COLORADO
Parks and Wildlife
Department of Natural Resources

Water Resources Section – Aquatic, Terrestrial, and Natural Resources Branch

January 11, 2023

Mr. Rob Viehl, Section Chief
Colorado Water Conservation Board
Stream and Lake Protection Section
1313 Sherman Street, 7th Floor
Denver, CO 80203

Subject: Instream Flow Recommendations for Curecanti Creek in Water Division 4, Gunnison County to be presented at the January 2023 CWCB Meeting

Dear Mr. Viehl:

The information contained in and referred to in this letter forms the scientific and biological basis for an instream flow (ISF) increase on two segments of Curecanti Creek in Water Division 4. In 1984, the Colorado Water Conservation Board (CWCB) appropriated a water right on Curecanti Creek of 3 cfs and 5 cfs year-round above and below Commissary Gulch, respectively. Beginning in 2020, Colorado Parks and Wildlife (CPW) and National Park Service (NPS) staff began investigating if a seasonal increase was warranted. Data collection efforts in 2020 through 2022 demonstrated there is a need for a seasonal increase in both segments of Curecanti Creek during the extended summer period. Curecanti Creek was presented to interested parties at the ISF Workshop in January 2020. Outreach was also conducted to the Gunnison County Commissioners in September 2022. It is the CPW staff's opinion that the information contained in this letter is sufficient for the CWCB's staff to recommend an ISF appropriation to the Board on Curecanti Creek and to specifically address the findings required in Rule 5(i) of the Instream Flow Program Rules.

CPW participates in the ISF Program and develops instream flow recommendations for the Board's consideration in an effort to address CPW's legislative declarations "… that the wildlife and their environment are to be protected, preserved, enhanced, and managed for the use, benefit, and enjoyment of the people of this state and its visitors … and that, to carry out such program and policy, there shall be a continuous operation of planning, acquisition, and development of wildlife habitats and facilities for wildlife-related opportunities" (See §33-1-101 (1) C.R.S.), and "… that the natural, scenic, scientific, and outdoor recreation areas … be protected, preserved, enhanced and managed for the use, benefit, and enjoyment of the people of this state and (its) visitors … and that, to carry out such program and policy, there shall be a continuous operation of acquisition, development, and management of … lands, waters, and facilities." (See §33-10-101 (1) C.R.S.).

In addition to these broad statutory guidelines, CPW's current strategic planning document (CPW Strategic Plan, 2015) explains current agency goals to, "[c]onserve wildlife and habitat to ensure healthy sustainable populations and ecosystems." In order to, "protect and enhance water resources for fish and wildlife populations," by pursuing, "partnerships and agreements to enhance instream flows, protect reservoir levels, and influence water management activities," and to, "[a]dvocate for

water quality and quantities to conserve aquatic resources." In addition to the CPW Strategic Plan, the agency's fish and wildlife conservation activities are also directed by the State Wildlife Action Plan (2002, Revised 2015). The goals and priorities from these documents direct CPW to advocate for the preservation of the state's fish and wildlife resources and natural environment, and therefore link CPW's mission to the goals and priorities of CWCB's ISF and Natural Lake Level (NLL) Program.

Recommended Segments

Upper Reach

CPW is proposing an increase on upper Curecanti Creek from its headwaters (located at UTM 13S 293747.09 4286947.81) to its confluence with Commissary Gulch (UTM 13S 294045.93 4272414.37). The reach is approximately 9.9 miles in length. All of the proposed reach is on public lands managed as Gunnison National Forest.

Lower Reach

CPW is also proposing an increase on lower Curecanti Creek from its confluence with Commissary Gulch (UTM 13S 294045.93 4272414.37) to its confluence with Morrow Point Reservoir (UTM 13S 289312.65 4258638.97). The reach is approximately 10.1 miles in length. A majority of the proposed reach is on public lands managed as Gunnison National Forest. The downstream 4 miles of Curecanti Creek above its mouth are a mixture of private lands and lands managed by the National Park Service as the Curecanti National Recreation Area (NRA).

Natural Environment and Biological Summary

Curecanti Creek is a tributary of the Gunnison River at Morrow Point Reservoir. The stream's hydrology is mainly snowmelt-driven. The mean elevation of the basin is 9,500 feet with approximately 22 inches of precipitation a year. The contributing basin is approximately 39 square miles and is a confined, forested valley.

Curecanti Creek is a first to second order stream. Over the proposed ISF reaches, there is significant variability in the channel as the creek transitions from a medium to high-gradient, heavily forested headwaters stream to a lower-gradient gaining stream with a contributing basin comprised primarily of sage brush and some conifer and noticable grazing impacts. Below State Highway 92, the creek starts to sharply descend towards the Black Canyon of the Gunnison, exhibiting extremely high-gradient, boulder cascade features and steep canyon walls. At the mouth of Curecanti Creek, a towering spire, the Curecanti Needle, can be seen directly across the reservoir.

Overall, Curecanti Creek has a mixture of coarse substrate riffles, as well as traditional riffles in the both sections of the creek. Throughout the creek, deep runs and pools support fish habitat as flows drop. Flow-through beaver ponds are common throughout Curecanti Creek and signs of active beaver have been observed. Large cobble and small boulder substrate supports plentiful pocket pool habitat. With significant woody debris in the channel and abundant overhead cover in the upper reach, Curecanti Creek provides complex fish habitat with temperature buffering and shading in the upper portions of the creek. Side channels and braiding are also common throughout both reaches. Riparian willows and alder are dense throughout both segments contrubuting to an overall healthy and robust riparian community.

In the upper segment, the fishery is primarily brook trout. In the lower segment, the fishery is comprised of mainly brook trout with some rainbow trout and Colorado River cutthroat trout present. Marmot, snakes, frogs, young-of-the-year fish, and numerous adult trout have been observed in the field. Mutiple age classes of fish surveyed by CPW in 2012 and 2005 (see attached) indicate self-

sustaining, wild trout fisheries in both reaches. Macroinvertebrates noted in the field include caddisfly, mayfly, and two types of stonefly.

R2Cross Background

Initial biological instream flow recommendations were developed using the R2Cross methodology (Espegren, 1996[1]). R2Cross uses field data that has been collected in a riffle habitat type. Riffles are often the limiting habitat type in streams during low flow events, so maintaining specific conditions across riffle habitat types will also maintain aquatic habitat in pools and runs for most life stages of fish and macroinvertebrates (Nehring, 1979[2]). The R2Cross model uses field data, including a survey of cross-sectional channel geometry, a longitudinal slope of the water surface, and a flow measurement, as input to a single transect hydraulic model. R2Cross uses Ferguson's Variable-Power Equation (Ferguson, 2007[3]) to model a stage-discharge relationship and compute corresponding hydraulic parameters of average depth, average velocity, and percent wetted perimeter over modeled stages. Maintaining these three hydraulic parameters at specified levels should ensure conditions that allow movement longitudinally across riffles and adequate depths, velocities, and oxygenation for production of macroinvertebrates and development of trout eggs.

Baseflow recommendations are typically developed based on the flows that meet two of three hydraulic criteria and summer flow recommendations are based on hydraulic criteria that meet three of three hydraulic criteria (as described in Nehring 1979 and Espergren 1996).

Upper Segment Flow Recommendations

In 2022, CPW collected two cross-sectional data sets on upper Curecanti Creek. The results of the R2Cross analysis are summarized below.

R2Cross Summary: Data Collected above Commissary Gulch					
	Bankfull Top Width	Date Measured	Flow Measured	Flow Meeting Two Criteria	Flow Meeting Three Criteria
1	22.6 ft	8/12/2022	3.277 cfs	1.43 cfs	8.61 cfs
2	37.4 ft	8/12/2022	3.277 cfs	11.34 cfs	14.41 cfs
Recommended Flow Rates:				**N/A**	**11.5 cfs**

CPW is not recommending an increase to the 1984 decreed ISF right during the winter period because it is CPW's opinion that 3 cfs is protective of the fishery during that timeframe. CPW is recommending an increase in the summer to 11.5 cfs.

[1]Espegren, G.D., 1996, Development of Instream Flow Recommendations in Colorado Using R2CROSS, Colorado Water Conservation Board.

[2]Nehring, B.R., 1979, Evaluation of Instream Flow Methods and Determination of Water Quantity Needs for Streams in the State of Colorado, Colorado Division of Wildlife.

[3] Ferguson, R.I., 2007. Flow resistance equations for gravel- and boulder-bed streams. Water Resources Research 43. https://doi.org/10.1029/2006WR005422

Upper Curecanti Creek Water Availability-Refined Flow Recommendation

In order to make a preliminary determination whether water is available for the R2Cross-based flow recommendations and to determine the appropriate seasonal transition dates, CPW examined basic hydrologic data and water rights information for upper Curecanti Creek. Streamflow records from the USGS gage "Curecanti Creek near Sapinero" (091250000) were analyzed by CWCB to help inform physical water availability to meet the biological flow recommendations. CPW is aware of the following active water rights within the upper reach: Head & Ferrier Ditch.

