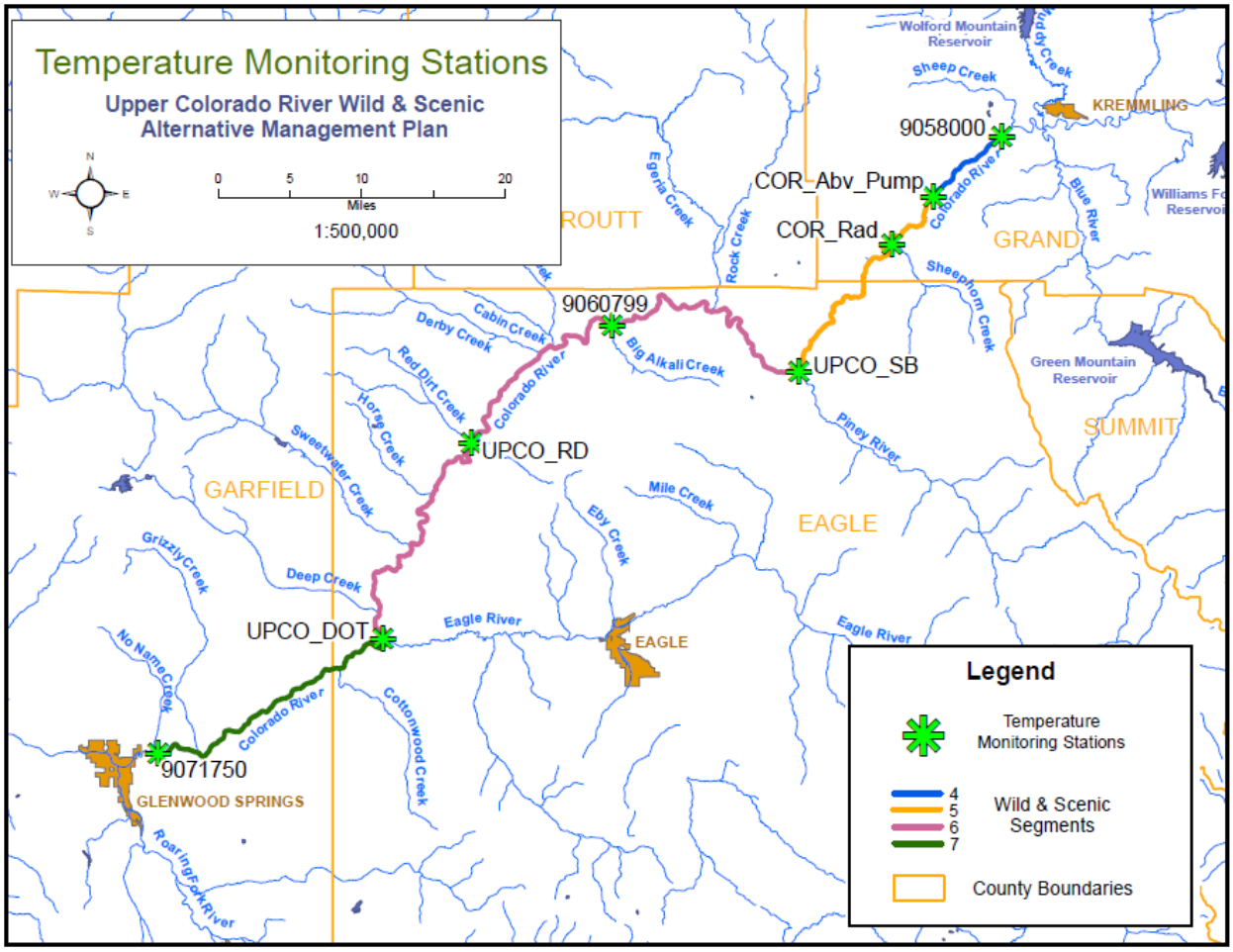


Figure 9. 2022 Time-series temperature monitoring station locations.

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 2013 to 2022 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 2022.

Table 23. Time-series water temperature data availability from 2013 to 2022 in Segments 4 – 7 (in downstream order).

Site ID	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
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	X
UPCO_RD	X	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 2022 water temperature data was analyzed by Lotic Hydrological. The 2022 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.

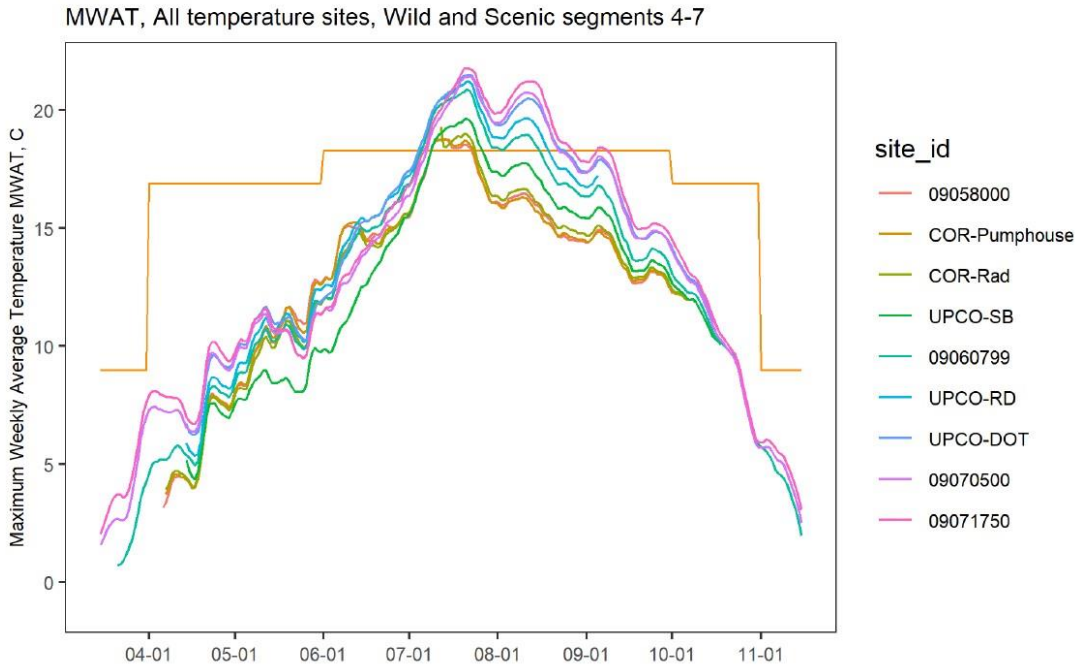


Figure 10. Weekly average temperatures (WAT) in 2022 and the applicable WQCC summer, shoulder, and winter season Maximum Weekly Average Temperature (MWAT) standards.

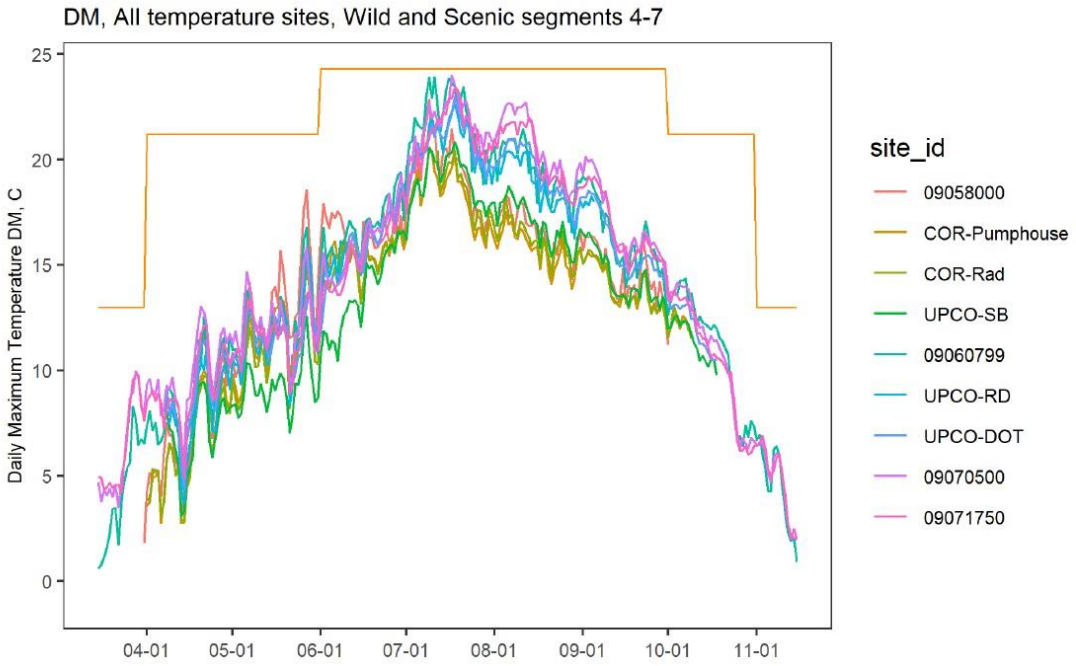


Figure 11. Daily maximum (DM) temperatures in 2022 and applicable WQCC summer, shoulder, and winter season DM standards.

