Monitoring

Report

2019

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

> FINAL May 29, 2020

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Abbreviations and Acronyms

303(d)	Colorado's Section 303(d) list of impaired waters per Regulation 93
AF	Acre-Feet
BLM	U.S. Bureau of Land Management
CDPHE	Colorado Department of Public Health and Environment
CWCB	Colorado Water Conservation Board
CPW	Colorado Parks and Wildlife
CPUE	Catch Per Unit Effort
CROS	Coordinated Reservoir Operations
CFS	Cubic Feet per Second
DM	Daily Maximum
HUP	Historic User's Pool
MWAT	Maximum Weekly Average Temperature
M&E	Monitoring and Evaluation list per Colorado's Regulation 93
MMI	Multi-Metric Index
ORV(s)	Outstandingly Remarkable Value(s)
SG	Upper Colorado River Wild and Scenic Stakeholder Group
SG Plan	Upper Colorado River Wild and Scenic Stakeholder Group Management Plan January, 2012
TIV	Tolerance Indicator Value
TFE	Total Fishing Effort
USFS	U.S. Forest Service
USGS	U.S. Geological Survey
W&S	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 (W&S) 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 about 2 miles east of Glenwood Springs. The Upper Colorado River W&S 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." 2019 marked the fifth year of a five-year provisional period in the SG Plan, during which time the SG will evaluate and revise the provisional ORV Indicators and Resource Guides, if necessary.

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) 2019, from April 1, 2019 to March 31, 2020. These monitoring activities support evaluation of the provisional 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) to review the Resource Guide for Recreational Floatboating. The 2019 Year Type in all segments was in the Wettest 25% category.

During 2019, the Cooperative Measures Committee monitored streamflow and temperature in segments 4-7 and participated in Historic User's Pool (HUP) calls. E-mails summarizing activities on the Colorado River including forecasted flows, current stream temperature, and flow gage data were circulated to the Cooperative Measures Committee and Executive Committee regularly throughout the summer. Natural flows were adequate to accommodate the annual Gore Canyon Festival in August.

The SG monitored the provisional ORV Indicators in 2019. Based on available data, the provisional fishing ORV Indictor for Quality Trout was met at all three sites, but biomass was met only at Radium, as summarized in Table 1, below. Biomass at State Bridge was 87 pounds per acres and at Catamount was 81 pounds per acres while the provisional ORV Indicator is 90 pounds per acre.

1

Species diversity was below the provisional ORV Indicator of 14 at all sites.¹ Similarly, thresholds for Total Fishing Effort (TFE) and Catch per Unit Effort (CPUE) have not yet been established. The provisional ORV Indicator for boating is a narrative and was not evaluated.

ORV Indicator	Measure/Metric	2019 Status
Recreational Floatboating	Narrative	Not evaluated
Recreational Fishing	Quality Trout	Met at all three sites
	Biomass	Met at Radium, not met at State Bridge or Catamount
	Species Diversity	Not met at all three sites
	TFE / CPUE	No criteria to evaluate

Table 1. Summary of provisional ORV Indicators in 2019.

The SG also monitored the provisional Resource Guides in 2019. During the Provisional Period, the Resource Guides were used as a source of information among others to inform SG discussions under the SG Plan and are not intended to be used as a test for Plan success. Most Resource Guides were within range as summarized by Table 2. Summary of provisional ORV Resource Guides in 2019.. Flows were within range for both usable floatboating days and seasonal flows for fishing. The provisional flushing flow of 2,000 cfs for 3 consecutive days occurred, with flows at or above 2,000 cfs for 55 days in 2019, and a peak flow of 4,990 cfs on July 4, 2019. Daily Max (DM) and Maximum Weekly Average (MWAT) temperature observations attained the standards at all sites.

¹ Note: the "one-size-fits-all" approach to establishing provisional ORV Indicators is being re-evaluated during the Provisional Period in order to better reflect the variability in Quality Trout and Biomass that is now known to exist across W&S Segments 5 and 6.

ORV Resource Guides	Measure/Metric	2019 Status
Recreational Floatboating	Useable Days	Within range for all Opportunities
Recreational Fishing	Seasonal Flows	Within range for all seasonal flows
Recreational Fishing	Flushing Flows	Flows above provisional flushing flow
Water Quality ²	Water Quality Standards	Macroinvertebrates listed on M&E list
Water Temperature	Daily Maximum (DM)	No exceedances of the temperature threshold recorded
	Maximum Weekly Average	Potential exceedances of the
	Temperature (MWAT)	temperature threshold at Catamount,
		No Name, and Red Dirt

Table 2. Summary of provisional ORV Resource Guides in 2019.

In addition, the SG conducted additional monitoring in 2019 to support SG decisions, including Recreational Fishing and floatboating use data collected by RRC Associates (RRC), and macroinvertebrate collections by Timberline Aquatics. The SG also initiated a flushing flow study and field work was completed in 2019, with a final report completed in 2020.

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

INTRODUCTION

The 2012 Upper Colorado River Wild and Scenic Stakeholder Management Plan (SG Plan or Plan) was adopted by the U.S. Bureau of Land Management (BLM) and the U.S. Forest Service (USFS) as a Wild and Scenic (W&S) management alternative to protect the Outstandingly Remarkable Values (ORVs) identified in the Eligibility Reports for BLM segments 4 through 7 (USFS segments 1 through 2), which includes over 80 miles of the upper Colorado River (See Appendix A: Project Area Map). The purpose of the SG Plan is to "balance permanent protection of the ORVs, certainty for the Upper Colorado River Wild & Scenic Stakeholders (SG or "stakeholders"), water project yield, and flexibility for water users." Key elements of the SG Plan include provisions for protection of the ORVs and a plan for monitoring the ORV Indicators and Resource Guides to assist in implementation of the SG Plan.

Protection of the ORVs

The 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 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 Program³. The 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

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).

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...and Recreational Floatboating...The SG Plan uses two distinct tools – 'ORV Indicators...' and 'Resources Guides...'" (SG Plan, p.3). ORV Indicators, which describe conditions that characterize the ORVs, are monitored to gauge whether the ORVs are being protected under the SG Plan. Provisional ORV Indicators were developed for Recreational Floatboating and Recreational Fishing. Failure to meet criteria related to the provisional or final ORV Indicators (SG Plan, Section IV) may be cause for elevation and potential termination of the SG Plan.

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

The Monitoring Plan included in the SG Plan has an initial 5 year provisional period during which the SG will monitor, evaluate, and revise the provisional ORV Indicators and Resource Guides, if necessary. The provisional period began when BLM and USFS signed their Records of Decision (RODs) in June 2015. Consequently, the 2019 water year was the fifth year of the SG's provisional period.

PURPOSE

The purpose of this report is to provide a summary of monitoring activities and cooperative measures conducted by the SG in 2019. Monitoring activities include evaluation of the provisional 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 SG Plan, the 2019 monitoring year began on April 1, 2019 and ended March 31, 2020.

HYDROLOGY

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

Data for three streamflow gages were available in the W&S segments in 2019 (Table 3). The SG Plan uses the U.S. Geological Survey (USGS) Kremmling (USGS 09058000) and Dotsero (USGS 09070500) gages to monitor flows in segments 4 through 7. In addition, the SG spearheaded the installation of the Catamount gage (USGS 09070500) in October of 2016 at the Catamount Bridge in segment 6. This gage is operational for 8 months each year, from March 15th through November 15th and is used to monitor streamflow, water temperature and air temperature. Figure 1, Figure 2, and Figure 3 display the historic median daily streamflow and the average daily streamflow from all gages during the 2019 W&S Year.