CPW's analysis indicates that the following flows are needed to protect the natural environment to a reasonable degree. Based on water availability investigations, there are slight limitations during the late summer period. Therefore, CPW's flow recommendation has been refined to the following:

- Early Spring Flow Recommendation (March 1 through March 31): **4.5 cfs**, *1.5 cfs increase*
    - Maintains adequate depth and wetted perimeter across most riffles, which will support fish they begin to move, transitioning from overwintering habitat to more metabolic activity as temperatures rise before the beginning of spring runoff.
- Summer Flow Recommendation (April 1 through July 15): **11.5 cfs**, *8.5 cfs increase*
    - Maintains adequate depth, velocity, and wetted perimeter during the spring and early summer periods. This flow rate supports fish passage and ideal conditions macroinvertebrate production, fish feeding, and spawning.
- Late July Flow Recommendation (July 16 through July 31): **5.5 cfs**, *2.5 cfs increase*
    - Maintains habitat with suitable depth and wetted perimeter and allows fish movement as flows receed and temperatures may be high in late July. This recommendation has been reduced due to water availability constraints.
- Baseflow Recommendation (August 1 through February 28): **3.0 cfs**, *No increase*
    - This flow rate is protective by maintaining adequate available habitat in most riffles, glides, and pools to support fish during the late summer and overwintering periods.

Lower Segment Flow Recommendations

In 2020 and 2021, CPW collected three cross-section data sets on lower Curecanti Creek. The results of the R2Cross analysis are summarized below.

R2Cross Summary: Data Collected below Commissary Gulch					
	Bankfull Top Width	Date Measured	Flow Measured	Flow Meeting Two Criteria	Flow Meeting Three Criteria
1	35.8 ft	10/6/2020	2.772 cfs	5.04 cfs	19.95 cfs
2	36.4 ft	8/10/2021	2.26 cfs	6.39 cfs	13.46 cfs
3	38.8 ft	8/10/2021	2.26 cfs	5.44 cfs	16.84 cfs
Recommended Flow Rates:				**5.6 cfs**	**16.8 cfs**

CPW is recommending an increase to the 1984 decreed ISF right during both the winter period and summer periods. CPW is recommending an increase to 5.6 cfs in the winter and 16.8 cfs in the summer.

Lower Curecanti Creek Water Availability-Refined Flow Recommendation

In order to make a preliminary determination whether water is available for the R2Cross-based flow recommendations and to determine the appropriate seasonal transition dates, CPW examined basic

hydrologic data and water rights information for lower Curecanti Creek. Streamflow records from the USGS gage "Curecanti Creek near Sapinero" (091250000) were analyzed by CWCB to help inform physical water availability to meet the biological flow recommendations. CPW is not aware of the active water rights within the lower reach maintained with diversion records.

CPW's analysis indicates that the following flows are needed to protect the natural environment to a reasonable degree. Based on water availability investigations, there are water availability limitations during the late summer period. Therefore, CPW's flow recommendation has been refined to the following:

- Early Spring Flow Recommendation (March 1 through March 31): **8.0 cfs,** *3.0 cfs increase*
    - Maintains adequate depth and wetted perimeter across riffles, which will support fish they begin to move, transitioning from overwintering habitat to more metabolic activity as temperatures rise before the beginning of spring runoff.
- Summer Flow Recommendation (April 1 through July 15): **16.8 cfs**, *11.8 cfs increase*
    - Maintains adequate average depth of 0.4 feet, velocity, and wetted perimeter during the spring and early summer periods. This flow rate supports fish passage and ideal conditions macroinvertebrate production, fish feeding, and spawning.
- Late July Flow Recommendation (July 16 through July 31): **9.8 cfs,** *4.8 cfs increase*
    - Maintains fish habitat with adequate depth and wetted perimeter and allows fish movement as flows receed and temperatures may be high in late July. This recommendation has been reduced due to water availability constraints.
- Late Summer Flow Recommendation (August 1 through September 30): **5.4 cfs,** *0.4 cfs increase*
    - This flow rate has been reduced slightly due to water availability constraints but will still provide suitable habitat availability by maintaining depth and wetted perimeter in most riffles.
- Fall Flow Recommendation (October 1 through November 30): **6.4 cfs**, *1.4 cfs increase*
    - Maintains available habitat and allows fish movement during the fall transition to overwintering conditions.
- Baseflow Recommendation (December 1 through February 28): **5.6 cfs**, *0.6 cfs increase*
    - This flow rate is protective by maintaining adequate habitat to support fish during the overwintering period by maintaining adequate depth and wetted perimeter in riffles, as well as habitat availability in glides and pools.

Summary
The purpose of this letter is to formally transmit this ISF recommendation to CWCB for the Board's consideration. CPW believes there is a flow-dependent natural environment in Curecanti Creek that can be preserved to a reasonable degree with two ISF water rights in the specified rates. Please refer to attachments which include; R2Cross field forms, R2Cross output, fish survey information, and photographs at each cross section location.

CPW personnel will be available at the January 2023 CWCB meeting to answer any questions that the Board might have regarding these flow recommendations. We appreciate your consideration.

Sincerely,

Katie Birch

Katie Birch
CPW Instream Flow Program Coordinator
Attachments (as stated)

United States Department of the Interior
NATIONAL PARK SERVICE
Black Canyon of the Gunnison National Park
Curecanti National Recreation Area
102 Elk Creek
Gunnison, CO 81230

IN REPLY REFER TO:

January 13, 2023

Mr. Rob Viehl, Section Chief
Colorado Water Conservation Board
Stream and Lake Protection Section
1313 Sherman Street, 7th Floor
Denver, CO 80203

Subject: Letter of Support for Instream Flow Recommendations for Curecanti Creek in Water Division 4, Gunnison County to be presented at the January 2023 CWCB Meeting

Dear Mr. Viehl:

On behalf of the Curecanti National Recreation Area and the National Park Service (NPS), I would like to express our support for the preservation of the Curecanti Creek watershed by protecting streamflow as outlined by the Colorado Parks and Wildlife (CPW) recommendation. The overall objective to protect instream flows aligns closely with the NPS mission to preserve natural and cultural resources for the enjoyment, education, and inspiration of this and future generations.

The NPS manages land along the lower one-and-a-half-mile section of Curecanti Creek to where it meets Morrow Point Reservoir. One of the most popular trails in the park is the Curecanti Creek trail, which provides a remote inner canyon experience easily accessible from State Highway 92. Many visitors are drawn to this area for the excellent fishing opportunities that can be found right along the trail. We rely heavily on our upstream neighbors (both private and public landowners) to preserve and protect the waters flowing into our park and maintain this scenic, recreational opportunity. This is a high gradient system as the creek drops into the canyon on NPS lands, so maintaining minimum flows, as recommended by CPW, are necessary to provide connectivity among pools and runs for aquatic life habitat.

The NPS has been monitoring flows and water quality on Curecanti Creek going back to 2001. Comparing the flows recommended by CPW to our historic data shows that the recommended flows are both attainable and necessary. We have also been monitoring aquatic macroinvertebrate populations on Curecanti Creek since 2013, which has shown that the existing conditions support aquatic life. Applying the multi-metric index created by the Colorado Department of Public Health and Environment to our aquatic macroinvertebrate surveys, Curecanti Creek has always exceeded the attainment threshold for the Mountain Biotype. This indicates that historic conditions support healthy aquatic habitats.

CPW has our full support for their instream flow recommendations on Curecanti Creek. Thank you for your consideration.

Sincerely,

Derek Carter

Derek Carter
Acting Superintendent
Curecanti National Recreation Area and
Black Canyon of the Gunnison National Park

Nicole Gibney
Aquatic Ecologist
Curecanti National Recreation Area and
Black Canyon of the Gunnison National Park

COLORADO WATER CONSERVATION BOARD

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

COLORADO DIVISION OF WILDLIFE

LOCATION INFORMATION

STREAM NAME: Currecanti Creek					CROSS-SECTION NO.: 1
CROSS-SECTION LOCATION: Above Commissary Gulch					
DATE: 8/12/22	OBSERVERS: Birch Gibney				
LEGAL DESCRIPTION	¼ SECTION:	SECTION:	TOWNSHIP: N/S	RANGE: E/W	PM:
COUNTY:	WATERSHED:		WATER DIVISION:		DOW WATER CODE:
MAP(S): USGS: UTM 13S 294015 4272475	USFS:				