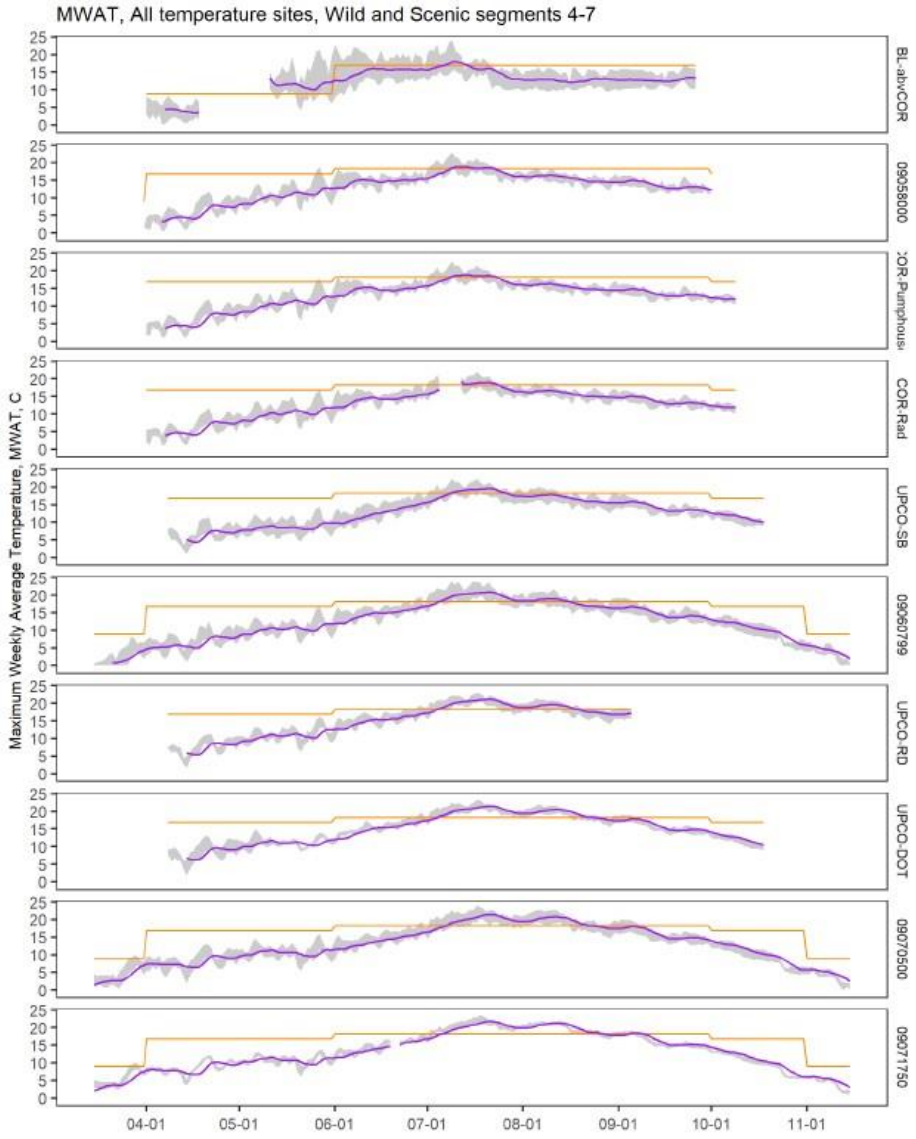


Figure 12. Maximum Weekly Average Temperatures (MWAT) temperatures in 2022 and applicable WQCC standards at all sites.

Based on comparison to State standards all sites within the W&S segments exceeded the chronic (MWAT) temperature standards in 2022 (Figure 12).[11] All sites from State Bridge downstream exceeded it for one or multiple weeks. The lower Blue River above the Colorado River confluence (BL-abvCOR) had a notable period of standards exceedances in May (Figure 12, top panel) prior to the shift to summer standards.

The lower Blue River displays a unique pattern compared to the Colorado, facing frequent temperature concerns during the late spring shoulder season in May. During this period, Dillon and Green Mountain Reservoirs are filling, attenuating or fully eliminating the

[11] Colorado Department of Public Health and Environment, Water Quality Control Commission *5 CCR 1002-33*, 09/30/2022. Segment-specific standards for Whitefish Spawning also apply to the W&S reach (COUCUC03), as specified in Regulation 33 sections 33.6(3)(8) and 33.6(4)(a)

natural spring rise, peak, and recession of cold snowmelt flows. The hydrograph for the lower Blue River is essentially 'inverted' from a natural snowmelt regime from the second week of April until early July. The extremely low flows (~30-40cfs) coupled with warming early summer temperatures and the wide, shallow channel geometry of the Blue near its confluence with the Colorado contribute to rapid daily warming during late May. Exceedances of both the DM and MWAT standards were extended during this period in 2022. These exceedances occurred during the shoulder season between spring and summer, when temperatures would naturally be rising to some degree, and follow the correct direction of temperature change for the time of year, which may attenuate the severity of potential impacts to cold water fisheries to a degree.

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. However, MWAT potential exceedance summaries by site for 2013-2022 are shown in Table 24 below. Table 24

Table 24. MWAT potential exceedances at W&S temperature sites from 2013 – 2022.

Site	Segmen	201	201	201	201	201	201	201	202	202	2022
9058000	4	y	n	n	n	y	n	n	n	y	y
COR-	4/5	y	n	n	n	n	*	n	n	y	y
COR-Rad	5	y	n	n	n	n	n	n	n	y	y
UPCO_SB	5/6	y	n	n	n	nd	n	n	n	y	y
9060799	6	nd	nd	nd	nd	y	y	n	n	y	y
UPCO_RD	6	y	n	y	y	nd	y	n	y	y	y
UPCO_DO	6	y	n	*	y	nd	nd	n	y	y	y
9071750	7	y	y	y	y	y	y	n	y	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 2022. The mean Snow Water Equivalent (SWE) value for NRCS remote snowpack monitoring stations in Colorado Basin headwaters registered at 94% of the 30 year median peak of 16.0 inches. [12]

At the statewide level, the Colorado Climate Center ranked 2022 as Colorado's 35th driest and 6th warmest year in the 127 year period of record.[13] Due once again to cumulative

[12] https://www.nrcs.usda.gov/wps/portal/nrcs/main/co/snow/
[13] https://climate.colostate.edu/reports/wy2022_climate_summary.pdf

effects of warm temperatures and low soil moisture levels from the preceding fall and summer, the 2022 snowpack melted early and converted poorly to surface runoff. Streamflows in the Colorado River headwaters ranked comparatively low in the historical record as a result. The Upper Colorado River had no natural hydrograph peak this season, as upstream reservoirs struggled to replenish diminished storage for 2021 and achieved only partial fills without spilling during regional runoff periods in May, June, and July. 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 the lower tributaries like the Eagle River and Roaring Fork.

Mean August flows ranked 23rd lowest out of 62 years at the Kremmling gage and mean July flows ranked as the 10th lowest on record. The monsoon season in the Upper Colorado River provided little relief. The peak flow for the season of just over 1600cfs occurred on June 14th. In early July, near or around July 10, flows again began increasing from reservoir releases to meet downstream water calls, beginning a concurrent improvement in water temperature conditions.

Temperature concerns existed for local fisheries on all segments of W&S, with voluntary closure requests from Colorado Parks and Wildlife on various combinations of segments between Kremmling and Glenwood Canyon in effect from July 15 through August 24. Air temperatures reached 90 degrees F during several periods in June, July, and August.

Fishing and Floatboating Additional Use Data

In addition to the intercept surveys conducted for Floatboating and Fishing, the SG retained 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 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

No user group surveys were collected in 2022. RRC has recommended these surveys be distributed every other year. They were collected in 2021. 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.

Outfitter Surveys

No Outfitter Surveys were conducted in 2022 and no future surveys are anticipated.

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 2022 commercial data as reported by outfitters to the Kremmling and Colorado River BLM offices and USFS. Commercial outfitters typically report their river use daily to the agencies. These reports have been obtained since 2013 and RRC has aggregated the available data into a master file that permits analysis of both floatboating and angling commercial user groups by date, party size, craft type, and location of launch and takeout. See Appendix D for selected summary graphs of Commercial Data.

Vehicle Counters Program

The BLM Kremmling and Colorado River Field Offices maintained vehicle counters at 12 sites during the 2022 season. A graph showing use at these site is included in Appendix D. RRC compiled and analyzed the results from 2022. Vehicle counters were monitored and downloaded by BLM periodically from May through October. The 2022 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 summary graphs of Vehicle Counts.

River Ranger Data

In 2022, as in prior years, USFS and participating outfitters supported interviews of river users in Segment 7 by USFS River Rangers. 2022 data was received from USFS and participating outfitters, but is very limited.

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, utilize the Colorado WQCC aquatic life standards for water quality. Accordingly, macroinvertebrate sampling did not occur in 2022.

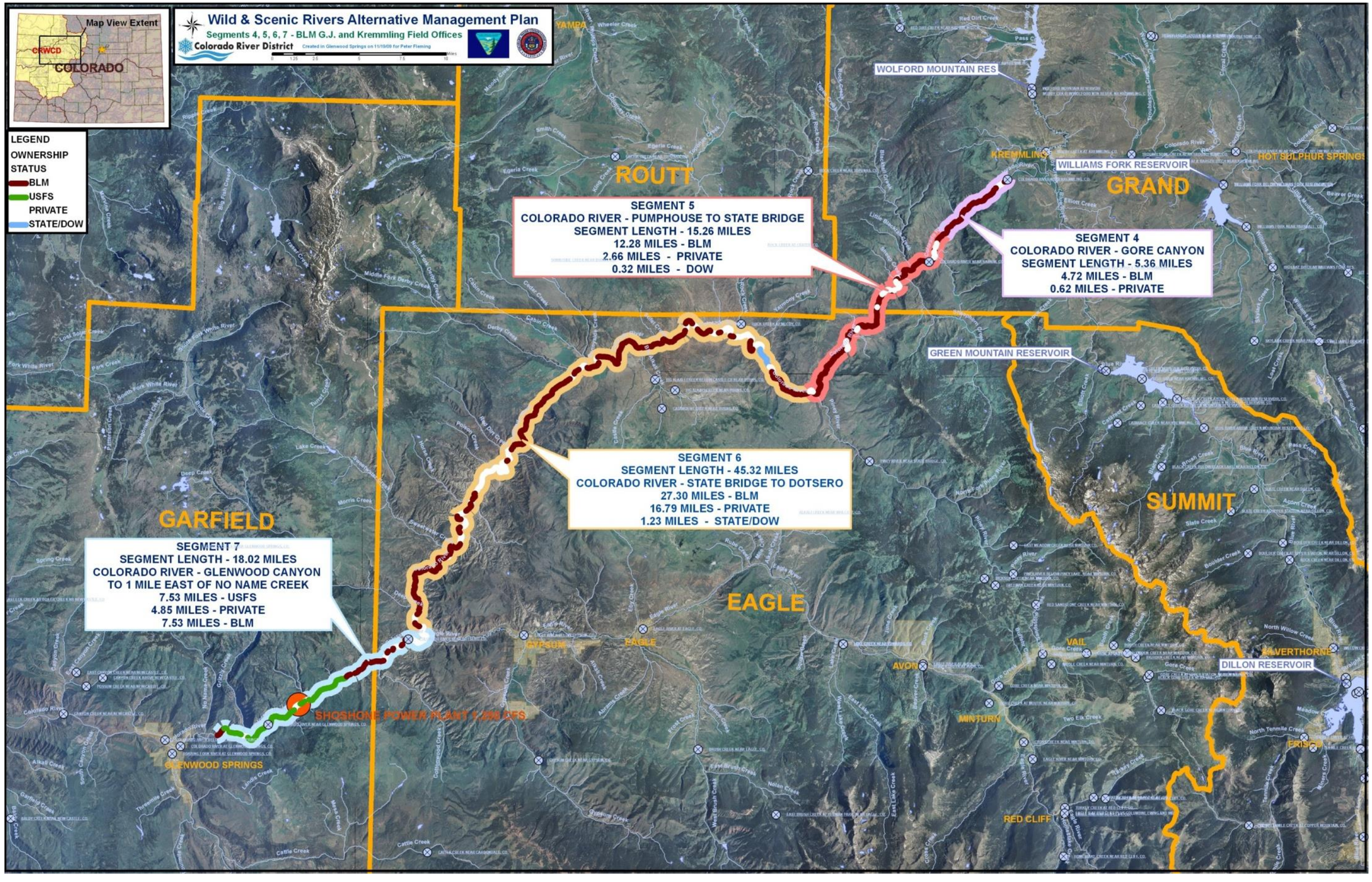
2023 Monitoring Plan

The SG approved its fiscal year 2023 Monitoring Plan at the March 2023 SG meeting. The 2023 Monitoring Plan is attached as Appendix E. This year's monitoring plan includes provisions for intercept surveys, monitoring for water temperature, streamflows, and assessment of data collected by others.