All three hydrographs and all subsequent analyses use USGS data available as of April 30, 2020, including approved and provisional data. The Kremmling gage data is provisional from November 7, 2019 to March 31, 2020, the Dotsero gage is provisional from November 5, 2019 to March 31, 2020, and the Catamount gage is provisional from October, 21 2019 to March 31, 2020. Only USGS data and USGS estimates were used, there were no missing values.

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

Table 3. USGS gages operated in segments 4, 6 and 7 in 2019.



Figure 1. Daily streamflow in 2019 at the Colorado River near Kremmling, CO gage (USGS 09058000).



Figure 2. Daily streamflow in 2019 at the Colorado River near Dotsero, CO gage (USGS 09070500).



Figure 3. Daily streamflow in 2019 at the Colorado River at Catamount Bridge, CO gage (USGS 09060799).

YEAR TYPE DETERMINATION

The SG Plan calls for evaluating and categorizing annual flow volumes by "Year Type" (Table 4). The actual Year Type is based on total annual flow volumes measured at the Kremmling (USGS 09058000) and Dotsero (USGS 09070500) gages from April 1st through March 31st. In addition, the SG evaluates the predicted Year Type based on the Colorado Basin River Forecast Center's April 1 Water Supply Forecast (Table 5). The April 1 prediction is based on undepleted forecasted flows. The April 1 prediction in 2019 estimated that the undepleted flows would be 975,000 acrefeet (AF) for Kremmling and 1,580,000 AF at Dotsero (Table 6). Based on these volumes the predicted flows at both Kremmling and Dotsero were classified as a "Wet Typical" Year Type.

During W&S Year 2019, the total actual annual flow volume at the Kremmling gage was 886,815 AF and the total volume at the Dotsero gage was 1,801,686 AF (red font indicates provisional values), consequently, these volumes are ranked in the "Wettest 25%" category. It is worth noting that 5 of 8 years since 2012 have been classified as "Wettest 25%" or "Wet Typical." This is partly due to the Year Type classification, which is based on simulated future modeled hydrology, which includes water projects that have not yet been fully constructed.

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

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

Table 5. April 1, 2019 forecast predicted Year Type classifications for segments 4-6 and segment7.

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

Table 6. Summary of April 1 flow predictions, actual flow volumes, and actual Year Type from
2012 through 2019 for all segments.

	Segment 4-6 Kremmling Gage			Segment 7 Dotsero Gage		
Year	April 1			April 1		
	Prediction	Actual AF	Actual Type	Prediction	Actual AF	Actual Type
2012	Driest 25%	409,208	Driest 25%	Driest 25%	733,824	Driest 25%
2013	Driest 25%	514,954	Dry Typical	Driest 25%	1,107,878	Dry Typical
2014	Wettest 25%	1,207,257	Wettest 25%	Wettest	2,170,195	Wettest
2015	Dry Typical	1,074,067	Wettest 25%	Dry Typical	1,744,893	Wettest
2016	Wet Typical	855,910	Wettest 25%	Dry Typical	1,565,583	Wettest
2017	Wet Typical	790,942	Wettest 25%	Wet Typical	1,439,400	Wet Typical
2018	Dry Typical	511,023	Dry Typical	Dry Typical	947,581	Driest 25%
2019	Wet Typical	886,815	Wettest 25%	Wet Typical	1,801,686	Wettest 25%

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

2019 COOPERATIVE MEASURES

During 2019, the Cooperative Measures Committee developed web-based tools to aid in discussions on Resource Guides and potential cooperative efforts on the Colorado River. A floatboating usable day tool, which is populated by preliminary gage data at the Kremmling and Dotsero gages, was developed and published on the Upper Colorado Wild and Scenic website. The tool provides a graphical representation and an automated summary of the number of usable days for each opportunity category defined in the SG Plan. The Cooperative Measures Committee has also been in the process of developing an automated tool to calculate year-to-date flow volumes and compare the volumes and projections to the Year Type volumes as defined in the SG Plan.

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

Coordinated Reservoir Operations (CROS) occurred from June 13th through June 22nd in 2019. The primary objective of CROS is to enhance spring peak flows in a section of the Colorado River upstream of the confluence with the Gunnison River for the benefit of endangered fish, without diminishing reservoir or diversion yields or affecting the timing of reservoir filling. The CROS coordinating group worked to extend the peak flow in the Colorado River for fish that are

protected under the Endangered Species Act (Figure 4)⁴. The CROS operation also created higher peak flows in all the segments as releases from participating upstream CROS reservoirs passed through the segments.



Figure 4. Daily streamflow in 2019 with CROS at the Colorado River near Kremmling gage (USGS 09058000), above the Eagle River confluence, and at the Palisade gage (USGS 09106150).

During the summer, representatives from the Cooperative Measures Committee were involved in discussions regarding operational flexibility within the Colorado River. In August, the Bureau of Reclamation, Northern Water, Fish and Wildlife Service for the Upper Colorado Endangered Fish Recovery Program, and the Colorado River District coordinated 5412 operations between

⁴ 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). https://www.coloradoriverrecovery.org/documents-publications/work-plan-documents/arpts/2019/isf/12C~C-14 FY19AR%20CROS.pdf

Wolford Reservoir and Granby Reservoir. Water was released from Granby and stored in Wolford for later use in the 15 Mile Reach for the Upper Colorado River Endangered Fish Recovery Program. This exchange, which occurs sooner than when the water is called for in the 15 mile reach, is an important example of operational flexibility which allows for increased flow to address low flows and elevated temperatures in the Colorado River between Windy Gap Reservoir and Kremmling in early August.

In 2019, the HUP Managing Entities declared a Surplus with the HUP allocation within Green Mountain Reservoir.⁵ Surplus deliveries commenced on August 29th and continued through October 31st, allowing for release in excess of 50,000 acre-feet for the Upper Colorado River Endangered Fish Recovery Program. Surplus releases ranged from 300 to 500 cfs during this time.

Denver Water and the Bureau of Reclamation exercised an exchange between Williams Fork and Green Mountain Reservoirs from August 29th through September 29th. From October 1st through November 24th, releases were made from Green Mountain while channel work was completed below Williams Fork. The exchange kept the Colorado River below Kremmling whole to complete work below Williams Fork.

Members of the Wild and Scenic Cooperative Measures Committee and the Floatboating ad hoc Committee worked with the HUP call participants on slight changes to flows in the Colorado River to facilitate a successful flushing flow study (Mid-June), Gore Canyon Race (August 24th), and macroinvertebrate sampling (Late-October).

⁵ Conditions can allow for the declaration of a HUP Surplus. Water that is surplus to the needs of the HUP, can be used for Municipal Recreation contract deliveries to entities in the Grand Valley, which uses have the ancillary benefit of providing environmental benefits to the 15-Mile Reach of the Colorado River. Such releases are administered in a manner that also provides recreational and environmental benefits the stream reaches that are the subject of the SG Plan.

2019 MONITORING RESULTS

The Monitoring Committee assembled or collected information to evaluate the provisional ORV Indicators and review the Resource Guides. During 2019, the SG conducted the following activities:

- Determined Recreational Floatboating usable days and recreational seasonal flows by Year Type.
- Evaluated fish biosurvey data collected by Colorado Parks and Wildlife (CPW).
- Evaluated temperature readings at eight sites operated by USGS, BLM, and the SG.
- Funded boating and float-fishing intercept surveys, a displacement survey, and other data gathering efforts and analysis by RRC Associates.
- Funded macroinvertebrate data collection at five locations.
- Funded a flushing flow study.

RECREATIONAL FLOATBOATING

ORV Indicators for Recreational Floatboating

The SG Plan has a provisional ORV Indicator for Recreational Floatboating, which applies to the Upper Colorado River from the top of Gore Canyon to No Name in Glenwood Canyon. The provisional ORV Indicator is the following narrative standard:

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

The intent of the SG is to develop and incorporate objective criteria into the final ORV Indicators for Recreational Floatboating. The Floatboating ad hoc Committee continued to work towards this goal based in part on recreational survey work conducted by RRC Associates. This work is summarized in the Additional Monitoring section.