SUPPLEMENTAL DATA

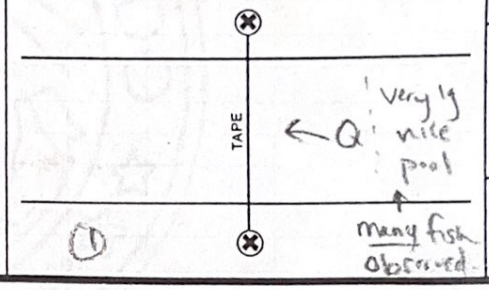
SAG TAPE SECTION SAME AS DISCHARGE SECTION: YES (NO)	METER TYPE: FT#2 u/s glide by N. Gibney			
METER NUMBER:	DATE RATED:	CALIB/SPIN: _____ sec	TAPE WEIGHT: _____ lbs/foot	TAPE TENSION: _____ lbs
CHANNEL BED MATERIAL SIZE RANGE: Small cobble - laarge. boulder	PHOTOGRAPHS TAKEN: (YES)/NO	NUMBER OF PHOTOGRAPHS: 3-KB		

CHANNEL PROFILE DATA

Horizontal: 2.5 20.8

STATION	DISTANCE FROM TAPE (ft)	ROD READING (ft)
⊗ Tape @ Stake LB	0.0	~
⊗ Tape @ Stake RB	0.0	~
① WS @ Tape LB/RB	0.0	8.57 / 8.56
② WS Upstream	> 34.7'	8.47
③ WS Downstream		9.20
SLOPE		

SKETCH



LEGEND: Stake ⊗ Station ① Photo ◇→ Direction of Flow ←→

AQUATIC SAMPLING SUMMARY

STREAM ELECTROFISHED: YES/NO	DISTANCE ELECTROFISHED: _____ft	FISH CAUGHT: YES/NO	WATER CHEMISTRY SAMPLED: YES/NO

LENGTH - FREQUENCY DISTRIBUTION BY ONE-INCH SIZE GROUPS (1.0-1.9, 2.0-2.9, ETC.)

SPECIES (FILL IN)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	>15	TOTAL
Many fish observed, multiple age classes																	
caddis, Stone(2) - 1 very large exoskeleton																	
Mayfly																	

AQUATIC INSECTS IN STREAM SECTION BY COMMON OR SCIENTIFIC ORDER NAME:

COMMENTS

Excellent riparian community - Alder, Willow, upland pine/aspen
wild raspberry + mint. Lots of algae observed - filamentous, didymo (?)
Good fish habitat - riparian cover, large boulders, good pool/glides, clean, cool
water, Some undercut banks + logs in channel

FORM #ISF FD 1-85

DISCHARGE/CROSS SECTION NOTES

STREAM NAME: Curecanti (upper) | CROSS-SECTION NO: 1 & 2 | DATE: 8/12/22 | SHEET ___ OF ___

BEGINNING OF MEASUREMENT | EDGE OF WATER LOOKING DOWNSTREAM: LEFT / RIGHT (0.0 AT STAKE) | Gage Reading: _____ ft | TIME: 12:14

Features (Stake (S), Grassline (G), Waterline (W), Rock (R))	Distance From Initial Point (ft)	Width (ft)	Total Vertical Depth From Tape/Inst (ft)	Water Depth (ft)	Depth of Observation (ft)	Revolutions	Time (sec)	Velocity (ft/sec) At Point	Velocity (ft/sec) Mean in Vertical	Area (ft^2)	Discharge (cfs)
	0		5.62		5.09/4.98	XS #2	UTM:	13 S		294057	
										4272378	
step	0.8		7.69			WS u/s:	4.95				
BF1	1.8		7.80			WS d/s:	6.31				
BF1	2.0		8.4			Riffle length: 47.5					
WS	2.5		8.57								
	3.5		8.93	0.36		H	vel				
	4.5		8.81	0.32	S	0	3.65				
	5.5		8.90	0.35	BF1	3.4	3.94				
	6.5		8.91	0.30	BF1	4.1	4.39	.27	39	4.9	ØNS
	7.5		8.83	0.27		5.1	4.59		50.9	3.88	BF
	8.5		8.77	0.24		5.9	4.6		42.2	3.71	S
	9.5		8.94	0.39	WS	6.1	4.9	0			
	10.5		8.98	0.45		8.0	5.02	0.18			
	11.5		8.97	0.42		9.5	5.06	0.22			
	12.5		9.01	0.47		11.0	4.98	0.14			
	13.5		8.73	0.20		12.5	5.22	0.38			
	14.5		8.87	0.35		14.0	5.31	0.46			
	15.5		8.78	0.26		15.5	5.21	0.40			
	16.5		8.87	0.33		17	5.08	0.20			
	17.5		8.87	0.31		18.5	5.26	0.40			
	18.5		8.85	0.30		20	5.25	0.39			
	19.5		8.75	0.20		21.5	5.00	0.10			
WS	20.8		8.56	0		23	5.08	0.16			
	21.4		8.28			24.5	5.07	0.17			
	21.9		8.1			26	5.11	0.19			
*BF	24.9		7.74			27.5	5.31	0.36			
	28.7		7.2			29	5.16	0.24			
	30.0		7.15			30.5	5.12	0.19			
						32	5.03	0.09			
					R	33.5	4.9	0.			
						35	5.04	0.05			
						36.5	5.03	0.06			
						38	5.08	0.12			
TOTALS:											

Notes: wide riffle, truly a critical xsec from a fish passage perspective
Good sampling at this transect
Few fish observed in the riffle

Less algae observed here

End of Measurement | Time: | Gage Reading: _____ ft | CALCULATIONS PERFORMED BY: | CALCULATIONS CHECKED BY:

Discharge Measurement Summary

Site name	Curecanti
Site number	081220A
Operator(s)	Ng
File name	Curecanti_20220812-185636.ft
Comment	

Start time	8/12/2022 6:11 PM
End time	8/12/2022 6:55 PM
Start location latitude	38.577
Start location longitude	-107.365
Calculations engine	FlowTracker2

Sensor type	Top Setting
Handheld serial number	FT2H2113010
Probe serial number	FT2P2114008
Probe firmware	1.30
Handheld software	1.6.4

# Stations	Avg interval (s)	Total discharge (ft³/s)
20	40	3.277

Total width (ft)	Total area (ft²)	Wetted Perimeter (ft)
16.100	8.868	16.532

Mean SNR (dB)	Mean depth (ft)	Mean velocity (ft/s)
32.271	0.551	0.370

Mean temp (°F)	Max depth (ft)	Max velocity (ft/s)
59.509	0.900	0.662

Discharge Uncertainty		
Category	**ISO**	**IVE**
Accuracy	1.0%	1.0%
Depth	0.4%	4.8%
Velocity	0.5%	9.8%
Width	0.1%	0.1%
Method	2.0%	
# Stations	2.5%	
Overall	**3.4%**	**11.0%**

Discharge equation	Mid Section
Discharge uncertainty	IVE
Discharge reference	Rated

Data Collection Settings	
Salinity	0.000 PSS-78
Temperature	-
Sound speed	-
Mounting correction	0.000 %

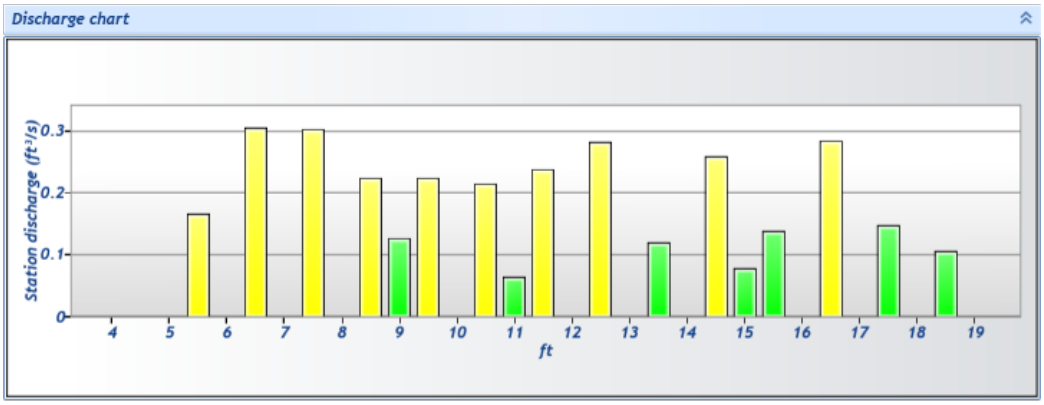
Summary overview

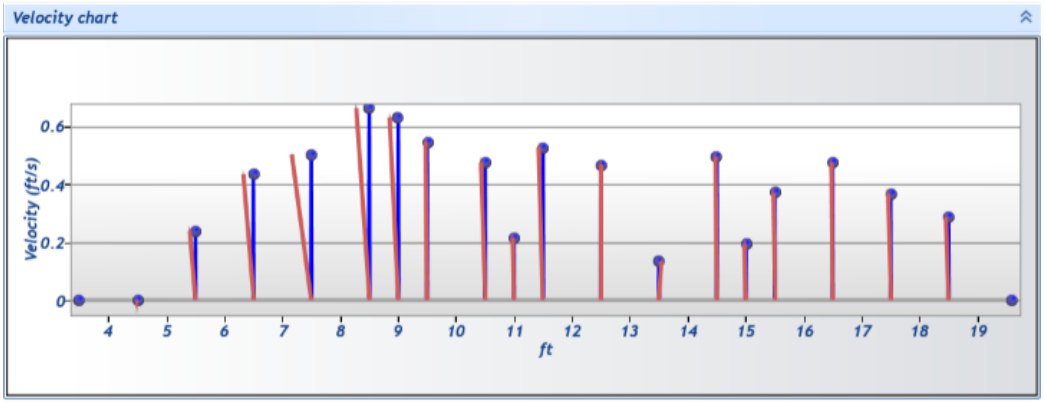
No changes were made to this file
Quality control warnings