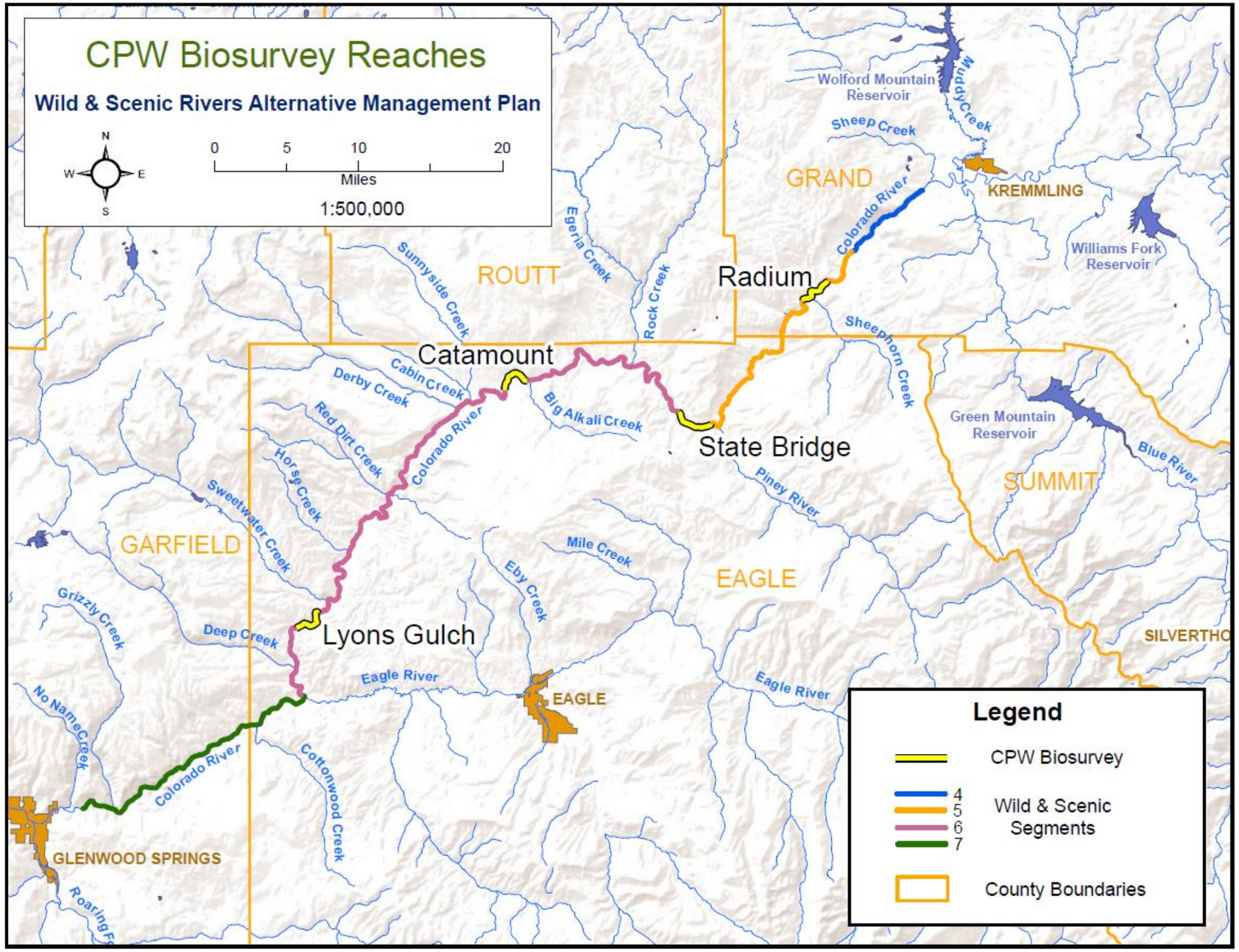
Appendices

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: 2023 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

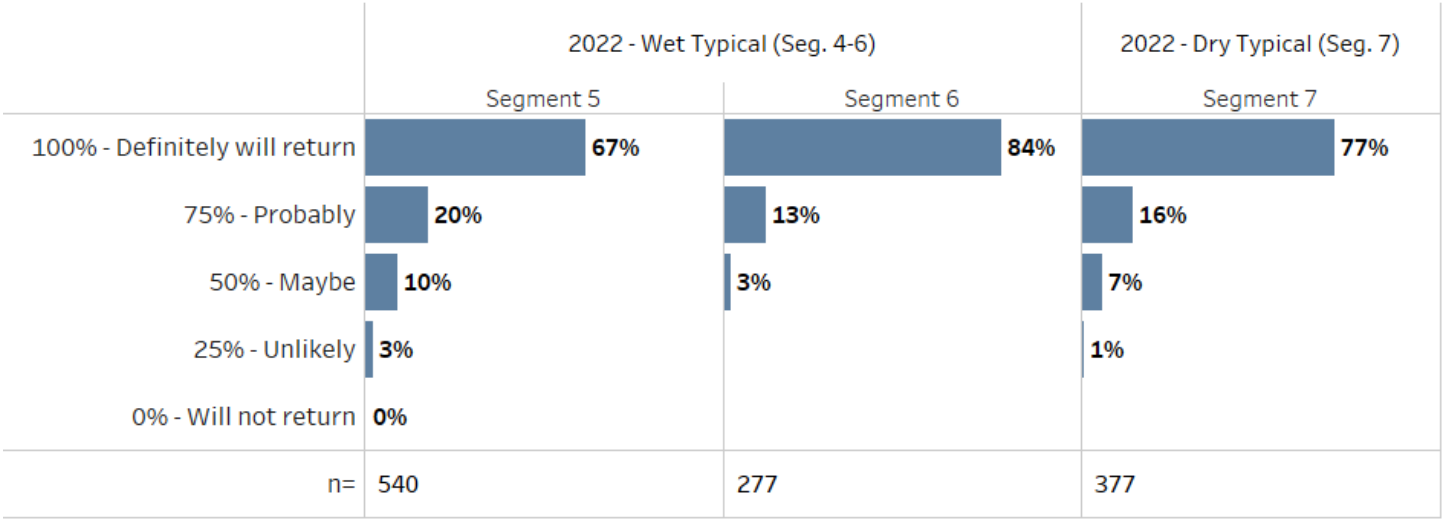
Intercept Survey Overview

Likelihood to Return – Boater Survey ORV

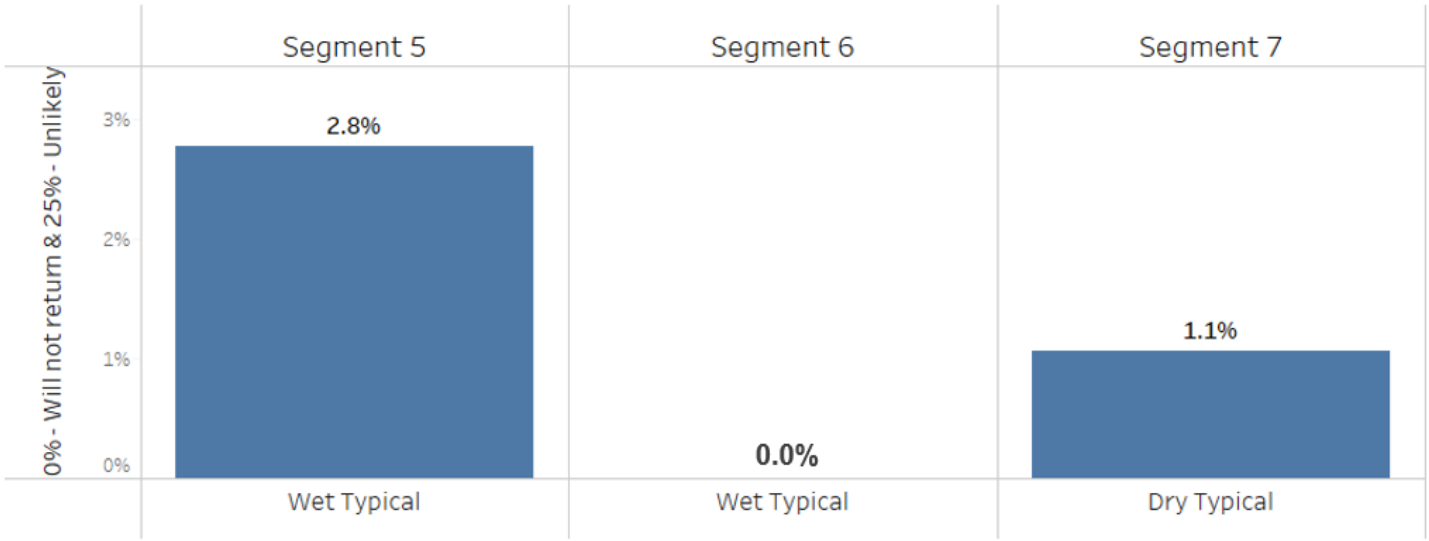
2022 survey days and locations

	Radium	State Bridge	Two Bridges	Catamount	Cottonwood	Pinball	Horse Creek	Lyons Gulch	Doterso	Grizzly	2 Rivers
27-May	1	1	1						1		1
28-May	2	1	2						1		1
8-Jun		1	1	1				1			1
18-Jun	2	1	1	1							1
26-Jun	2	1	1					1	1		
2-Jul	1			2						1	1
11-Jul		2	1	1					1	1	
22-Jul	1	1	1						1		1
23-Jul	2	1							1		1
3-Aug	1	1	1			1					1
12-Aug	2			1		1			1		1
28-Aug	1	1		1							1
10-Sep	2	1		1					1		1
1-Oct	1		1	1					1		1

Q 8: Based on your experience today, how likely are you to return to this section of river?