Resource Guides for Recreational Floatboating

Resource Guides for Recreational Floatboating are based on assessing the number of usable days at different flow rates depending on the Year Type determined by the CBRFC's April 1st forecast for Kremmling (segments 4-6) and Dotsero (segment 7).

Segments 4-6

Provisional Floatboating Resource Guides for segments 4-6 are shown in Table 7. In 2019, there were 174 total usable days in these segments during the floatboating season (April 1 to September 30), which was within the Resource Guide range for usable days in a Wettest 25% Year-Type e. Of those, 68 days were in the "Green Opportunities" category, 94 days were in the "Blue Opportunities" category, and 12 days were in the "Black Opportunities" category (Table 8). Provisional Resource Guides for the number of usable days in these segments were within or better than the Resource Guide range in 2019. Figure 5 illustrates mean daily streamflow and the range of floatboating opportunities in these segments during the 2019 floatboating season.

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

<u></u>	Total Usable	Green Opportunities	Blue Opportunities	Black Opportunities
Year Type	Days	(700-1,300 cfs)	(1,300-4,000 cfs)	(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

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

Table 8. Summary of usable days in segments 4-6 from 2012 through 2019.

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



Figure 5. Hydrograph from the Colorado River near Kremmling, CO gage (USGS 0905800) demonstrating the floatboating opportunities in 2019 in segments 4-6.

W&S Segment 7

The provisional Resource Guides for segment 7 are shown in Table 9. In 2019, there were 152 total usable days in this segment during the floatboating season (April 1 to September 30), which was within the range in the Wettest 25% Year Type. This included 49 usable days in the "Green Opportunities" category, 81 usable days in the "Blue Opportunities" category, and 22 usable days

in the "Black Opportunities" category (Table 10). Figure 6 illustrates mean daily streamflow and the range of floatboating opportunities in this segment during the 2019 floatboating season.

Year Type	Total Usable Days	Green Opportunities (1,200/1250-1,800 cfs)	Blue Opportunities (1,800-5,500 cfs)	Black Opportunities (5,500-8,600 cfs)
Wettest 25%	120 (156) 169	33 (57) 83	49 (68) 77	21 (29) 42
Wet Typical	126 (164) 172	44 (68) 102	39 (75) 110	1 (13) 33
Dry Typical	138 (161) 178	75 (86) 121	40 (61) 91	0 (2) 11
Driest 25%	136 (159) 177	88 (126) 137	10 (32) 63	0 (0) 6

 Table 9. Provisional Floatboating Resource Guide for number of usable days in segment 7

 minimum (median) maximum.

Table 10. Summary of usable days in segment 7 from 2012 through 2019.

Year	Year Type	Total Usable Days	Green Opportunities (1,200/1250 - 1,800 cfs)	Blue Opportunities (1,800-5,500 cfs)	Black Opportunities (5,500-8,600 cfs)
2012	Driest 25%	136	131	5*	0
2013	Dry Typical	152	94	57	1
2014	Wettest 25%	158	34	96	28
2015	Wettest 25%	159	69	79	11*
2016	Wettest 25%	165	86	54	25
2017	Wet Typical	179	64	97	18
2018	Driest 25%	156	93	63	0
2019	Wettest 25%	152	49	81	22

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



Figure 6. Hydrograph from the Colorado River near Dotsero, CO gage (USGS 09070500) demonstrating the floatboating opportunities in 2019 in segment 7.

RECREATIONAL FISHING

ORV Indicators for Recreational Fishing

The SG Plan identifies five provisional ORV Indicators for Recreational Fishing (Table 11, below), which apply to the Upper Colorado River from Gore Canyon to Red Dirt Creek, within Segments 4, 5 and 6: Quality Trout abundance, Biomass, Species Diversity, Total Fishing Effort (TFE), and

Catch Per Unit Effort (CPUE). These provisional Fishing ORV Indicators characterize both the *fishery* and the *fishing experience* (SG Plan page 14) in segments 4, 5 and 6 (SG Plan page 14). The SG monitors these provisional ORV Indicators based on the results of annual fish population surveys (biosurveys) conducted by CPW, as well as angler intercept surveys performed by RRC, Associates.

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

 Table 11. Provisional ORV Indicators for Recreational Fishing in segments 4-6.

Starting in 2010, CPW began conducting extensive biosurveys across segments 5 and 6. It has become apparent in the CPW biosurveys during the Provisional Period that the "one-size-fits-all" approach to definition of the provisional ORV Indicators for Quality Trout and Biomass does not reflect the natural variability that is now known to exist in the fishery across segments 5 and 6.

The provisional Fishing ORV Indicators establish minimum thresholds for Quality Trout abundance (i.e., "Quality Trout"), Biomass, and fish Species Diversity. Refer to Table 11, above, for specific metrics. A Quality Trout is recognized as a trout over 14 inches, and the minimum target abundance is 24 Quality Trout per acre. The minimum target for Trout Biomass has been defined as 90 pounds of trout per acre. The SG monitors these provisional ORV Indicators through CPW's biosurveys which they use to evaluate fish abundance, biomass, and presence/absence of species. CPW's biosurveys are regularly conducted along four established two-mile reaches within segments 5 and 6 at Radium, State Bridge, Catamount, and Lyons Gulch, as identified in the map of CPW biosurvey sites in Appendix B. It is not feasible to perform a biosurvey in segment 4, Gore Canyon, and since the Recreational Fishing ORV ends in segment 6 at the confluence with Red Dirt Creek, and the Lyons Gulch reach is located downstream of Red Dirt Creek, the Lyons Gulch biosurvey is not included in this summary. CPW's biosurveys are conducted annually

between April 15 and May 15 on two of the four reaches, generally in alternating years at each reach (exceptions are noted in Table 12). The data is analyzed and reported by CPW to the W&S Stakeholders.

The results of CPW's biosurveys and RRC intercept data from 2010 to 2019 (Table 12) are discussed below. In 2019, biosurveys were conducted at Radium, State Bridge and Catamount. Between 2010 and 2015, data reported was for brown trout only; however, starting in 2016 trout estimates were recalculated by pooling data for both brown trout and rainbow trout since the ORV and the provisional ORV Indicators do not distinguish between the two trout species that dominate the river fishery. Starting with the 2016 Monitoring Report, pooled trout estimates are reported for Quality Trout and Biomass for the biosurvey reaches, thus comparisons made between the most recent monitoring reports and reports before 2016 must take this change into consideration.

Quality Trout Evaluation

In 2019, CPW estimated Quality Trout abundance to be 77 trout over 14 inches per acre in the Radium Reach, 28 trout in the State Bridge reach, and 27 trout in the Catamount reach. Each site exceeded the Quality Trout target abundance; Radium by 221%, State Bridge by 17%, and Catamount by 13%. Quality Trout abundance at each of the three survey reaches varies annually. Abundance of Quality Trout was documented at its highest at both Catamount and Radium. Indeed, at Radium, a long-term trend of increasing Quality Trout abundance has been documented. Catamount's Quality Trout abundance also met the ORV Indicator for the first time, and continues to be considered a relatively stable trout population with acceptable increases and decreases in abundance annually. Though State Bridge estimates indicate a reduced abundance of Quality Trout this year, the reach is well within acceptable variability of Quality Trout abundance over time and continues to meet the ORV Indicator threshold.

Biomass Evaluation

In 2019, CPW estimated Trout Biomass to be 186 pounds per acre in the Radium Reach, 87 pounds per acre in the State Bridge reach, and 81 pounds per acre in the Catamount reach. The provisional ORV Indicator for Trout Biomass was only met at the Radium Reach, which exceeded the threshold by 106%. Neither State Bridge nor Catamount met the established threshold, falling short by 3% and 11%, respectively. Trout Biomass at State Bridge and Catamount varies annually but is considered relatively stable over time despite estimates falling short of the provisional ORV Indicator.