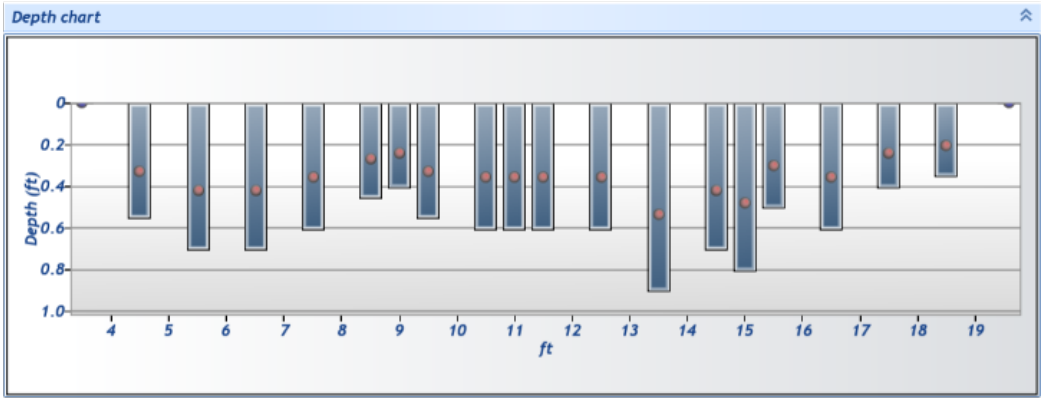
Discharge Measurement Summary

Site name	Curecanti
Site number	081220A
Operator(s)	Ng
File name	Curecanti_20220812-185636.ft
Comment	

Station Warning Settings	
Station discharge OK	Station discharge < 5.000%
Station discharge caution	5.000% >= Station discharge < 10.000%
Station discharge warning	Station discharge >= 10.000%







Discharge Measurement Summary

Site name	Curecanti
Site number	081220A
Operator(s)	Ng
File name	Curecanti_20220812-185636.ft
Comment	

Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q	
0	6:11 PM	3.500	None	0.000	0.000	0.000	0	0.000	0.500	0.001	0.000	0.000	0.000	✓
1	6:12 PM	4.500	0.6	0.550	0.600	0.330	80	0.002	1.000	0.002	0.550	0.001	0.029	✓
2	6:14 PM	5.500	0.6	0.700	0.600	0.420	80	0.239	1.000	0.239	0.700	0.167	5.102	✓
3	6:17 PM	6.500	0.6	0.700	0.600	0.420	80	0.434	1.000	0.434	0.700	0.304	9.278	✓
4	6:19 PM	7.500	0.6	0.600	0.600	0.360	80	0.503	1.000	0.503	0.600	0.302	9.204	✓
5	6:21 PM	8.500	0.6	0.450	0.600	0.270	80	0.662	1.000	0.662	0.338	0.223	6.815	✓
6	6:55 PM	9.000	0.6	0.400	0.600	0.240	80	0.629	1.000	0.629	0.200	0.126	3.841	✓
7	6:22 PM	9.500	0.6	0.550	0.600	0.330	80	0.545	1.000	0.545	0.413	0.225	6.863	✓
8	6:24 PM	10.500	0.6	0.600	0.600	0.360	80	0.475	1.000	0.475	0.450	0.214	6.521	✓
9	6:53 PM	11.000	0.6	0.600	0.600	0.360	80	0.215	1.000	0.215	0.300	0.065	1.969	✓
10	6:25 PM	11.500	0.6	0.600	0.600	0.360	80	0.527	1.000	0.527	0.450	0.237	7.237	✓
11	6:27 PM	12.500	0.6	0.600	0.600	0.360	80	0.468	1.000	0.468	0.600	0.281	8.567	✓
12	6:28 PM	13.500	0.6	0.900	0.600	0.540	80	0.134	1.000	0.134	0.900	0.121	3.685	✓
13	6:30 PM	14.500	0.6	0.700	0.600	0.420	80	0.494	1.000	0.494	0.525	0.259	7.914	✓
14	6:39 PM	15.000	0.6	0.800	0.600	0.480	80	0.195	1.000	0.195	0.400	0.078	2.377	✓
15	6:31 PM	15.500	0.6	0.500	0.600	0.300	80	0.370	1.000	0.370	0.375	0.139	4.231	✓
16	6:32 PM	16.500	0.6	0.600	0.600	0.360	80	0.474	1.000	0.474	0.600	0.285	8.685	✓
17	6:34 PM	17.500	0.6	0.400	0.600	0.240	80	0.367	1.000	0.367	0.400	0.147	4.476	✓
18	6:35 PM	18.500	0.6	0.350	0.600	0.210	80	0.286	1.000	0.286	0.368	0.105	3.206	✓
19	6:37 PM	19.600	None	0.000	0.000	0.000	0	0.000	0.500	0.143	0.000	0.000	0.000	✓

Discharge Measurement Summary

Site name	Curecanti
Site number	081220A
Operator(s)	Ng
File name	Curecanti_20220812-185636.ft
Comment	

Quality Control Settings	
Maximum depth change	50.000%
Maximum spacing change	100.000%
SNR threshold	10.000 dB
Standard error threshold	0.033 ft/s
Spike threshold	10.000%
Maximum velocity angle	20.000 deg
Maximum tilt angle	5.000 deg

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
1	6:12 PM	4.500	0.6	0.550	0.600	0.330	Large SNR Variation,SNR Threshold Variation
2	6:14 PM	5.500	0.6	0.700	0.600	0.420	Velocity Angle > QC
3	6:17 PM	6.500	0.6	0.700	0.600	0.420	Velocity Angle > QC
4	6:19 PM	7.500	0.6	0.600	0.600	0.360	Velocity Angle > QC

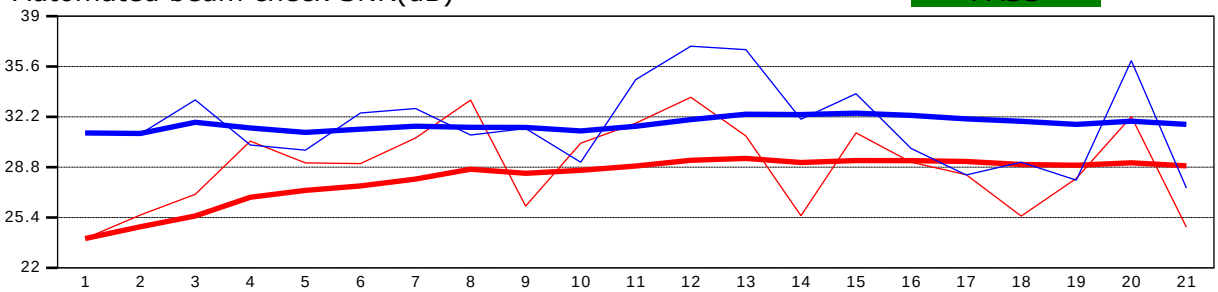
Discharge Measurement Summary

Site name	Curecanti
Site number	081220A
Operator(s)	Ng
File name	Curecanti_20220812-185636.ft
Comment	