Q 8: Based on your experience today, how likely are you to return to this section of river?
Percent Not Likely to Return



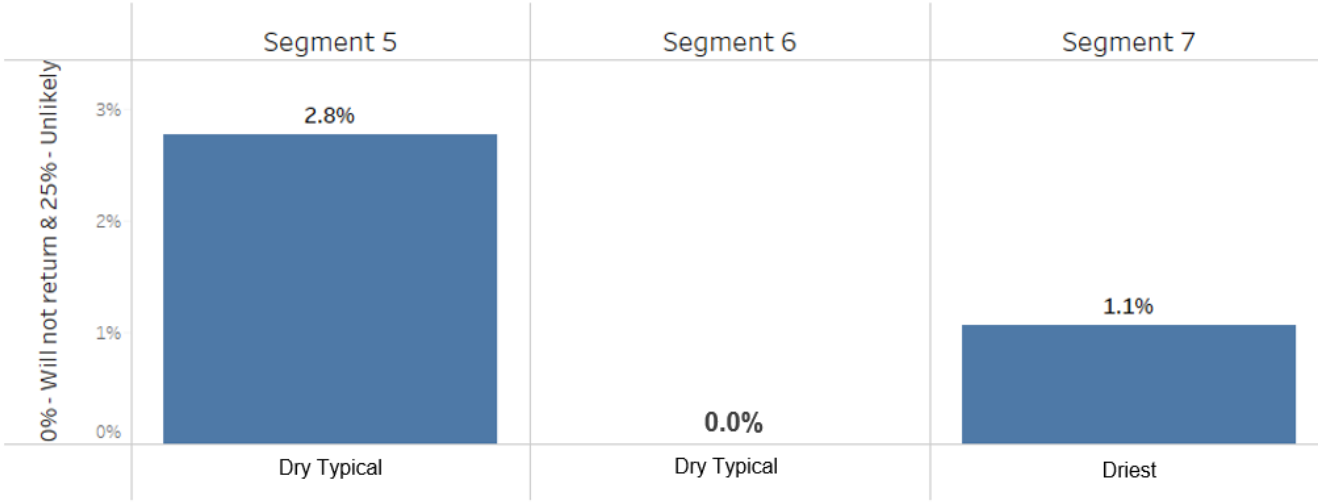
✓ Interim Threshold: 3.8%

✓ Interim Threshold: 1.6%

✓ ORV Threshold: 2.7%

Comparison to ORV Thresholds Under Dry Typical / Driest Conditions

Q 8: Based on your experience today, how likely are you to return to this section of river?
Percent Not Likely to Return



✓ ORV Threshold: 6.1%

✓ ORV Threshold: 2.4%

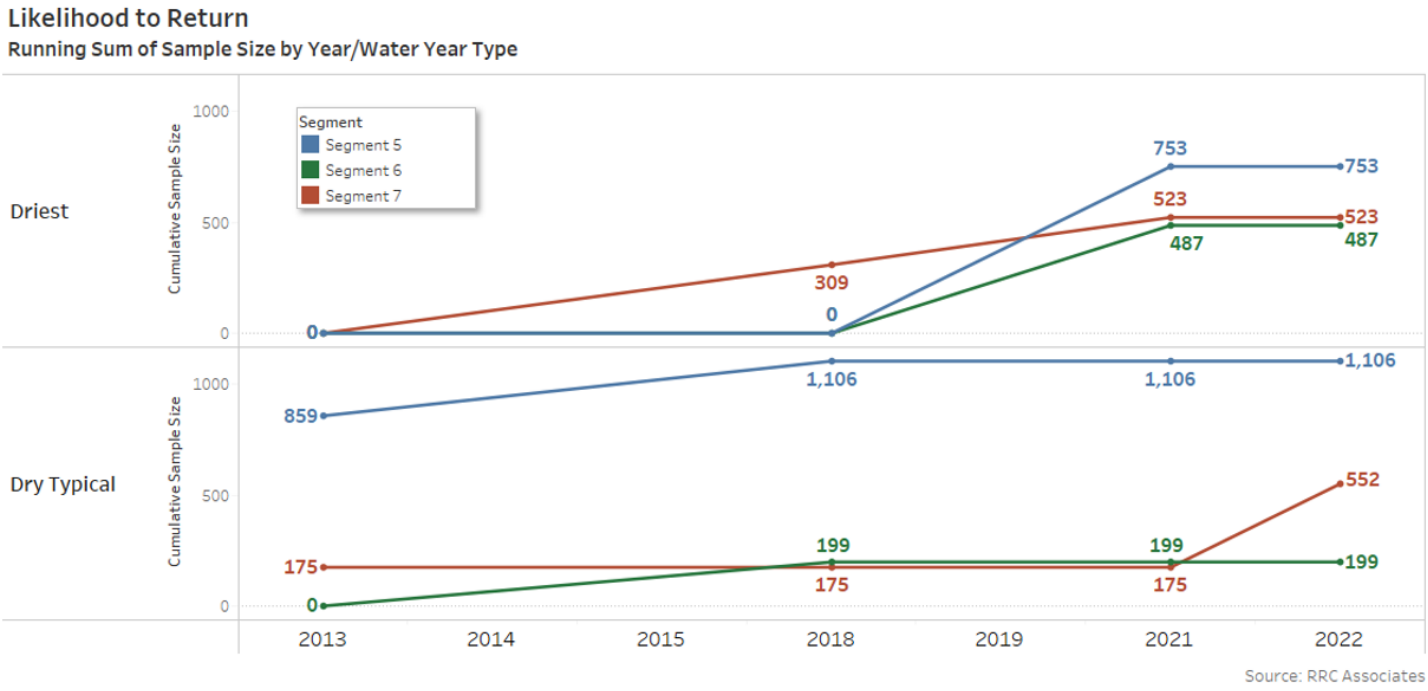
✓ ORV Threshold: 4.0%

	Driest	Dry Typical	Wet Typical	Wettest
Segment 5	4.9%	6.1%	4.2%	3.1%
Segment 6	2.2%	2.4%	-	1.6%
Segment 7	4.0%	2.7%	-	3.2%

Segment 5 Wet Typical: Locked at n=540

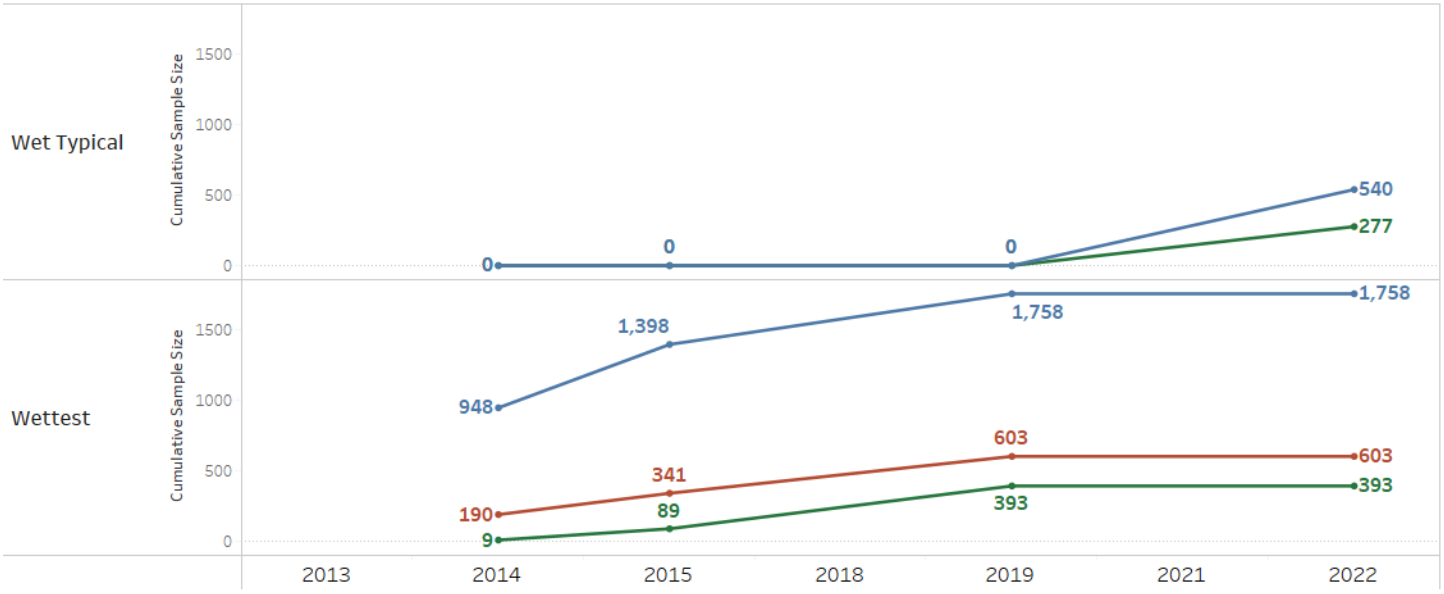
Segment 6 Wet Typical: 0%, n=277

Table 1: Percentage Values for Not Likely to Return for each year type. Values are based on the upper 95% confidence interval for floatboating survey responses (2013 – 2021) that indicate "will not" or "unlikely" to return.