Species Diversity

Species Diversity is the total number of species detected during CPW's biosurveys. In 2019, CPW captured 12 different species of fish in the Radium reach, and 10 and 9 species in both the State Bridge and Catamount reaches, respectively. All surveyed reaches fell short of the provisional species diversity values. This is four fewer species than the SG's provisional ORV Indicator, a discrepancy of 29%. Table 13 lists all species caught by CPW in the W&S segments from 2010 – 2019 and provides information about class and endemic status of these species with regard to CPW's fishery management objectives. Table 13 also indicates which species were detected in the 2019 biosurveys.

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

The SG Plan does not specify values for TFE and CPUE, but indicates that values are to be determined in the provisional period. Results from the research have been analyzed and combined with data from previous years (2013-2015, 2018) to augment TFE and CPUE measures. RRC Associates continued to explore the data generated by angler intercept surveys and coordinated with the Fishing ad hoc Committee and CPW to consider the relationships between biosurvey data and RRC's data. In addition, RRC continued to assist the SG in interpreting the available data on TFE and CPUE. This assistance will continue as the SG considers refining the ORV Indicators during the provisional period.

Sampling Metric	ORV	2010	2011	2012	2013	2014 ^b	2015	2016	2017	2018	2019
Radium (segment 5)											
Quality Trout (# > 14"/acre)	24	44	60	49	52	-	65	-	66	-	77
Biomass (lbs/acre)	90	121	143	155	164	-	145	-	173	-	186
Species Diversity (# present)	14	12	14	15	14	-	11	-	7	-	12
CPUE (annual average)	TBD	-	-	-	0.73	0.93	0.53	-	-	1.05	.71
Number of anglers represented		-	-	-	166	191	80	-	-	83	77
State Bridge (segment 6)											
Quality Trout (# > 14"/acre)	24	-	-	-	52 ^c	-	23	31	33	40	28
Biomass (lbs/acre)	90	-	-	-	172 ^c	-	71	74	86	108	87
Species Diversity (# present)	14	-	-	-	11 ^c	-	8	7	9	10	10
CPUE (annual average)	TBD	-	-	-	0.94	0.74	0.67	-	-	.66	.54
Number of samples		-	-	-	34	75	99	-	-	73	30
Catamount (segment 6)											
Quality Trout (# > 14"/acre)	24	-	18	-	19	-	22	-	-	21	27
Biomass (lbs/acre)	90	-	57	-	57	-	50	-	-	56	81
Species Diversity (# present)	14	-	7	-	12	-	8	-	-	10	9
CPUE (annual average)	TBD	-	-	-	-	1.25	0.93	-	-	-	1.66
Number of samples	-	-	-	-	-	24	60	-	-	-	20
Two Bridges (segment 6)											
CPUE (annual average)	TBD	-	-	-	-	-	0.56	-	-	.79	.82
Number of samples		-	-	-	-	-	47	-	-	131	120

Table 12. Summary of CPW biosurvey and RRC intercept survey data collected in 2010 – 2019. Shading indicates unmet provisional ORV Indicators.

^a Data in this table in previous reports included only brown trout; all years shown in this table have been revised to include both brown and rainbow trout.

^b High water prevented CPW from conducting biosurveys in the W&S segments in 2014.

^c CPW determined the biosurvey data collected at State Bridge in 2013 was imprecise. An additional biosurvey was performed in this survey reach in 2016.

Fish	Class	Endemic Status	2019
Colorado Cutthroat Trout	Coldwater fish	Native	Х
Rainbow Trout	Coldwater Sportfish	Introduced	х
Rainbow/Cutthroat Hybrid	Coldwater Sportfish	Hybrid - introduced	х
Brown Trout	Coldwater Sportfish	Introduced	х
Brook Trout	Coldwater Sportfish	Introduced	х
Kokanee Salmon	Coldwater Sportfish	Introduced	
Lake Trout	Coldwater Sportfish	Introduced	
Mountain Whitefish	Coldwater Sportfish	Introduced	х
Speckled Dace	Non-game	Native	
Mottled Sculpin	Non-game	Native	х
Bluehead Sucker	Non-game	Native	х
Flannelmouth Sucker	Non-game	Native	
White Sucker	Non-game	Invasive	х
Longnose Sucker	Non-game	Invasive	х
White/Longnose hybrid	Non-game	Hybrid - invasive	х
White/Flannelmouth hybrid	Non-game	Hybrid - invasive	х
White/Bluehead hybrid	Non-game	Hybrid - invasive	х
Longnose/Bluehead hybrid	Non-game	Hybrid – invasive	х
White/Flannelmouth/Bluehead	Non-game	Hybrid – invasive	х

Table 13. Fish species captured from 2010 – 2019 in the segments 5 & 6. Species captured in 2019 at State Bridge, Radium, and Catamount are identified below. "Invasive" indicates undesirable non-native species.

Resource Guides for Recreational Fishing

Seasonal Flows

The provisional Resource Guides shown in Table 14 represent the seasonal ranges of flow for the Recreational Fishing ORV in segments 4, 5 and 6. Since the effective date of the 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 for purposes of discussion under the SG Plan.⁶

⁶ During the provisional period, the 5-year rolling average will include data from the previous 4 years.

Season	Number of Days	Months	Seasonal Fish Flow Range, 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, December	400-800	600
4	121	January, February, March	400-600	500

 Table 14. Provisional Resource Guides for Recreational Fishing in segments 4-6.

Calculations of the seasonal average flow and rolling 5-year average flows are based on daily mean discharge data from April 1, 2019 to January 26, 2020 at the Kremmling gage (USGS 09058000). These calculations included use of provisional data as discussed in the Hydrology section.

Figure 7 provides a comparison of 5-year average seasonal flows at the Kremmling gage to the provisional Resource Guides between 2014 and 2019. The 5-year rolling average is within or above the Seasonal Flow ranges in Seasons 1, 2, and 3 in 2019. The 5-year rolling average for Season 4 was 482 cfs, which is below the midpoint, but within the range of the Seasonal Flow Resource Guide. Season 4 results are based on provisional data for 2019. In all but one case, the 5-year average stream flows exceed the mid-point value of the seasonal flow ranges for each season. The exception is the 2012 average flow of 434 cfs during Season 4, which falls within the target flow range, but below the midpoint of 500 cfs.





Flushing Flows

In addition to seasonal flows, the SG Plan includes "Flushing Flows" as a provisional Resource Guide for the Fishing ORV. During the provisional period, the SG has negotiated the following provisional Resource Guide for a periodic high flow: "A daily average flow of at least 2,000 cfs maintained for three consecutive days with a frequency of occurrence of once in two years on average." Table 15 summarizes instantaneous peak stream flows, or "Flushing Flows" from 2012 through 2019 based on the Colorado River near Kremmling, CO gage (USGS 09058000). Streamflow exceeded 2,000 cfs in 2019, reaching an instantaneous peak of 4,990 cfs on July 4, 2019.

Year	Year Type	Instantaneous Peak Streamflow, cfs	Maximum Daily Mean Streamflow, cfs	2,000 cfs for 3 consecutive days	Number of days above 2,000 cfs
2012	Driest 25%	1,280	1,150	No	0
2013	Dry	1,750	1,680	No	0
2014	Wettest 25%	7,830	7,670	Yes	99
2015	Wettest 25%	7,860	7,820	Yes	76
2016	Wettest 25%	4,830	4,770	Yes	58
2017	Wettest 25%	4,380	4,280	Yes	32
2018	Dry Typical	1,650	1,610	No	0
2019	Wettest 25%	4,990	4,960	Yes	55

Table 15. Peak streamflow and flushing flow metrics based on the Colorado River near Kremmling gage (USGS 09058000).