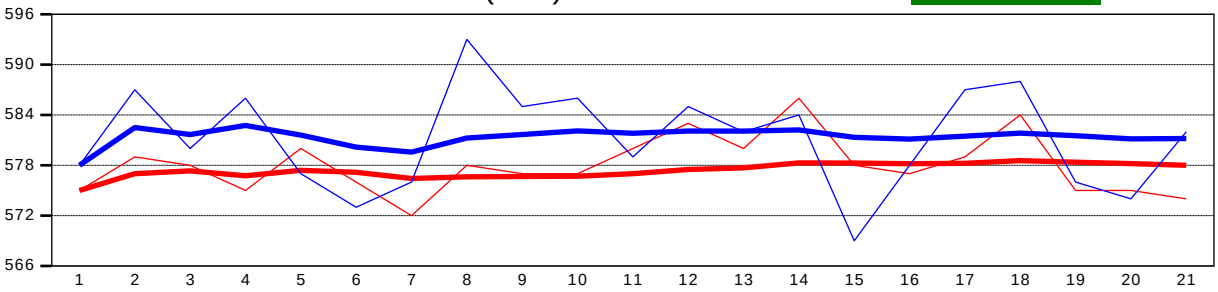
Beam 1	
Beam 2	

Automated beam check Start time 8/12/2022 6:10:38 PM

Automated beam check SNR(dB) PASS



Automated beam check Noise level(cnts) PASS



Automated beam check Quality control warnings

No quality control warnings

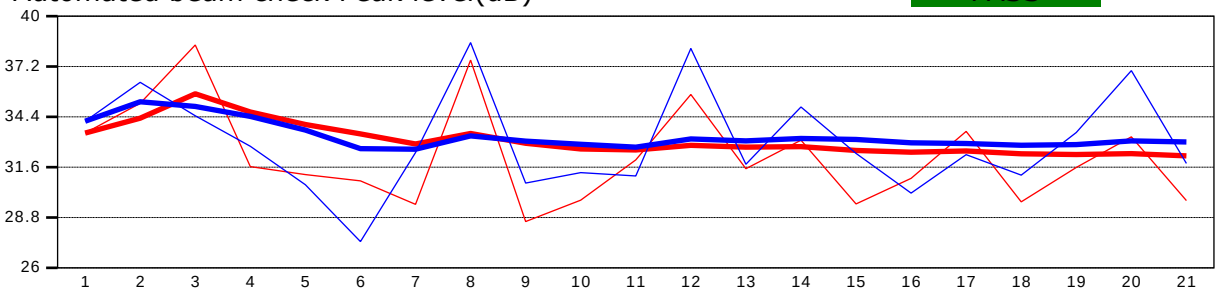
Discharge Measurement Summary

Site name	Curecanti
Site number	081220A
Operator(s)	Ng
File name	Curecanti_20220812-185636.ft
Comment	

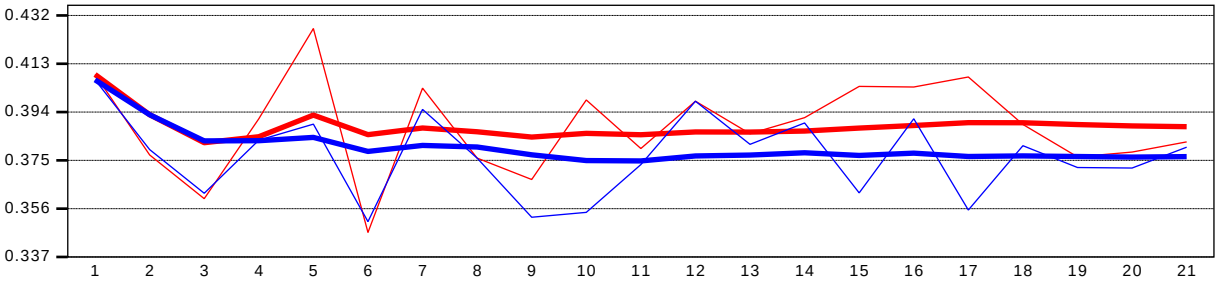
Beam 1	
Beam 2	

Automated beam check Start time 8/12/2022 6:10:38 PM

Automated beam check Peak level(dB) PASS



Automated beam check Peak position(ft) PASS



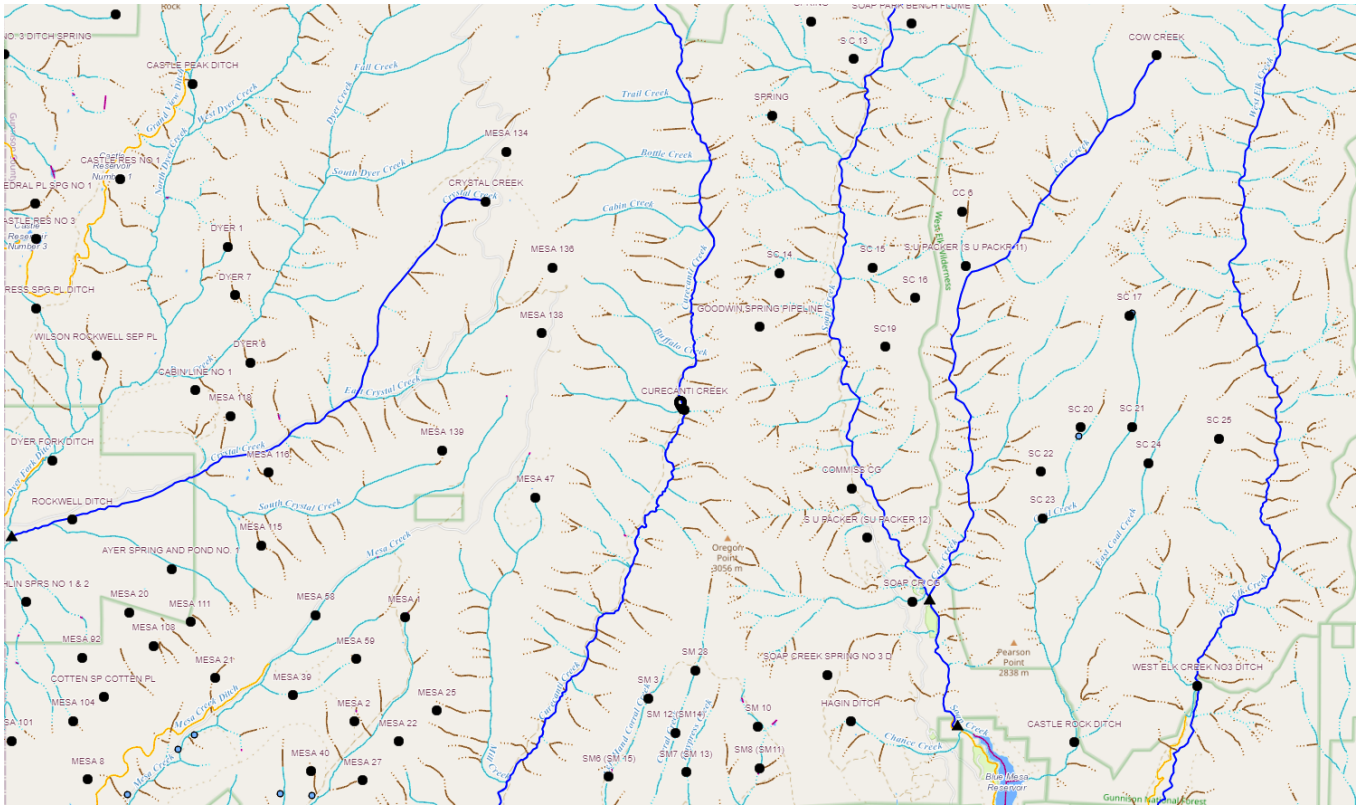
Automated beam check Quality control warnings

No quality control warnings

R2Cross RESULTS

Stream Name: Curecanti Creek
Stream Locations: Above Commissary Gulch
Fieldwork Date: 08/12/2022
Cross-section: 1
Observers: Birch Gibney
Coordinate System: UTM Zone 13
X (easting): 294015
Y (northing): 4272475
Date Processed: 10/11/2022
Slope: 0.021
Discharge: Entered Value: 3.28 (cfs)
Computation method: Ferguson VPE
R2Cross data filename: 1-Curecanti-upper-8-12-22-Q=3.277.xlsx
R2Cross version: 2.0.0

LOCATION



ANALYSIS RESULTS

Habitat Criteria Results

Bankfull top width (ft) = 22.6

	Habitat Criteria	Discharge (cfs) Meeting Criteria
Mean Depth (ft)	0.2	1.43
Percent Wetted Perimeter (%)	50.0	0.06
Mean Velocity (ft/s)	1.0	8.61