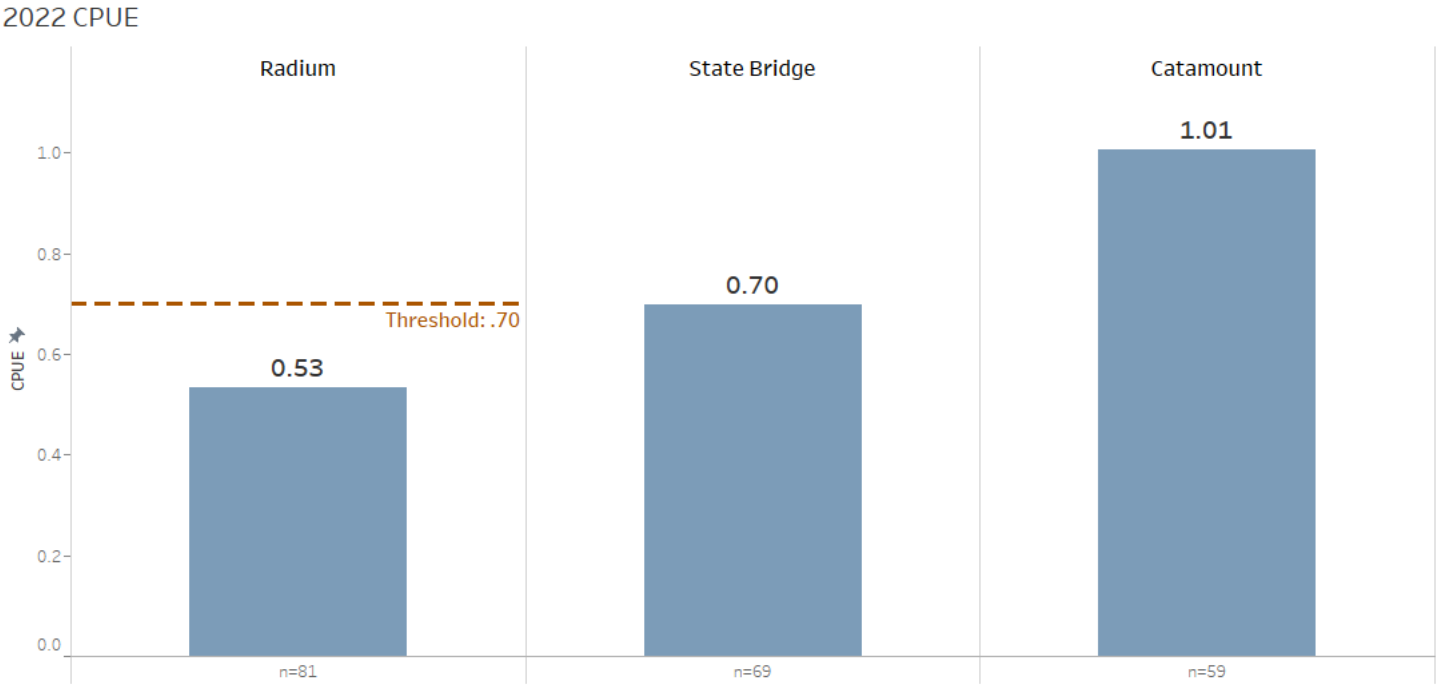
Likelihood to Return

Running Sum of Sample Size by Year/Water Year Type



Source: RRC Associates

Catch Per Unit Effort – Angler Survey ORV



CPUE: Catch per Unit of Effort - Fish caught per angler per hour.
Sample size equals number of anglers represented

Thresholds	Catch Per Unit Effort (CPUE)
Radium (Segment 5)	0.70
State Bridge (Segment 5)	-
Catamount (Segment 6)	-
Confidence Interval	95%

Current value after 2022 is .64 with n=453 anglers represented

Current value after 2022 is .80 with n=187 anglers represented

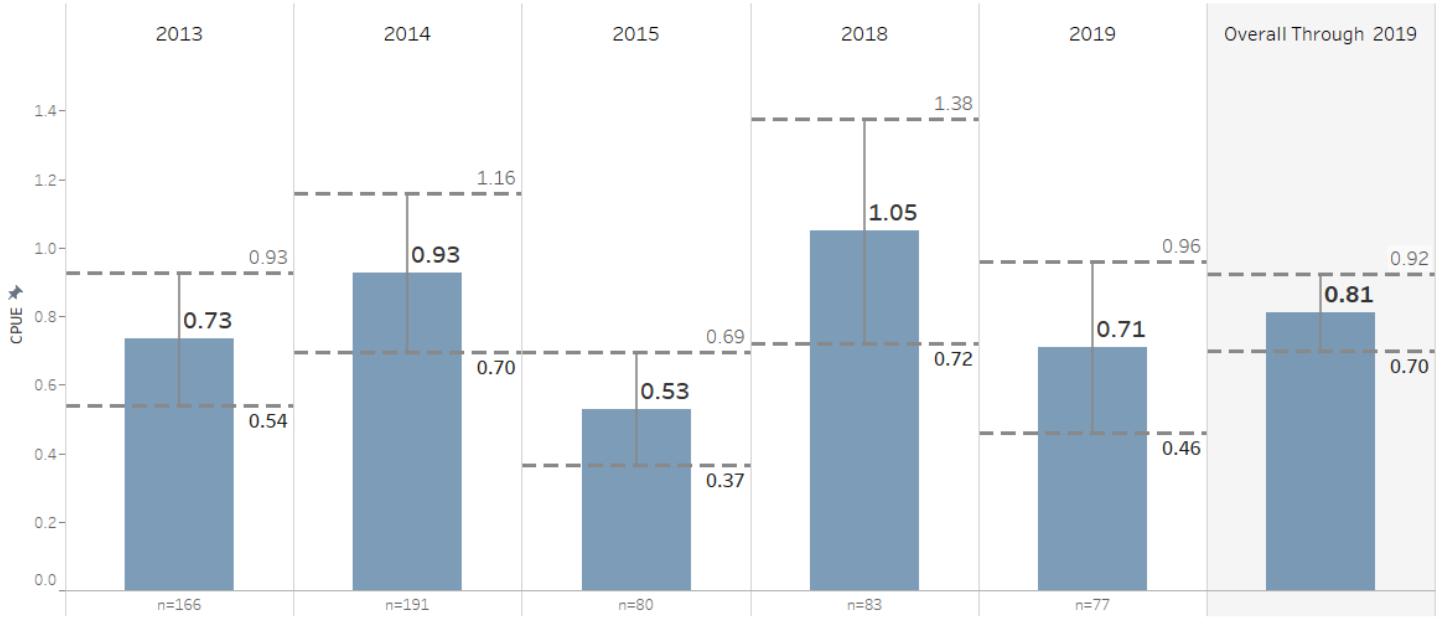
Sample size (number of anglers) required to establish CPUE Threshold:

- State Bridge (525). Current n=453 anglers represented
- Radium (531)
- Catamount (494). Current n=187 anglers represented

CPUE All Years

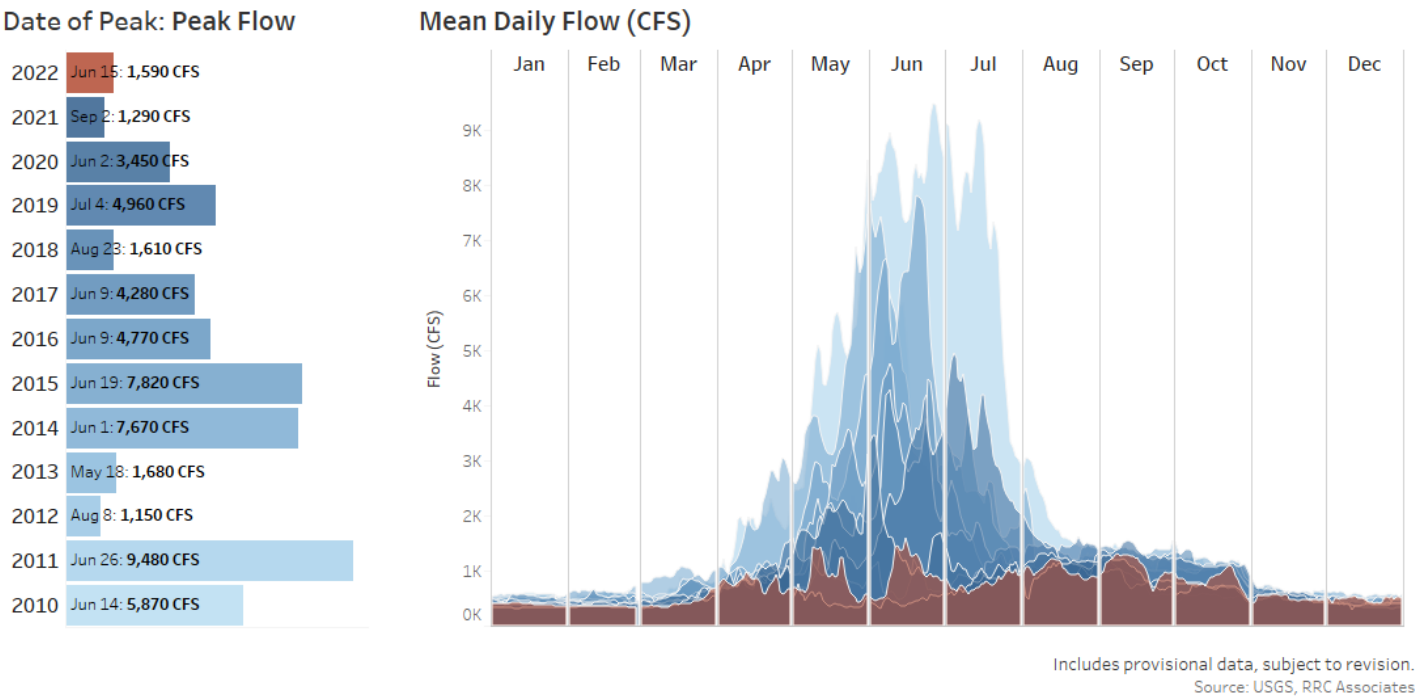
CPUE: Catch per Unit of Effort - Fish caught per angler per hour.
Sample size equals number of anglers represented

Radium Angling CPUE, 2013 - 2019



CPUE: Catch per Unit of Effort - Fish caught per angler per hour.
Margin of error calculated at 95% confidence. Sample size reflects number of anglers represented

Upper CO River Flow at Kremmling 2010 - 2022



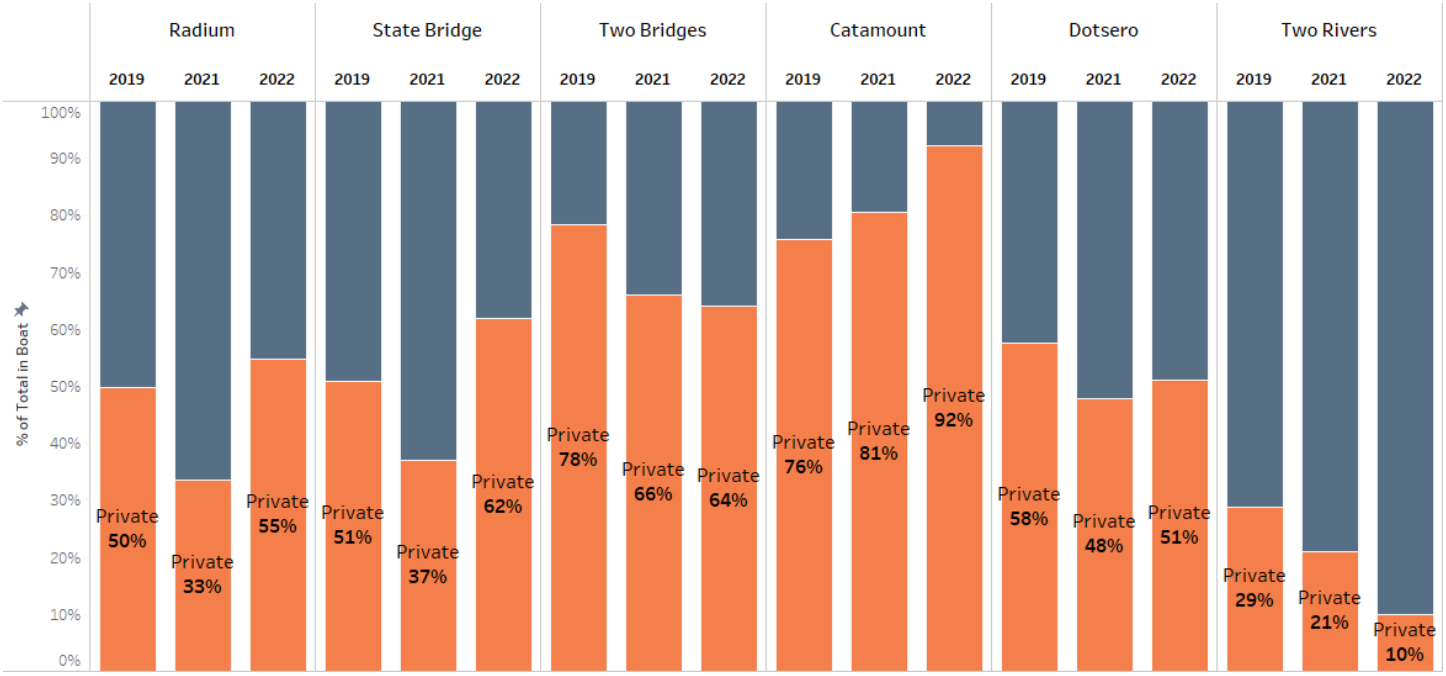
Includes provisional data, subject to revision.
Source: USGS, RRC Associates

Commercial vs. Private

Q 1: Were you boating with a commercial company, outfitter or guide today?