In 2019, the SG funded a flushing flow study by the USGS This study used hydrophones to evaluate movement of gravels and fine sediment at various levels of flow The study was completed at two locations, one in the vicinity of the Radium boat ramp and the other at a site 3.4 miles upstream from the Catamount gage. The study also included two longitudinal passes through portions of segments 5 and 6 at two different flow rates. The study will be reported in a USGS Scientific Investigations Report expected in June 2020.

WATER QUALITY

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

"The [provisional] Resource Guides for water quality are the Colorado Department of Public Health and Environment (CDPHE) water quality standards for cold water aquatic life and recreation uses for the portion of the stream segment that CDPHE has designated COUCUC03 (Mainstem of the Colorado River from the outlet of Granby Reservoir to the confluence with the Roaring Fork River) that is within the segments 4 through 7."

These standards are specified in CDPHE's Regulation #33 - Classifications and Numeric Standards for the Upper Colorado River Basin and North Platte River.

Colorado's Section 303(d) List of Impaired Waters and Monitoring and Evaluation List (Regulation #93 – 5 CCR 1002-93), effective March 2, 2018, lists Segments COUCUC03_C and COUCUC03_D (Gore Canyon to Derby Creek; W&S Segments 4, 5, and the top of 6) on the Monitoring &

Evaluation list for macroinvertebrates. Segments COUCUC03_C, COUCUC03_D, and COUCUC03_E are identified as impaired for temperature (From 578 Road Bridge to the confluence with the Roaring Fork River; W&S Segments 4 – 7). Appendix A shows the locations of the relevant W&S segments. Regulation 93 listings necessarily lag the most recent year's data by as much as four years because listings are based on the most recent five years of data at the time of the data call, which must be validated and processed via the Water Quality Control Division's listing process. The 2018 list uses data from 2011-2015.

Listed Portion	Description	Affected Use	Parameter	Category /List	Segment
COUCUC03_C	Colorado River from 578 Road Bridge to Gore Canyon	Aquatic Life	Temperature	3b. – M&E list	4
COUCUC03_C	Colorado River from 578 Road Bridge to Gore Canyon	Aquatic Life	Macroinvertebrates	3b. – M&E list	4
COUCUC03_D	Colorado River from Gore Canyon to Derby Creek	Aquatic Life	Temperature	5 303(d)	4, 5, 6
COUCUC03_D	Colorado River from Gore Canyon to Derby Creek	Aquatic Life	Macroinvertebrates	3b. – M&E list	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

Table 16: Segments listed for impairment in Colorado's WQCC Regulation #93 - 5 CCR 1002-93.

Water Temperature

The provisional Resource Guide for water temperature is based on the WQCC's standard for segment COUCUC03, ⁷ mainstem of the Colorado River from the outlet of Lake Granby to the confluence with Roaring Fork River, which is classified as a Cold Stream Tier II. Regulations provide both numeric and narrative guidance, stating that "temperature shall maintain a normal pattern of diurnal and seasonal fluctuations with no abrupt changes and shall have no increase in temperature of a magnitude, rate, and duration deemed deleterious to the resident aquatic life."⁸

⁷ Colorado Department of Public Health and Environment, Water Quality Control Commission 5 CCR 1002-31, 01/31/2018.

⁸ Colorado Department of Public Health and Environment, Water Quality Control Commission 5 CCR 1002-33, 12/31/2019.

Table 17 shows the currently adopted numeric temperature standards for the Upper Colorado River Basin. Attainment of chronic temperature standards is based on a Maximum Weekly Average Temperature (MWAT), which is defined as a seven-day moving average. Attainment of the acute temperature standard is based on a Daily Maximum (DM), which is defined as the highest two-hour average water temperature in each 24-hour period. Temperature data are evaluated against numerical standards for chronic (MWAT) and acute (DM) seasonal maxima.

Temperature Tier	Species Expected	Applicable Months	Temperature Standard MWAT (°C)	Temperature Standard DM (°C)
Cold Stream Tier	All other	Jun 1 - Sep 30	18.3	23.9
II (CS-II)	cold-water	Nov 1-Mar 31	9.0	13.0
	species ⁹	Apr 1 – May 31 & Oct 1 – Oct 31	16.9	21.2

Table 17. CDPHE numeric temperature standards for Cold Stream Tier II.

In 2019 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 two BLM temperature sites (Table 18 and Figure 8).

Table 18.	2019 1	Cemperature	stations,	responsible	agencies,	and locations.

Site ID	Station Description	Responsible Agency	Latitude	Longitude
UPCO_DOT	Upper Colorado River above Dotsero	W&S	39°38′52″	107°03'46"
UPCO_RD	Upper Colorado River below Red Dirt Creek	W&S	39°48′2″	106°58'26"
UPCO_SB	Upper Colorado River above State Bridge	W&S	39°51′20″	106°38′40″
9058000	Colorado River near Kremmling	USGS	40°02'12"	106°26'22"
9060799	Colorado River at Catamount Bridge	USGS	39°53'28"	106°49'54"
9071750	Colorado River above Glenwood Springs	USGS	39°33'32"	107°17'25"
COR-Pump	Colorado River upstream of Pumphouse	BLM	39°59'23"	106°30′30"
COR-Rad	Colorado River at Radium	BLM	39°57'16"	106°33 2"

⁹ All other cold-water species includes brown trout and rainbow trout.



Figure 8. 2019 Time-series temperature monitoring station locations.

The Monitoring Committee has been collecting and reviewing water temperature data within the W&S segments since 2012. Data availability at each site in the years from 2012 to 2019 is shown In Table 18. 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://www.gcwin.org/data. USGS data can be obtained from https://maps.waterdata.usgs.gov/mapper/. A summary of these and other relevant time-series water temperature data were prepared for the SG and Northwest Colorado Council of Governments in the "Wild and Scenic Group Water Temperature Data Inventory and Evaluation" report completed by Lotic Hydrological in July of 2019.

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

Table 19. Time-series water temperature data availability from 2012 to 2019 in segments 4 – 7 (in downstream order).

2019 water temperature data was analyzed by Lotic Hydrological. The 2019 temperature data shows the typical natural downstream warming trend between Kremmling and Glenwood Springs (Figure 9 and Figure 10). In general, during runoff and post-runoff conditions, little warming is observed between the mouth of Gore Canyon below Kremmling and Radium due to geographic confinement in a steep walled canyon, with a more-recognizable increase from site to site downstream of Radium.



Figure 9. Weekly average temperatures (WAT) in 2019 and the applicable WQCC summer, shoulder, and wintertime Maximum Weekly Average Temperature (MWAT) standards.



Figure 10. Measured daily maximum (DM) temperatures in 2019 and applicable WQCC summer, shoulder, and wintertime DM standards.

Based on comparison to State standards¹⁰ no sites exceeded the chronic or acute temperature standards in 2019. Although the Colorado River above Glenwood site reached the MWAT standard temperature for a brief period during the second week of August, the event is unlikely to achieve the threshold for a regulatory exceedance if the Division's *Warming Event* criteria were to be applied. Although three sites had absent data for a period of approximately two to three weeks in August and early September, a comparison of temperature trends at adjacent upstream and downstream monitoring locations during these time periods indicates a general cooling trend, therefore the possibility of unmonitored exceedances at sites in these time periods is unlikely. An official regulatory analysis per WQCD's 2018 Section 303(d) listing methodology and Policy Statement 06-1, which tallies exceedances using only non-overlapping 7-day periods and may exclude exceedances based on exceptions for air temperature, low flow, or shoulder-season excursions has not been conducted. MWAT potential exceedance summaries by site for 2013-2019 are shown in Table 20.