STAGING TABLE

Feature	Distance to Water (ft)	Top Width (ft)	Mean Depth (ft)	Maximum Depth (ft)	Area (sq ft)	Wetted Perimeter (ft)	Percent Wetted Perimeter	Hydraulic Radius (ft)	Manning's n	Mean Velocity (ft/s)	Discharge (cfs)
Bankfull	7.8	22.6	0.91	1.21	20.47	23.31	100.0	0.88	0.08	2.54	51.92
	7.85	22.2	0.88	1.16	19.44	22.88	98.12	0.85	0.08	2.43	47.19
	7.9	21.77	0.84	1.11	18.34	22.4	96.1	0.82	0.08	2.31	42.37
	7.95	21.33	0.81	1.06	17.26	21.93	94.07	0.79	0.08	2.19	37.85
	8.0	20.9	0.78	1.01	16.21	21.46	92.05	0.76	0.09	2.07	33.62
	8.05	20.47	0.74	0.96	15.17	20.99	90.02	0.72	0.09	1.96	29.67
	8.1	20.03	0.71	0.91	14.16	20.51	87.99	0.69	0.09	1.84	26.0
	8.15	19.86	0.66	0.86	13.16	20.29	87.05	0.65	0.1	1.69	22.19
	8.2	19.7	0.62	0.81	12.17	20.09	86.19	0.61	0.1	1.53	18.68
	8.25	19.54	0.57	0.76	11.19	19.89	85.33	0.56	0.11	1.38	15.49
	8.3	19.36	0.53	0.71	10.22	19.67	84.37	0.52	0.11	1.24	12.65
	8.35	19.13	0.48	0.66	9.26	19.4	83.2	0.48	0.12	1.1	10.16
	8.4	18.9	0.44	0.61	8.31	19.12	82.03	0.43	0.13	0.96	7.97
	8.45	18.55	0.4	0.56	7.37	18.76	80.45	0.39	0.14	0.83	6.12
	8.5	18.19	0.35	0.51	6.45	18.38	78.84	0.35	0.15	0.71	4.55
Waterline	8.55	17.83	0.31	0.46	5.55	18.01	77.23	0.31	0.17	0.58	3.24
	8.6	17.49	0.27	0.41	4.67	17.66	75.73	0.26	0.19	0.47	2.18
	8.65	17.17	0.22	0.36	3.8	17.32	74.28	0.22	0.22	0.35	1.35
	8.7	16.85	0.18	0.31	2.95	16.98	72.83	0.17	0.27	0.25	0.74
	8.75	16.35	0.13	0.26	2.12	16.46	70.61	0.13	0.34	0.16	0.34
	8.8	14.24	0.09	0.21	1.34	14.33	61.46	0.09	0.45	0.1	0.13
	8.85	10.9	0.07	0.16	0.71	10.95	46.97	0.06	0.6	0.06	0.04
	8.9	6.14	0.05	0.11	0.29	6.17	26.45	0.05	0.79	0.04	0.01
	8.95	3.07	0.03	0.06	0.09	3.08	13.21	0.03	1.13	0.02	0.0
	8.99	0.43	0.01	0.02	0.0	0.43	1.85	0.01	3.65	0.0	0.0

This Manning's roughness coefficient was calculated based on velocity estimates from the Ferguson VPE method

MODEL SUMMARY

Measured Flow (Qm) =	3.28	(cfs)
Calculated Flow (Qc) =	3.26	(cfs)
(Qm-Qc)/Qm * 100 =	0.49%	
Measured Waterline (WLm) =	8.56	(ft)
Calculated Waterline (WLc) =	8.55	(ft)
(WLm-WLc)/WLm * 100 =	0.22%	
Max Measured Depth (Dm) =	0.47	(ft)
Max Calculated Depth (Dc) =	0.46	(ft)
(Dm-Dc)/Dm * 100 =	1.34%	
Mean Velocity =	0.59	(ft/s)
Manning's n =	0.167	
0.4 * Qm =	1.31	(cfs)
2.5 * Qm =	8.19	(cfs)

FIELD DATA

Feature	Station (ft)	Rod Height (ft)	Water depth (ft)	Velocity (ft/s)
	0	5.62		
	0.8	7.69		
Bankfull	1.8	7.8		
	2	8.4		
Waterline	2.5	8.57	0	
	3.5	8.93	0.36	
	4.5	8.89	0.32	
	5.5	8.9	0.35	
	6.5	8.91	0.36	
	7.5	8.83	0.27	
	8.5	8.77	0.24	
	9.5	8.94	0.39	
	10.5	8.98	0.45	
	11.5	8.97	0.42	
	12.5	9.01	0.47	
	13.5	8.73	0.2	
	14.5	8.87	0.35	
	15.5	8.78	0.26	
	16.5	8.87	0.33	
	17.5	8.87	0.31	
	18.5	8.85	0.3	
	19.5	8.75	0.2	
Waterline	20.2	8.56	0	
	21.4	8.28		
	21.9	8.1		
Bankfull	24.9	7.74		
	28.7	7.2		
	30	7.15		

COMPUTED FROM MEASURED FIELD DATA

Wetted Perimeter (ft)	Water Depth (ft)	Area (ft^2)	Discharge (cfs)	Percent Discharge
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
1.06	0.36	0.36	0.21	6.49
1	0.32	0.32	0.19	5.77
1	0.35	0.35	0.21	6.31
1	0.36	0.36	0.21	6.49
1	0.27	0.27	0.16	4.87
1	0.24	0.24	0.14	4.32
1.01	0.39	0.39	0.23	7.03
1	0.45	0.45	0.27	8.11
1	0.42	0.42	0.25	7.57
1	0.47	0.47	0.28	8.47
1.04	0.2	0.2	0.12	3.6
1.01	0.35	0.35	0.21	6.31
1	0.26	0.26	0.15	4.68
1	0.33	0.33	0.19	5.95
1	0.31	0.31	0.18	5.59
1	0.3	0.3	0.18	5.41
1	0.2	0.17	0.1	3.06
0.73	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0

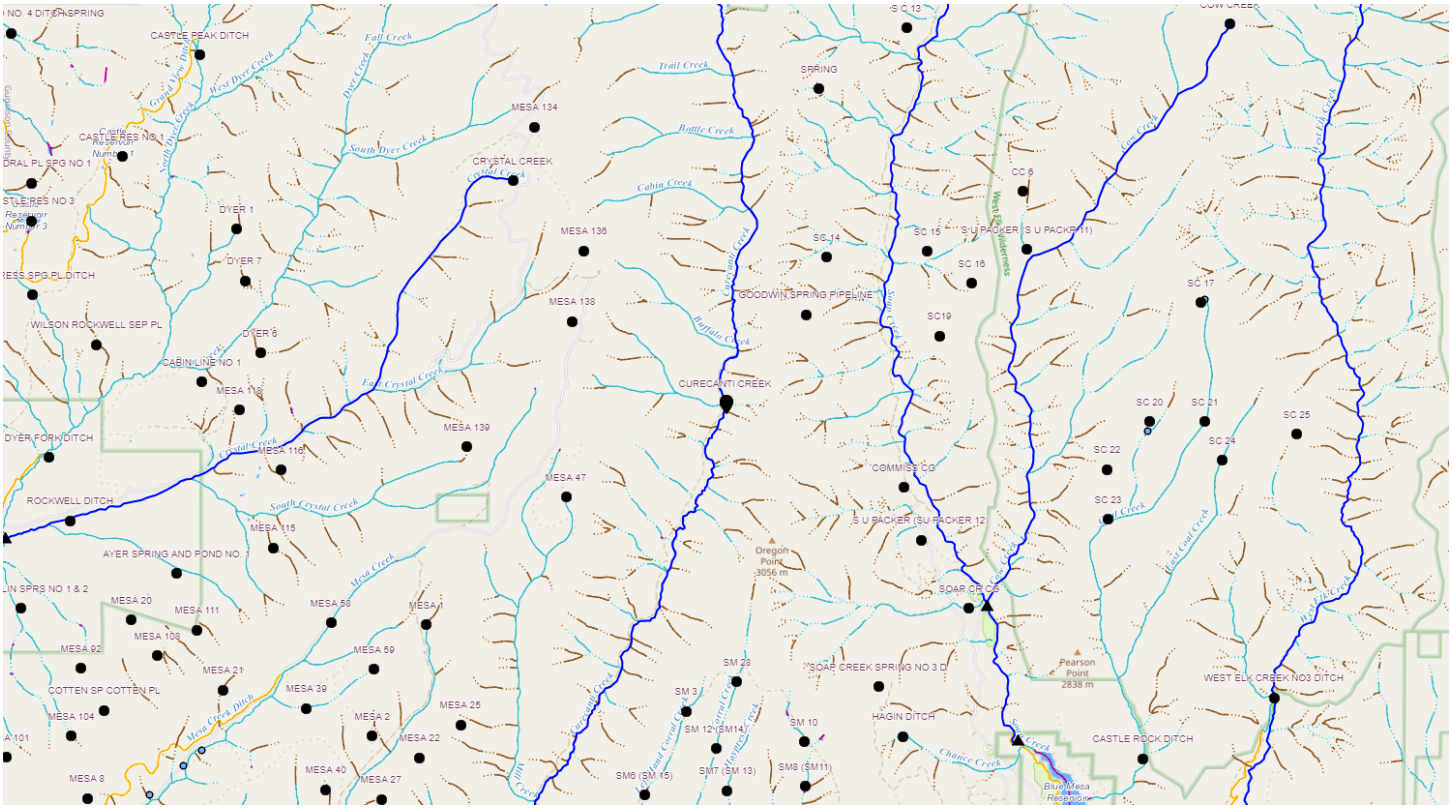
DISCLAIMER

"The Colorado Water Conservation Board makes no representations about the use of the software contained in the R2Cross platform for any purpose besides that for which it was designed. To the maximum extent permitted by applicable law, all information, modeling results, and software are provided “as is” without warranty or condition of any kind, including all implied warranties or conditions of merchantability, or fitness for a particular purpose. The user assumes all responsibility for the accuracy and suitability of this program for a specific application. In no event shall the Colorado Water Conservation Board or any state agency, official or employee be liable for any direct, indirect, punitive, incidental, special, consequential damages or any damages whatsoever including, without limitation, damages for loss of use, data, profits, or savings arising from the implementation, reliance on, or use of or inability to use the R2Cross platform.