	Overall	2022 - Wet Typical (Seg. 4-6)	2022 - Dry Typical (Seg. 7)	2021 - Driest	2019 - Wettest	2018 - Dry Typical (Seg. 4-6)	2018 - Driest (Seg. 7)	2015 - Wettest	2014 - Wettest	2013 - Dry Typical
No	53%	55%	37%	45%	61%	59%	66%	54%	55%	48%
Yes	47%	45%	63%	55%	39%	41%	34%	46%	45%	52%
n=	7,365	825	385	1,488	975	468	317	698	1,175	1,034

Source: RRC Associates



Prior Use – Boater Survey

Q 4: Prior to today, how many times have you floated this section of river?

	Overall	2022 - Wet Typical (Seg. 4-6)	2022 - Dry Typical (Seg. 7)	2021 - Driest	2019 - Wettest	2018 - Dry Typical (Seg. 4-6)	2018 - Driest (Seg. 7)	2015 - Wettest	2014 - Wettest	2013 - Dry Typical
This was my first time	45%	45%	51%	52%	41%	41%	32%	42%	38%	55%
1 time before	9%	8%	13%	8%	9%	7%	8%	9%	10%	9%
2 - 5	13%	13%	14%	12%	14%	13%	16%	13%	15%	10%
6 or more	33%	34%	22%	28%	36%	39%	43%	36%	37%	26%
n=	7,361	821	381	1,481	972	471	318	698	1,184	1,035

Source: RRC Associates

Boating Skill Level – Boater Survey

Q 7: Please rate your boating skill level on the type of craft you were in today?

	Overall	2022 - Wet Typical (Seg. 4-6)	2022 - Dry Typical (Seg. 7)	2021 - Driest	2019 - Wettest	2018 - Dry Typical (Seg. 4-6)	2018 - Driest (Seg. 7)	2015 - Wettest	2014 - Wettest	2013 - Dry Typical
Beginner	36%	34%	44%	40%	29%	29%	24%	38%	34%	44%
Intermediate	34%	37%	34%	35%	37%	33%	40%	29%	35%	31%
Advanced	18%	19%	15%	16%	21%	24%	24%	21%	17%	14%
Expert	12%	10%	6%	9%	13%	13%	12%	13%	14%	11%
n=	7,328	821	374	1,474	969	472	316	694	1,173	1,035

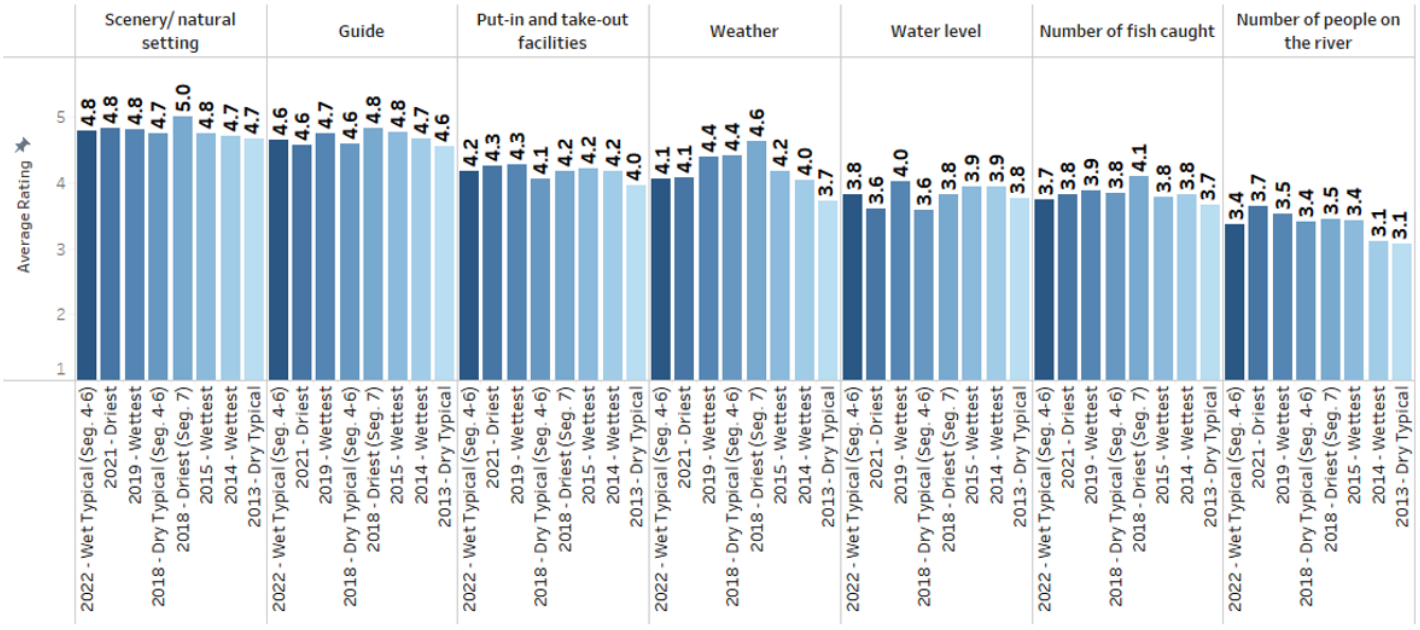
Source: RRC Associates

Ratings

All Years Angling Survey

Q 10: How did the following affect your experience today?

1 = Greatly reduced my experience today
5 = Greatly enhanced my experience today



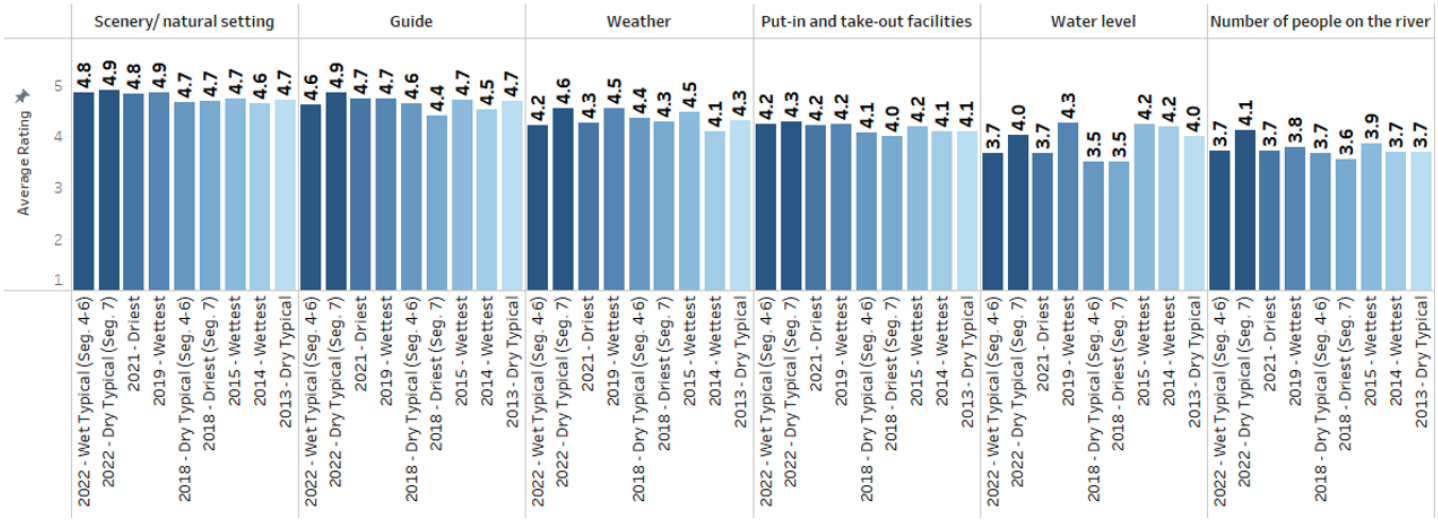
*Segment 7 Excluded

Source: RRC Associates

All Years Boater Survey

Q 10: How did the following affect your experience today?