¹⁰ 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)

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

Table 20. MWAT exceedances at W&S temperature sites from 2013 – 2019.

*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

Water temperature conditions are driven by multiple factors, with air temperature and flow conditions contributing strongly to daily and seasonal patterns. Due to a good snow year and lingering late season snowpack, the W&S segments qualified as a wettest Year Type in W&S Year 2019, and temperature concerns remained diminished throughout the warm season in the critical period between snowmelt recession and initiation of downstream water calls at Cameo and/or Shoshone. Segments 4 through 7 (WQCD 305(b) segments COUCUC03_D and COUCUC03_E) maintained their status as Category 5 for temperature (Water Quality Impaired, or '303(d)-listed') in 2019. CDPHE will release updated segment status in the 2020 Integrated Report (Regulation 93). Monitoring data for the 2019 monitoring season will not be considered in this report update, but may be submitted for the 2021 data call¹¹ by April 15, 2020 if desired by the stakeholder group.

FISHING AND FLOATBOATING USER SURVEYS

In 2013, the SG retained RRC Associates (RRC) to develop and conduct fishing and floatboating surveys (intercept surveys) at river access sites within the W&S segments (see Appendix D), with the understanding that the data collected from these surveys would be used to inform

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

management decisions. RRC has completed intercept surveys between 2013 and 2015 and again in 2018 and 2019.^{12 13 14 15} The goals of RRC's 2019 research included:

- a) To advance the pilot effort to establish baseline measures and methods for future use to evaluate ORVs.
- b) To continue to evaluate existing data including intercept survey results from prior years, and to add results from 2019 fieldwork.
- c) To refine methods for warehousing and accessing data.

The SG is using the results of RRC's multi-year efforts to assist in refining the provisional ORV Indicators and Resource Guides in the SG Plan.

In addition to the goals listed above, RRC's work in 2019 focused on: creating a new survey program designed to permit benchmarking of data over time, obtaining additional vehicle count information, evaluating commercial data from multiple years, and creating new methods for sharing data among stakeholders. RRC data is available on the Tableau platform (<u>http://rrcinteractive.squarespace.com/</u>). RRC is also working to create tools for warehousing data now and into the future. The following are some key elements of the 2019 program.

Floatboating and Angling Survey Research in 2019

Designed to gather data in formats developed in 2013-2015 and 2018, and closely following the guidance provided by the protocols document produced in 2017, the 2019 research program was based on surveying conducted on 15 "study days" over the 2019 summer season. In 2019, the intercept survey instruments for floatboating and angling were changed slightly to obtain more open-ended comments regarding the river experience. The total number of surveys collected in 2019 numbered 1,092.

For the purposes of quantifying visitor use levels and satisfaction, the SG has elected to cross reference visitor experiences on the Upper Colorado River as indicated in surveys with Year Types as described in the Hydrology section. Year Types include: Driest (0 to 25th percentile), Dry

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

 ¹³ RRC Associates, Inc., 2015, Upper Colorado River Wild & Scenic Stakeholder Group, 2014 Pilot Study - Final Results
 ¹⁴ RRC Associates, Inc., 2016, Upper Colorado River Wild & Scenic Stakeholder Group, 2015 Pilot Study and 3 year provisional period summary

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

Typical (26th to 50th percentile), Wet Typical (51st to 75th percentile), and Wettest (76th to 100th percentile). Selected results from years 2013 to 2019 are reported in Appendix E by year with the Year Types identified. The complete set of 2019 plots is available via the Tableau Dashboard link above. Some of the key findings from 2019 are described below.

- A key goal of the SG is to collect a sufficient number of surveys in each Year Type to enable a scientifically valid characterization of the visitor experience. 2019 represents the third year in five years of surveying in a Wettest 25% Year Type.
- Locations of surveying were shifted in 2019 to respond to relatively wet conditions, which were in contrast to 2018 Dry Typical conditions. Particular emphasis was placed on segment 6 boaters and anglers in an effort to augment the sample for this section of the river.
- In general, results are similar to past years although some shifts in behavior and ratings were evident in response to relatively wet conditions (Appendix E; figures 17 and 18). For example, survey respondents were more likely to characterize water conditions as "high acceptable" (14%) or "just about right" (58%) this year. 9% of all respondents called the water level "too high." These are the highest levels of this category recorded in any season, and are higher than those observed in the two prior "Wettest" Year Types. Similarly, ratings of water levels on the "experience today" showed increases in the percent of respondents saying water level "greatly" or "slightly" reduced the experience.
- RRC collected data in 2019 in support of the "Not likely to return" ORV metric proposed by the Floatboating AHC. The results showed little change in 2019 (Appendix E; figure 15). In other words, under the relatively wet conditions in 2019 that contrasted with a dry (Dry and Driest) Year Type in 2018, there was <u>not</u> an increase in visitors saying they would not return.
- CPUE results were reported in 2019 (Appendix E; figure 14) for the following locations in support of establishing ORV Indicator thresholds: Radium, State Bridge, Two Bridges, and Catamount.
- As noted above, a full set of breakdowns of survey responses, by Year Type, are presented in the Appendix.

User Group Surveys

RRC developed and conducted a web-based survey program that was distributed by American Whitewater. The 2019 "User Group" survey was designed to build upon a 2017 study that was distributed by similar means, as well as a study conducted in 2015 using the website *Mountain Buzz* to distribute the survey. The 2019 survey is a part of a continuing effort to evaluate "proof of concept" tools that might be used in the future to monitor river user experiences on an annual basis. The survey was intended to investigate whether useful data could be collected in a cost-effective way that could provide additional insight on user experiences to augment intercept data. Further, the technique provides a source of geographic-specific insight; survey respondents reported on their experiences on floats with both put-in and take-out locations identified. As a result, the understanding of experiences along the segments can be evaluated through survey-based data. The findings provide a benchmark of user-based data from the 2019 season and can be further evaluated. This type of survey can also be repeated in future years to develop multi-year evaluations of the river experience by a diverse set of river users.

Outfitter Surveys

An Outfitter Survey effort was initiated in 2019. This survey represented another "proof of concept" program designed to gather information from river outfitters and guides. The questionnaires were similar to the User Group surveys fielded in 2019. The survey forms were developed to gather information from outfitters themselves (i.e. the licensed business owners that operate guided trips on the Upper Colorado), as well as the guides that they hire. Digital and paper surveys were distributed to a list of identified outfitters in August and early September 2019. Reminder surveys were also sent in an attempt to improve response rates. In the end, only five completed surveys were obtained. The conclusion from this survey effort is that alternative means of encouraging participation of outfitters must be found if the input from this segment of river users is to be captured.

Wade Fishing Surveys—Special Angler Survey

In 2019, an effort was made to collect surveys from wade anglers upstream from the Pumphouse Recreation Area. This program continued the surveying that was initiated mid-summer 2017 and continued in summer 2018. The purpose of this effort was to collect data from these individuals using survey questions comparable to those asked of anglers who floated the river during

intercept surveys conducted from 2013-2015, 2018, and 2019. Signs were posted at a kiosk to encourage participation, and survey forms provided to allow exiting anglers to report their fishing results. The form asked anglers to report the number of hours they fished and the number of fish caught in order to calculate TFE and CPUE; these are survey-based metrics that are being discussed for a potential angling ORV measure. Data from the surveys were analyzed and the survey responses were compared to results obtained from floating anglers as obtained downstream in segments 5 and 6.

Responses from the wade-fishing kiosk resulted in 103 completed surveys obtained between July 1 and October 15, 2017, 146 surveys in 2018, and 277 surveys in 2019. In 2019, the calculated TFE was 3.9 hours fished per reported angler (down from the 4.4 observed in 2018 and the 4.0 in 2017). The CPUE was 1.6 (down from 1.9 in 2018 but up from 1.4 in 2017). This is higher than results reported by floating anglers from intercept surveys.