R2Cross RESULTS

Stream Name: Curecanti Creek
Stream Locations: Above Commissary Gulch
Fieldwork Date: 08/12/2022
Cross-section: 2
Observers: Birch Gibney
Coordinate System: UTM Zone 13
X (easting): 294057
Y (northing): 4272378
Date Processed: 10/11/2022
Slope: 0.0286
Discharge: Entered Value: 3.28 (cfs)
Computation method: Ferguson VPE
R2Cross data filename: 2-Curecanti-upper-8-12-22-Q=3.277.xlsx
R2Cross version: 2.0.0

LOCATION



ANALYSIS RESULTS

Habitat Criteria Results

Bankfull top width (ft) = 37.39

	Habitat Criteria	Discharge (cfs) Meeting Criteria
Mean Depth (ft)	0.4	14.41
Percent Wetted Perimeter (%)	50.0	0.47
Mean Velocity (ft/s)	1.0	11.34

STAGING TABLE

Feature	Distance to Water (ft)	Top Width (ft)	Mean Depth (ft)	Maximum Depth (ft)	Area (sq ft)	Wetted Perimeter (ft)	Percent Wetted Perimeter	Hydraulic Radius (ft)	Manning's n	Mean Velocity (ft/s)	Discharge (cfs)
Bankfull	3.94	37.39	1.08	1.37	40.24	38.02	100.0	1.06	0.06	4.57	184.05
	3.94	37.37	1.07	1.37	40.1	38.0	99.96	1.06	0.06	4.56	182.78
	3.99	37.17	1.03	1.32	38.24	37.78	99.37	1.01	0.06	4.34	165.85
	4.04	36.98	0.98	1.27	36.38	37.56	98.78	0.97	0.06	4.12	149.71
	4.09	36.78	0.94	1.22	34.54	37.33	98.2	0.93	0.06	3.89	134.38
	4.14	36.58	0.89	1.17	32.7	37.11	97.61	0.88	0.06	3.66	119.85
	4.19	36.38	0.85	1.12	30.88	36.89	97.02	0.84	0.06	3.44	106.15
	4.24	36.18	0.8	1.07	29.07	36.66	96.44	0.79	0.07	3.21	93.27
	4.29	35.94	0.76	1.02	27.26	36.41	95.76	0.75	0.07	2.98	81.34
	4.34	35.66	0.71	0.97	25.47	36.11	94.98	0.71	0.07	2.76	70.35
	4.39	35.39	0.67	0.92	23.7	35.81	94.19	0.66	0.08	2.54	60.19
	4.44	35.11	0.62	0.87	21.93	35.51	93.41	0.62	0.08	2.32	50.85
	4.49	34.83	0.58	0.82	20.19	35.22	92.63	0.57	0.08	2.1	42.34
	4.54	34.52	0.53	0.77	18.45	34.88	91.75	0.53	0.09	1.88	34.71
	4.59	33.76	0.5	0.72	16.74	34.11	89.72	0.49	0.09	1.7	28.43
	4.64	33.55	0.45	0.67	15.06	33.87	89.08	0.44	0.1	1.48	22.31
	4.69	33.42	0.4	0.62	13.39	33.7	88.64	0.4	0.11	1.26	16.93
	4.74	33.3	0.35	0.57	11.72	33.53	88.21	0.35	0.12	1.05	12.36
	4.79	33.17	0.3	0.52	10.06	33.37	87.77	0.3	0.13	0.85	8.58
	4.84	33.04	0.25	0.47	8.4	33.2	87.33	0.25	0.15	0.66	5.56
Waterline	4.89	32.92	0.21	0.42	6.76	33.04	86.9	0.2	0.18	0.48	3.27
	4.94	30.9	0.17	0.37	5.15	31.01	81.57	0.17	0.21	0.36	1.84
	4.99	28.27	0.13	0.32	3.67	28.37	74.62	0.13	0.26	0.25	0.9
	5.04	20.21	0.12	0.27	2.41	20.29	53.38	0.12	0.28	0.22	0.52
	5.09	14.51	0.11	0.22	1.53	14.58	38.34	0.11	0.31	0.18	0.28

	5.14	10.71	0.08	0.17	0.9	10.76	28.31	0.08	0.37	0.13	0.12
	5.19	7.78	0.06	0.12	0.45	7.81	20.55	0.06	0.51	0.07	0.03
	5.24	4.94	0.03	0.07	0.13	4.95	13.02	0.03	1.0	0.02	0.0
	5.29	0.8	0.01	0.02	0.01	0.81	2.12	0.01	2.59	0.0	0.0
	5.29	0.74	0.01	0.01	0.01	0.74	1.95	0.01	2.78	0.0	0.0

This Manning's roughness coefficient was calculated based on velocity estimates from the Ferguson VPE method

MODEL SUMMARY

Measured Flow (Qm) =	3.28	(cfs)
Calculated Flow (Qc) =	3.28	(cfs)
(Qm-Qc)/Qm * 100 =	0.05%	
Measured Waterline (WLm) =	4.9	(ft)
Calculated Waterline (WLc) =	4.89	(ft)
(WLm-WLc)/WLm * 100 =	0.13%	
Max Measured Depth (Dm) =	0.46	(ft)
Max Calculated Depth (Dc) =	0.42	(ft)
(Dm-Dc)/Dm * 100 =	9.49%	
Mean Velocity =	0.48	(ft/s)
Manning's n =	0.18	
0.4 * Qm =	1.31	(cfs)
2.5 * Qm =	8.19	(cfs)

FIELD DATA

Feature	Station (ft)	Rod Height (ft)	Water depth (ft)	Velocity (ft/s)
	0	3.65		
Bankfull	3.4	3.94		
	4.1	4.27		
	5.1	4.54		
	5.9	4.6		
Waterline	6.1	4.9	0	
	8	5.02	0.18	
	9.5	5.06	0.22	
	11	4.98	0.14	
	12.5	5.22	0.38	
	14	5.31	0.46	
	15.5	5.21	0.4	
	17	5.08	0.2	
	18.5	5.26	0.4	
	20	5.25	0.39	
	21.5	5	0.1	
	23	5.08	0.16	
	24.5	5.07	0.17	
	26	5.11	0.19	
	27.5	5.31	0.36	
	29	5.16	0.24	
	30.5	5.12	0.19	
	32	5.03	0.09	
	33.5	4.9	0	
	35	5.04	0.05	
	36.5	5.03	0.06	
	38	5.03	0.12	
Waterline	39	4.9	0	
Bankfull	40.9	3.88		
	42.2	3.71		

COMPUTED FROM MEASURED FIELD DATA

Wetted Perimeter (ft)	Water Depth (ft)	Area (ft^2)	Discharge (cfs)	Percent Discharge
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
1.9	0.18	0.31	0.15	4.53
1.5	0.22	0.33	0.16	4.88
1.5	0.14	0.21	0.1	3.11
1.52	0.38	0.57	0.28	8.44
1.5	0.46	0.69	0.33	10.21
1.5	0.4	0.6	0.29	8.88
1.51	0.2	0.3	0.15	4.44
1.51	0.4	0.6	0.29	8.88
1.5	0.39	0.58	0.28	8.66
1.52	0.1	0.15	0.07	2.22
1.5	0.16	0.24	0.12	3.55
1.5	0.17	0.26	0.12	3.77
1.5	0.19	0.28	0.14	4.22
1.51	0.36	0.54	0.26	7.99
1.51	0.24	0.36	0.17	5.33
1.5	0.19	0.28	0.14	4.22
1.5	0.09	0.14	0.07	2
1.51	0	0	0	0
1.51	0.05	0.07	0.04	1.11
1.5	0.06	0.09	0.04	1.33
1.5	0.12	0.15	0.07	2.22
1.01	0	0	0	0
0	0	0	0	0
0	0	0	0	0

DISCLAIMER

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Curecanti Creek (Upper) Fish Survey Data

Water **39518** **Curecanti Creek** Date **7/11/2012**

Station **GU3115** **NE of Bald Mt. Reservoir**

Drainage **Gunnison River** UtmX **292784** UtmY **4282982** Elevation **2986 m**

Length **91 m** Width **2.90 m** Area **0.03 Ha**

Surveyors **Brauch, BonDurant, Banks, Brittian**

Gear **NOT LISTED** Effort **2.00** Metric **PASS** Protocol **TWO-PASS REMOVAL**

Total catch **46**

Species	Count	Length (mm)	Weight (gm)	Status	Mark	Tag ID	Habitat
BRK	1	80	5	2			A
BRK	1	83	8	1			A
BRK	1	85	8	1			A
BRK	1	85	8	1			A
BRK	1	95	9	1			A
BRK	1	83	9	1			A
BRK	1	87	9	1			A
BRK	1	88	9	1			A
BRK	1	100	10	1			A
BRK	1	101	10	1			A
BRK	1	105	11	1			A
BRK	1	98	18	1			A
BRK	1	130	20	1			A
BRK	1	144	40	1			A
BRK	1	169	40	2			A
BRK	1	156	45	1			A
BRK	1	160	48	1			A