1 = Greatly reduced my experience today
5 = Greatly enhanced my experience today



Source: RRC Associates

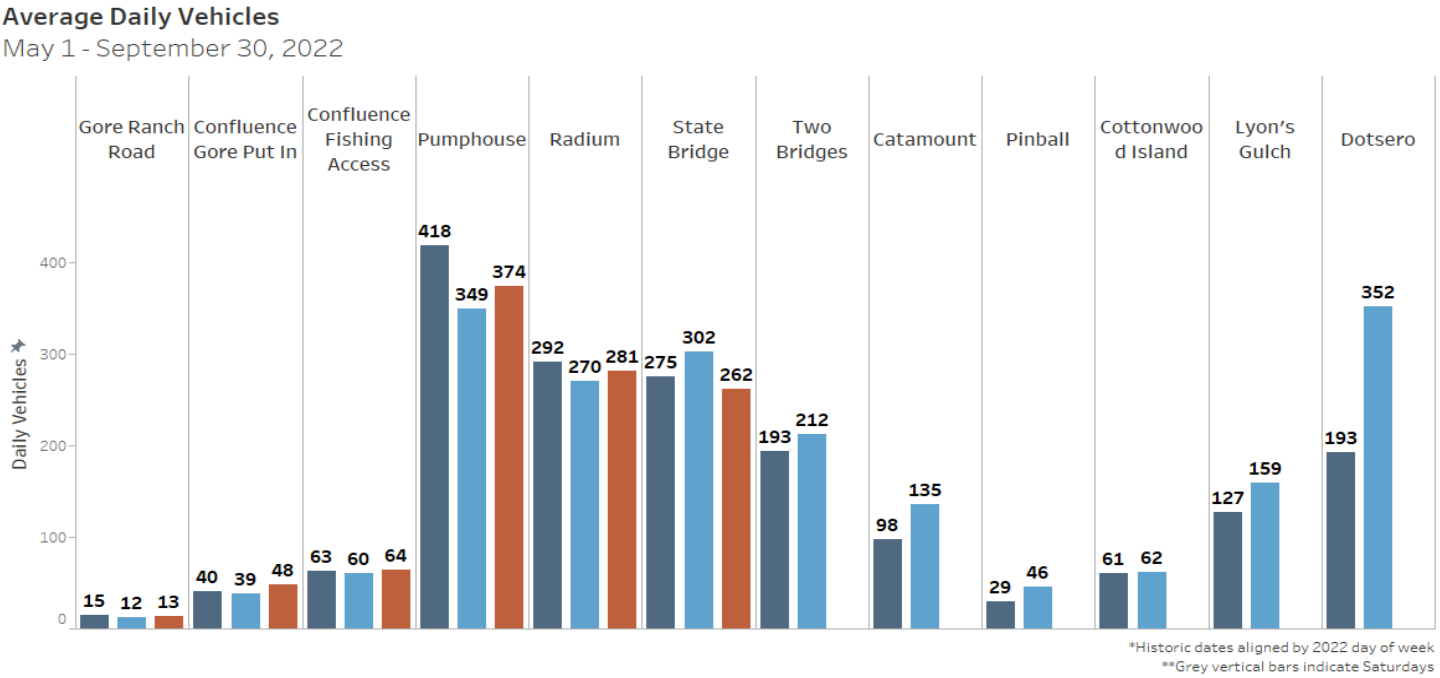
Impact of COVID-19

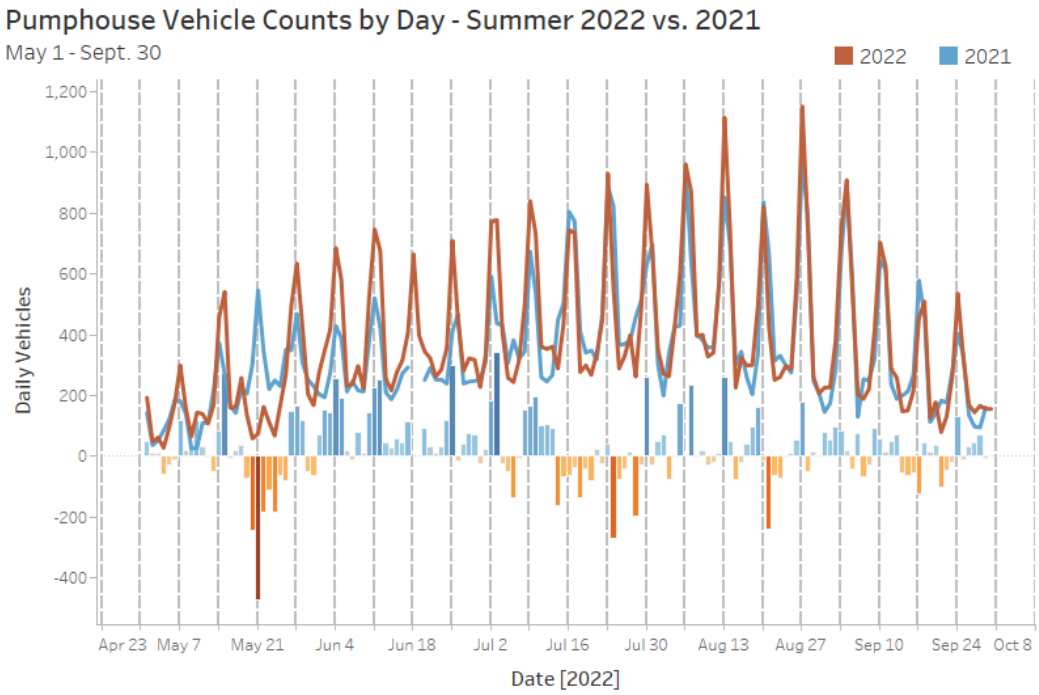
Q 9: Today, did COVID-19 influence your experiences or decision to boat on this section of river?
Boating and Angling Combined

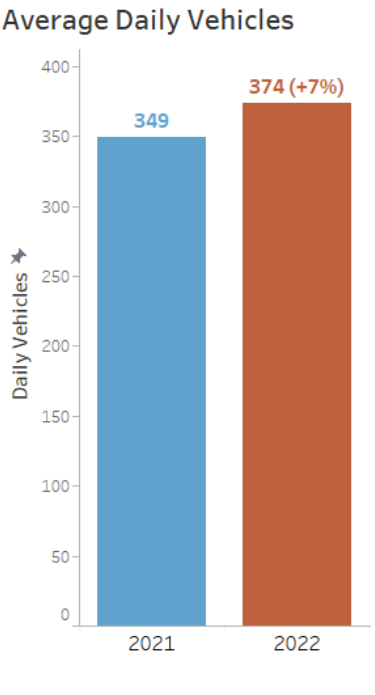
	Overall	2022 - Wet Typical (Seg. 4-6)	2022 - Dry Typical (Seg. 7)	2021 - Driest
Yes - This location was especially attractive in light of COVID considerations	8%	5%	5%	10%
No - COVID-19 did not influence my decisions or experiences today	92%	95%	95%	90%
Yes - My day was negatively impacted by COVID	0%		0%	0%
n=	2,964	958	344	1,662

Source: RRC Associates

Vehicle Counter Data

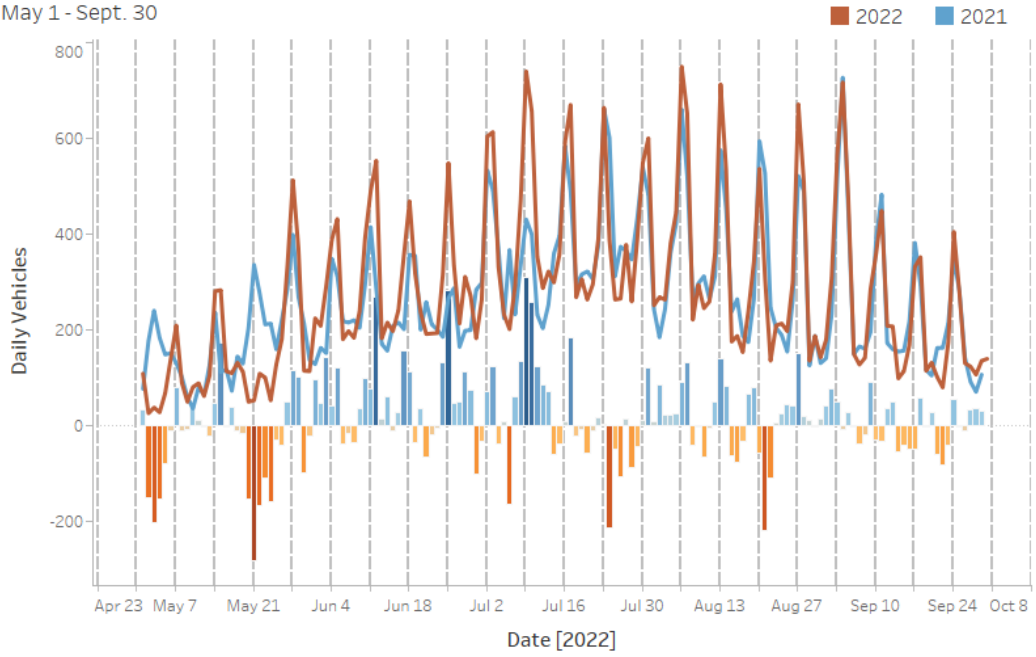






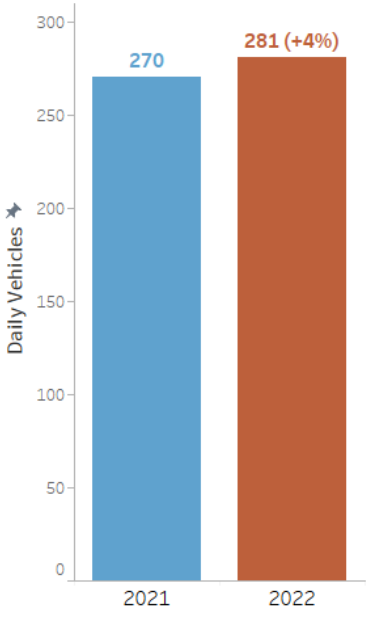
Radium Vehicle Counts by Day - Summer 2022 vs. 2021

May 1 - Sept. 30



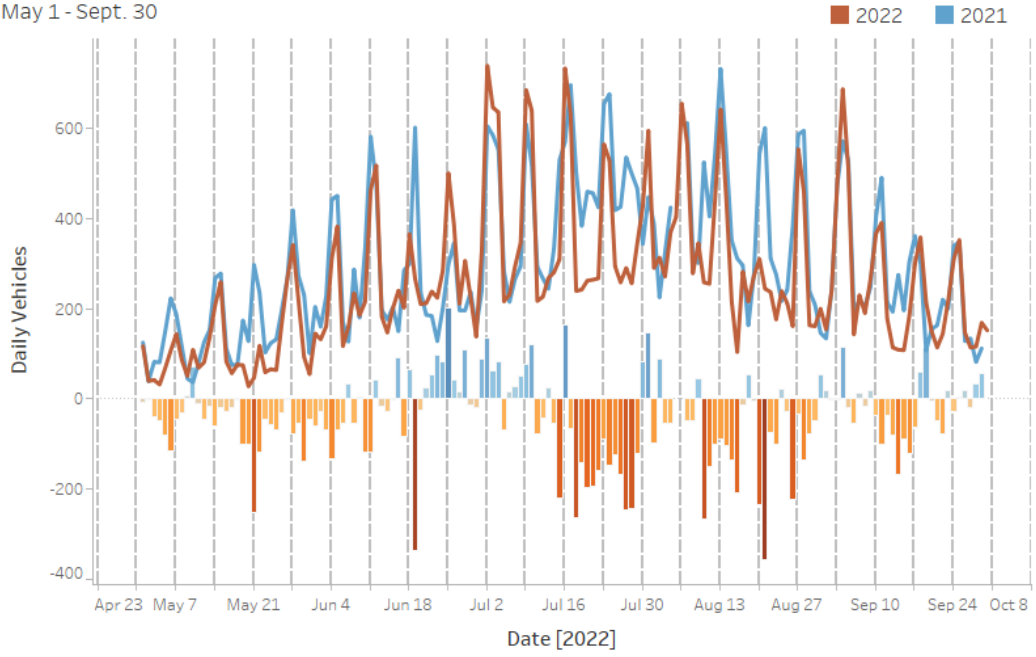
*Historic dates aligned by 2022 day of week
**Dashed grey vertical bars indicate Saturdays