Commercial Data

RRC tabulated 2018 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.

Vehicle Counters Program

Three vehicle counters were placed at Pumphouse, Radium, and State Bridge for the 2019 season. RRC assisted the BLM in monitoring and analyzing data from 2019. Vehicle counters were monitored and downloaded periodically from May through October. The 2019 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.

In 2019 as in 2018, the BLM Colorado Field Office placed vehicle counters downstream of State Bridge. The results from these counters have been integrated with data collected from the RRC annual effort. In the future, it is anticipated that the role of the SG (assisted by RRC) will change: RRC will assist in analyzing data from the multiple counters but will no longer be charged with placing and monitoring the units.

River Ranger Data

USFS and participating outfitters support interviews of river users in segment 7 by USFS River Rangers. Daily interviews record observations of user patterns at the sites, and the resulting graphs portray the number of people observed and segment 7 user patterns. Historic dates are aligned by 2019 day of week. The data have been shared with the SG on a cooperative basis and are compiled in Tableau format to permit various analyses. The 2019 findings are summarized in Appendix E along with results from previous years (2014-2018). The River Ranger data can be segmented and explored as requested by SG members.

Data Management and W&S SG Support

RRC conducted a number of other activities including warehousing and management of W&S SG data, sharing data in Tableau dashboard format, and analysis and visualization. RRC continued participation in SG and Committee work as requested. RRC also expanded the Tableau Dashboard to make the results of floatboating and angling data readily available to the SG. The dashboard represents a work in progress, undergoing continuing refinement and improvement, but it now represents a viable tool for interested groups to obtain current data from the surveying program from 2013-2019. Intercept Survey Research Protocols, developed in 2017 by RRC and the Floatboating AHC, were used to guide the survey research efforts and to ensure that methods are documented and can be replicated over time. Additionally, in 2019 a set of Angling Protocols were added to the Floatboating Protocol document to further guide research fieldwork and data collection efforts. RRC's contributions were intended to: advance the pilot effort to establish baseline measures and methods that will be used to guide research in the future, continue to evaluate existing data, refine methods for accessing that data, and to assist with the SG's efforts to refine the provisional ORV Indicators and Resource Guides for Recreational Fishing and floatboating. Raw data and research results were shared and discussed with the SG and committees in a variety of settings.

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 strategically selected metrics, and monitoring of physical habitat and water quality parameters, it is possible in some cases to identify specific factors (or types of factors) that are likely driving observed changes in aquatic communities.

In 2019, The Fishing ad hoc Committee agreed that macroinvertebrate biomonitoring was useful for understanding the health of the aquatic ecosystem and its continued ability to support the strong fishery needed to support the Recreational Fishing ORV for segments 4 through 6. In August 2019, the SG approved a long-term macroinvertebrate sampling and analysis protocol that includes sampling for macroinvertebrates every other year starting in 2021, subject to funding. The Monitoring Committee recommended, and the SG again approved contracting with Timberline Aquatics, Inc. for 2019 biomonitoring at five established sites in the Colorado River from Pumphouse to downstream of Red Dirt Creek. The decision was made to conduct biomonitoring in 2019, because higher than average snowpack and high runoff were anticipated following an exceptionally warm and dry 2018.

Because WQCC water quality standards for cold water aquatic life are the provisional Water Quality Resource Guides in the SG Plan, the 2019 Bioassessment study was conducted using an approach consistent with CDPHE's Aquatic Life Bioassessment methodology (assessment methodology).¹⁶ The CDPHE methodology relies on Colorado's multi-metric index (MMI). Upper Colorado Wild & Scenic segments 4 through 6 are classified as "Transition" or "Biotype 1" streams. The current applicable MMI v4 attainment and impairment thresholds are 45 and 34, respectively. When MMI falls between these scores for a site, a Shannon Diversity index (SDI) score greater than 2.1, or an Hilsenhoff's Biotic Index (HBI) score less than 5.8 would indicate

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

attainment of aquatic life standards. All sites had MMI scores greater than 56 in 2018, making them subject also to the alternative assessment approach intended to protect high-quality stream habitat from large declines, greater than 22 points in representative samples taken more than 12 months apart.

2019 Biomonitoring

During October 2019 Timberline Aquatics, Inc. collected macroinvertebrate samples at five sites in the segments from Pumphouse to below Red Dirt Creek (Table 21, Figure 11). All macroinvertebrates collected were identified, counted, and their CDPHE bioassessment metrics calculated using the MMI v4 method and subsampling process, which includes a range of metrics and the overall MMI v4 calculation, plus the SDI and HBI auxiliary metrics.

In 2019, MMI scores for all sites indicated they were in attainment of currently applicable aquatic life use (Cold Water, Class I). The MMI scores were above the attainment thresholds for each site and did not decline more than 22 points from 2018. In their full 2019 biomonitoring report, Timberline Aquatics Inc. reports a range of other useful metrics that are not part of CDPHE Aquatic Life Use assessment, including density, taxa richness, EPT (*Ephemeroptera, Plecoptera, Trichoptera*) taxa, Giant Stonefly (*Pteronarcys californica*) density, percent EPT taxa excluding *Baetidae*, and percent *Chironomidae*. Some metrics provided were only possible because of the full count Hess sampling method employed for sample collection, and they provide additional indication of macroinvertebrate community health or impacts. See the full Bioassessment report from Timberline Aquatics for an explanation of these additional metrics.¹⁷

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

Table 21. Bioassessment monitoring sites.

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



Figure 11 Bioassessment monitoring site locations

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

Table 22. Individual metrics and MMI v4 scores from benthic macroinvertebrate samples collected in the Colorado River Wild & Scenic study area during October 2019. All metric scores based on MMI v4 subsampling process.

SUBSTRATE MONITORING

In 2019, the SG did not conduct substrate monitoring. The 2018 Annual Monitoring Report contains a summary of all substrate data completed to date.

2020 MONITORING PLAN

The SG approved its fiscal year 2020 Monitoring Plan which continues stream temperature monitoring at the previous 3 locations and adds a new monitoring location in the Blue River upstream from the confluence with the Colorado River. The BLM Kremmling field office has offered to purchase, install, and maintain this new site. The SG has also approved conducting additional Recreational Floatboating and fishing user surveys and other supporting data. The group does not plan to sample macroinvertebrates in 2020 or complete any other additional monitoring work. The SG plans to develop a Channel Maintenance Flow Monitoring Plan within 1 year of adoption of the Amended and Restated Plan.

APPENDICES

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

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 two 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.

Grand County

In 2015, Grand County initiated macroinvertebrate monitoring at the Gore Canyon Whitewater Feature at Pump House (WWF) as required by special condition number 4 of the U.S. Army Corps of Engineers (USACE) Permit No. SPK-2013-00580, issued November 6, 2014.

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

Grand County's monitoring activities during 2019 represented the final year in five years of required monitoring under Grand County's Clean Water Act Section 404 permit for the Whitewater Park.

Colorado Department of Public Health and Environment (CDPHE)

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

CDPHE's data and information is chiefly used in the development and revisions of standards and criteria or performing assessments that determine attainment of Colorado's water quality standards and criteria, including reporting the status of water quality across Colorado. The SG relies on CDPHE's monitoring and assessment efforts to evaluate the provisional Water Quality Resource Guide for segments 4-7.

APPENDIX D: FISHING AND BOATING SURVEY SITES



APPENDIX E: RRC SELECTED SUMMARY GRAPHS

		2013 - Dry Typical	2014 - Wettest	2015 - Wettest	2018 - Dry Typical (Seg. 4-6)	2018 - Driest (Seg. 7)	2019 - Wettest	Overall
Segment 5	Radium	465	445	125	137		307	1,479
	State Bridge	402	537	342	119		60	1,460
	Total	867	982	467	256		367	2,939
Segment 6	Two Bridges Catamount Dotsero		9	8 15 57	77		190 8 108	275 32 289
	Total		9	80	201		306	596
Segment 7	Grizzly Creek Two Rivers Total	175	68 125 193	102 52 154		5 313 318	263 263	350 753 1.103
Grand Total	Total	1,042	1,184	701	457	318	936	4,638

Source: RRC Associates Floatboating Survey

Figure 10. Number of Floatboating Intercept Surveys by Site and Year Type.

		2013 - Dry Typical	2014 - Wettest	2015 - Wettest	2018 - Dry Typical (Seg. 4-6)	2019 - Wettest	Overall
Segment 5	Radium	166	191	80	83	77	597
	State Bridge	34	75	99	73	30	311
	Total	200	266	179	156	107	908
Segment 6	Two Bridges			47	131	120	298
	Catamount		24	60		20	104
	Dotsero			9	42	30	81
	Total		24	116	173	170	483
Grand Total		200	290	295	329	277	1,391

Source: RRC Associates Angler Survey

Figure 11. Number of Anglers Represented by Site and Year Type.



Figure 12. CPUE: Catch per Unit of Effort by Site, 2013-2015, 2018-2019.

Floatboating Survey: How did the following affect your experience today?

Category	Year - Year Type	Avg. Rating	Percent Responding					
Number of people	2019 - Wettest	3.8	8%	8	39%	17%	36%	
on the river	2013 - 2015, 2018	3.7	9%	9% 39%		15%	35%	
Put-in and	2019 - Wettest	4.2		20% 22%		53%		
take-out facilities	2013 - 2015, 2018	4.1		22%	23%		49%	
Scenery/natural	2019 - Wettest	4.9	5% 91%					
setting	2013 - 2015, 2018	4.7	4% 8	96		84%		
Water level	2019 - Wettest	4.3	5%	16%	22%		57%	
	2013 - 2015, 2018	4.0	4 96 9 96	17%	21%		48%	

Source: RRC Associates Floatboating Survey

Response

Greatly enhanced my experience today

Somewhat enhanced

Neither reduced or enhanced

Slightly reduced

Greatly reduced my experience today

Figure 13. Boater Survey – Ratings Sorted by Average Importance (categories of primary interest only), 2019 vs. Previous Seasons Combined.

Angling Survey: How did the following affect your experience today?

Category	Year - Year Type	Avg. Rating	Percent Responding						
Number of people	2019 - Wettest	3.5	19%		35%		i	30%	
on the river	2013 - 2015, 2018	3.2 5	i% 2 2	296	39 %	11%		22%	
Put-in and	2019 - Wettest	4.4	1896	19%		61%			
take-out facilities	2013 - 2015, 2018	4.1	2	24% 21%		50%			
Scenery/ natural	2019 - Wettest 4.8		7% 88%						
setting	2013 - 2015, 2018	4.8	7% 87%						
Water level	2019 - Wettest	4.0	11%	18%	96 2496		44%		
_	2013 - 2015, 2018	3.8	13%	21%	24%		3	9%	

Source: RRC Associates Angling Survey

Response

Greatly enhanced my experience today

Somewhat enhanced

Neither reduced or enhanced

Slightly reduced

Greatly reduced my experience today

Figure 14. Angler Survey – Ratings Sorted by Average Importance (categories of primary interest only), 2019 vs. Previous Seasons Combined.

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

	Overall	2013 - Dry Typical	2014 - Wettest	2015 - Wettest	2018 - Dry Typical (Seg. 4-6)	2018 - Driest (Seg. 7)	2019 - Wettest
100% - Definitely will return & 75% - Probably	90%	84%	90%	91%	93%	93%	92%
50% - Maybe	8%	12%	7%	8%	5%	5%	7%
0% - Will not return & 25% - Unlikely	3%	5%	3%	1%	2%	2%	2%

Source: RRC Associates Floatboating Survey

Figure 15. Floatboating Survey – Likelihood to Return by Year and Year Type.

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

	Overall	2013 - Dry Typical	2014 - Wettest	2015 - Wettest	2018 - Dry Typical (Seg. 4-6)	2019 - Wettest
100% - Definitely will return & 75% - Probably	92%	94%	92%	92%	92%	91%
50% - Maybe	7%	6%	6%	6%	8%	8%
0% - Will not return & 25% - Unlikely	1%		1%	2%	1%	1%

Source: RRC Associates Angler Survey

Figure 16. Angler Survey – Likelihood to Return by Year and Year Type.

Floatboating Survey: How would you characterize the water level today?

	Overall	2013 - Dry Typical	2014 - Wettest	2015 - Wettest	2018 - Dry Typical (Seg. 4-6)	2018 - Driest (Seg. 7)	2019 - Wettest
Too high	1%	0%	1%	1%			1%
High-acceptable	15%	7%	25%	18%	5%	3%	19%
Just about right/ideal	51%	55%	50%	53%	38%	43%	55%
Low-acceptable	24%	27%	16%	22%	42%	40%	19%
Too low	4%	5%	3%	1%	11%	10%	1%
Don't know/no opinion	5%	5%	5%	5%	4%	6%	6%

Source: RRC Associates Floatboating Survey

Figure 17. Floatboating Survey – Characterization of the Water Level by Year and Year Type.

Angling Survey: How would you characterize the water level today?

	Overall	2013 - Dry Typical	2014 - Wettest	2015 - Wettest	2018 - Dry Typical (Seg. 4-6)	2019 - Wettest
Too high	4%	5%	3%	3%		9%
High-acceptable	14%	15%	17%	17%	7%	14%
Just about right/ideal	50%	52%	59%	48%	36%	58%
Low-acceptable	22%	23%	15%	15%	39%	15%
Too low	5%	3%	1%	7%	11%	1%
Don't know/no opinion	6%	2%	5%	10%	7%	3%

Source: RRC Associates Angler Survey

Figure 18. Angler Survey – Characterization of the Water Level by Year and Year Type.

How did the following affect your experience today (or on your most recent trip on the Upper Colorado River)?

User Group Survey (2019) Intercept Survey (2013 - 2015, 2018, 2019) Scenery/natural 3% 16% 81% 93% setting Put-in and take-out 9% 61% 30% 21% 72% 6% facilities Water level 6% 37% 57% 12% 18% 70% Number of people on 22% 26% 53% 13% 38% 49% the river n=544 n=5,348

Enhanced (4 & 5)

Reduced (1 & 2)

Neither reduced nor enhanced (3)

Figure 19. 2019 "User Group" Survey vs. Intercept Survey – Ratings of Primary Interest.

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	Colorado River?	where did you take out?
Blue River Confluence (Gore Canyon)	13%	0%
Pumphouse	55%	13%
Radium	4%	8%
Rancho del Rio	8%	27%
State Bridge	2%	18%
Two Bridges	2%	9%
Catamount	1%	5%
Pinball	1%	1%
Horse Creek	1%	2%
Cottonwood	1%	1%
Lyons Gulch	0%	1%
Dotsero Landing		4%
Shoshone	8%	0%
Grizzly Creek	2%	4%
Two Rivers Park	0%	4%
Other public site:	1%	1%
Other private site:		0%
Can't recall	1%	1%
n=	565	565

Where did you launch on the Upper

Where did you take out?

Source: RRC Associates "User Group" Survey

Figure 20. 2019 "User Group" Survey Launch and Take-Out.

"User Group" Survey: Based on your experience that day, how likely would you be to return to that section of river in the future?



Source: RRC Associates "User Group" Survey

Figure 21. 2019 "User Group" Survey Likelihood to Return.