Average Daily Vehicles



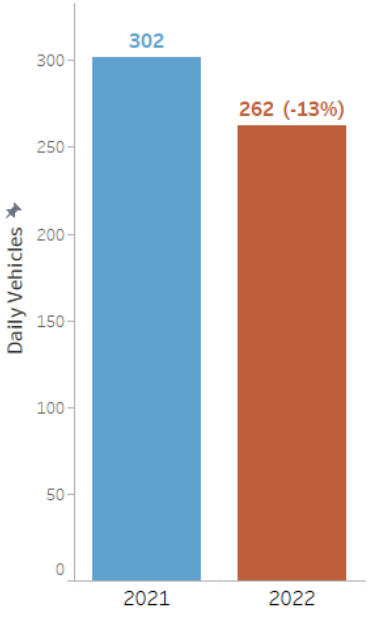
State Bridge Vehicle Counts by Day - Summer 2022 vs. 2021

May 1 - Sept. 30



*Historic dates aligned by 2022 day of week
**Dashed grey vertical bars indicate Saturdays

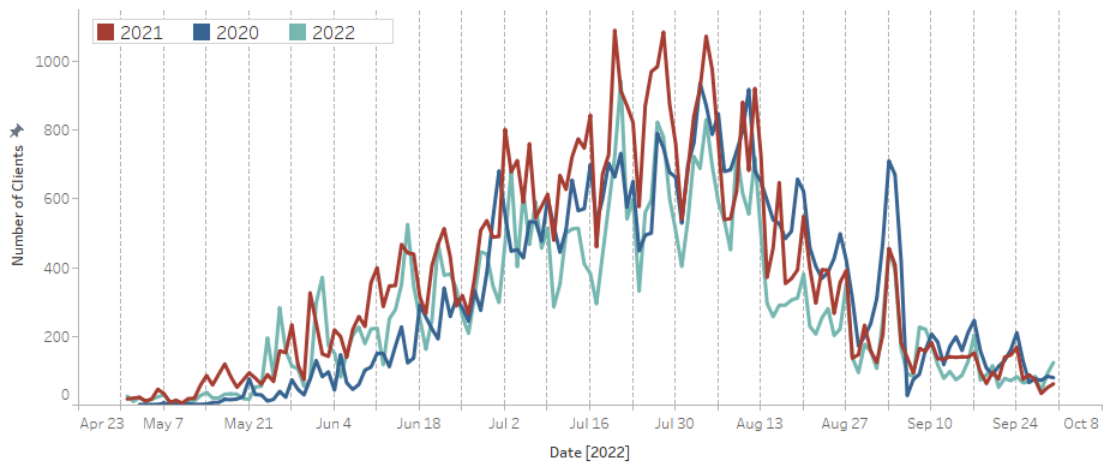
Average Daily Vehicles



Commercial Data

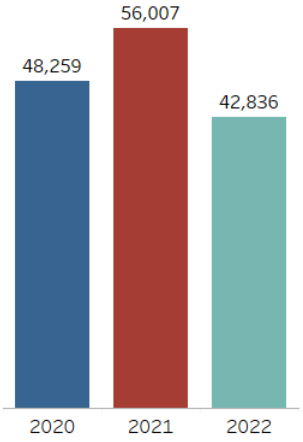
Number of Commercial Client Launches by Day

Kremmling and CRVFO Data, May 01 - Sep 30, 2022



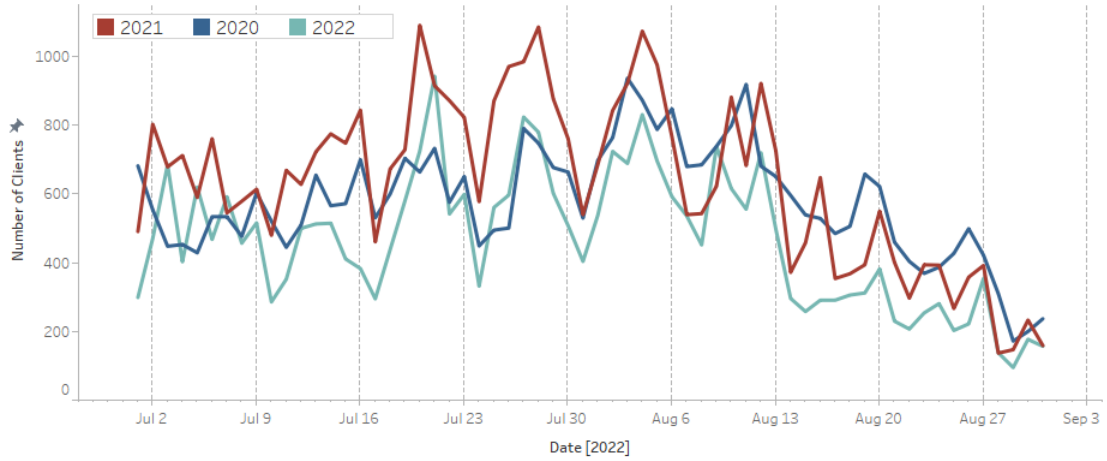
*Historic dates aligned by 2022 day of week
**Grey vertical bars indicate Saturdays

Total Commercial Clients



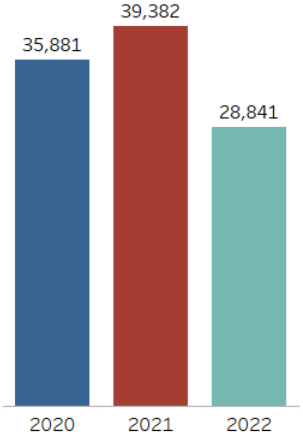
Number of Commercial Client Launches by Day

Kremmling and CRVFO Data, July 01 - Aug 31, 2022



*Historic dates aligned by 2022 day of week
**Grey vertical bars indicate Saturdays

Total Commercial Clients



APPENDIX E: 2023 Monitoring Plan

The Wild & Scenic Monitoring Committee (the Committee) has developed this proposal for 2023 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, macroinvertebrate monitoring, channel maintenance flow monitoring, and in-kind contributions.

Recreation Monitoring

For 2023, RRC Associates has submitted a $53,700 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 vehicle counts. The Committee worked with RRC, the SG's committees and agency representatives to develop RRC's final scope of work for 2023. Details of the proposed RRC program are shown in Table 1, below.

Table 25: Summary of 2023 RRC Program

	2021 (Completed)	2022 (Completed)	2023 (proposed)
Data Collection			
Intercept Surveys / Observational Data Collection	$28,000	$35,000	$40,250
Displacement Surveys (once every 3 years, last completed in 2021)	$3,000	N/A	N/A
Self-reporting Kiosk Data Collection	$3,000	N/A	N/A
User Group Surveys (once every 3 years, last completed in 2021)	$3,000	N/A	N/A
Vehicle Counters*	$3,500	$2,000	$1,000

Data Processing, Consolidation, and Management**			
Database Management	$2,500	$3,000	$3,450
Warehousing of SG Data	$2,500	$2,000	$2,300
Stakeholder Support**			
Committee Participation & Attendance	$6,000	$6,700	$6,700
TOTAL:	**$54,500**	**$51,700**	**$53,700**

*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 2023, which includes three time-series temperature loggers deployed at established study sites (highlighted in orange in Table 2, below). The W&S SG is a dues-paying member of GCWIN and will contract with GCWIN to administer the three W&S temperature sites during 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 Table 2, below.

Upon recommendation of the Committee, the SG approved weekly evaluation of stream temperature data, to be conducted by the Committee. The objectives for these weekly evaluations are to identify periods of thermal stress on W&S segments; provide the Committee and Stakeholder Group with timely data to make informed decisions; and assess stream temperatures against Colorado's stream temperature standard thresholds, using the computational averaging methods that were intended to accompany such assessments. Weekly evaluations will access data from the two USGS sites with telemetry (09058000 Colorado River at Kremmling and 09060799 Colorado River at Catamount). Data from the two sites will be downloaded, processed, plotted, and distributed to the Committee on a weekly basis from June – September.

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

Table 26: Stream temperature locations for 2023

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 Table 3, below. Consistent with the long-term monitoring plan, the Committee anticipates contracting with Timberline Associates to conduct macroinvertebrate sampling in 2023.

Table 27: W&S macroinvertebrate monitoring sites for 2023

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 Sweetwater	Eagle	39.70996	-107.047

Channel Maintenance Flow (CMF) Monitoring Plan Implementation

During 2023, the CMF Work Group will start collecting data per the Channel Maintenance Flow Observational Monitoring Plan. General observer notes and repeated photo points will be completed by the SG. Drone-based aerial imagery/photogrammetry, cross-sectional channel surveys, and substrate measures will be conducted by outside consultants. The CMF WG requests $2,500 for game cameras, at least one field trip, funds to execute the general observer notes, and materials to set photo points. The SG acknowledges that there will be a budget amendment to be approved at the July 2023 SG meeting after the contractor(s) are selected for drone-based aerial imagery/photogrammetry, cross-sectional channel surveys, and substrate measures.

Streamflow Monitoring (see Table 5)

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.

2023 Monitoring Plan – Cost Summary

The proposed monitoring plan for 2023 will cost $73,845. The breakdown for each element is shown in Table 4, below. In-kind contributions related to stream temperature and hydrology and flow-related monitoring are shown in Table 5, below.

Table 28: Monitoring budget for 2023

Category	2022 Cost
Recreation Monitoring (RRC Associates)	$53,700
Stream Temperature	
- Data analysis at 9 sites (Lotic Hydrological)	$800
- Monitoring of 3 W&S temp sites (GCWIN)	$1,553
- GCWIN membership dues	$552
Macroinvertebrate Monitoring	$14,740
Channel Maintenance Flows	
- CMF Monitoring Plan Implementation	$2,500 + cost for consultant(s) (budget amendment)
TOTAL:	**$73,845***

***Not including drone-based aerial imagery/photogrammetry, cross-sectional channel surveys, and substrate measures cost (SG budget amendment in July 2023).**

Table 29: Monitoring in-kind contributions for 2023/2024

Category	In-Kind
Stream Temperature	
- USGS stream temperature gage at Kremmling (River District)	$1,842
- 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 (USFS & BLM)	$17,500
TOTAL:	**$19,342**