Curecanti Creek (Upper) Fish Survey Data

Water **39518** **Curecanti Creek** Date **7/11/2012**

Station **GU3115** **NE of Bald Mt. Reservoir**

Species	Count	Length (mm)	Weight (gm)	Status	Mark	Tag ID	Habitat
BRK	1	163	50	2			A
BRK	1	173	50	2			A
BRK	1	168	55	1			A
BRK	1	165	58	1			A
BRK	1	165	58	1			A
BRK	1	175	58	1			A
BRK	1	170	60	1			A
BRK	1	175	62	1			A
BRK	1	167	65	1			A
BRK	1	170	65	1			A
BRK	1	180	65	1			A
BRK	1	182	65	2			A
BRK	1	174	68	1			A
BRK	1	185	75	1			A
BRK	1	185	80	1			A
BRK	1	175	80	1			A
BRK	1	183	82	1			A
BRK	1	188	85	1			A
BRK	1	195	95	2			A
BRK	1	220	130	1			A
BRK	1	216	132	1			A
BRK	1	238	165	1			A
BRK	1	188		1			A

Curecanti Creek (Upper) Fish Survey Data

Water **39518** **Curecanti Creek** Date **7/11/2012**

Station **GU3115** **NE of Bald Mt. Reservoir**

Species	Count	Length (mm)	Weight (gm)	Status	Mark	Tag ID	Habitat
BRK	1	37		2			A
BRK	1	37		2			A
BRK	1	38		2			A
BRK	1	37		2			A
BRK	1	39		2			A
BRK	1	31		2			A

Notes: Sampled to assess fish species distribution and to assess presence or absence of native cutthroat trout.
BRK = Brook Trout

Discharge Measurment Field Visit Data Report *(Filters: Name begins with Curecanti;)*

Div	Name	CWCB Case Number	Segment ID	Meas. Date	UTM	Location	Flow Amount (cfs)	Meas #	Rating	Station ID
4	Curecanti Creek		21/4/A-003	06/24/2022	UTMx: 291011 UTMy: 4266390	Above 720 Forest rd crossing	19.03	1	G	

Discharge Measurement Summary

Site name	Upper Curecanti
Site number	24062022
Operator(s)	Lfs
File name	Upper Curecanti_20220624-112835.ft
Comment	

Start time	6/24/2022 10:59 AM
End time	6/24/2022 11:27 AM
Start location latitude	38.523
Start location longitude	-107.394
Calculations engine	FlowTracker2

Sensor type	Top Setting
Handheld serial number	FT2H1747037
Probe serial number	FT2P1747048
Probe firmware	1.30
Handheld software	1.7

# Stations	Avg interval (s)	Total discharge (ft³/s)
25	40	19.0270

Total width (ft)	Total area (ft²)	Wetted Perimeter (ft)
21.400	15.0070	21.918

Mean SNR (dB)	Mean depth (ft)	Mean velocity (ft/s)
42	0.701	1.2679

Mean temp (°F)	Max depth (ft)	Max velocity (ft/s)
49.881	1.260	2.1316

Discharge Uncertainty		
Category	**ISO**	**IVE**
Accuracy	1.0%	1.0%
Depth	0.3%	2.6%
Velocity	0.9%	3.7%
Width	0.1%	0.1%
Method	1.7%	
# Stations	2.0%	
Overall	**3.0%**	**4.7%**

Discharge equation	Mid Section
Discharge uncertainty	IVE
Discharge reference	Rated

Data Collection Settings	
Salinity	0.000 PSS-78
Temperature	-
Sound speed	-
Mounting correction	0.000 %

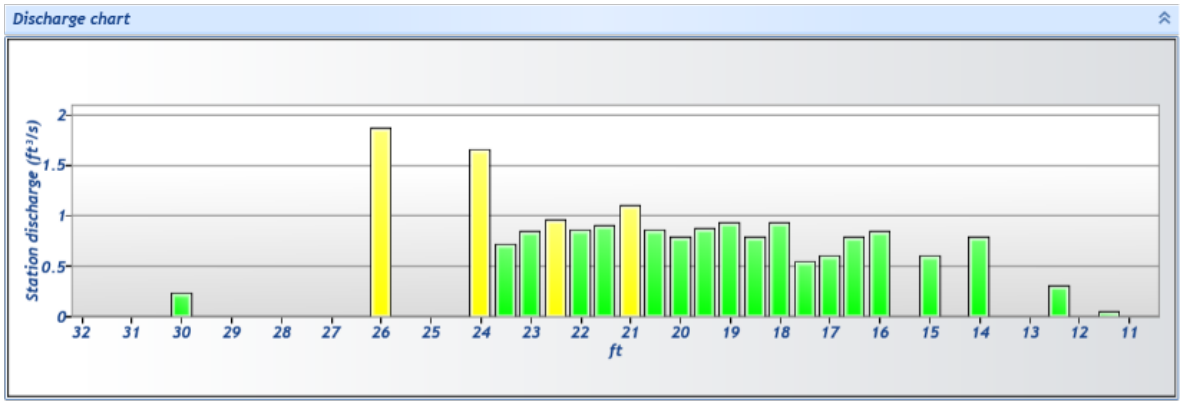
Summary overview

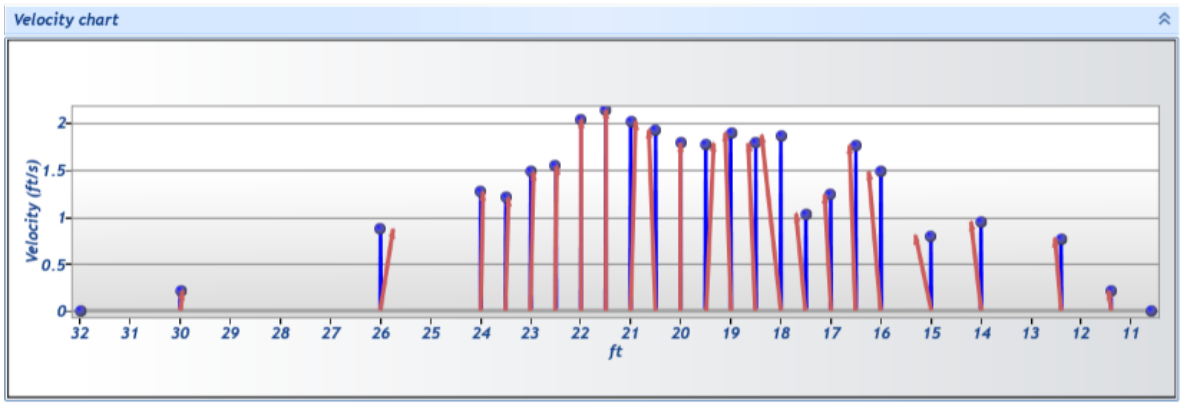
No changes were made to this file
Quality control warnings

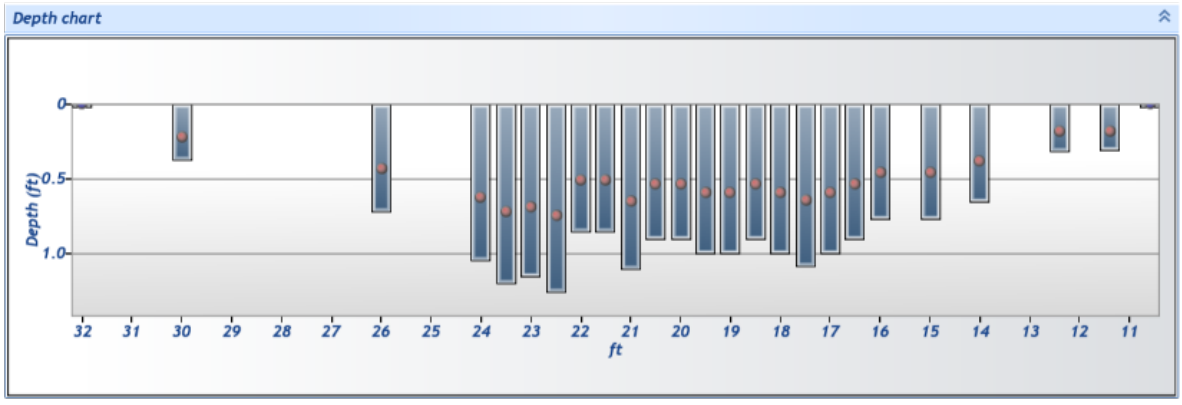
Discharge Measurement Summary

Site name	Upper Curecanti
Site number	24062022
Operator(s)	Lfs
File name	Upper Curecanti_20220624-112835.ft
Comment	

Station Warning Settings		
Station discharge OK	Station discharge < 5.00%	
Station discharge caution	5.00% >= Station discharge < 10.00%	
Station discharge warning	Station discharge >= 10.00%	







Discharge Measurement Summary

Site name	Upper Curecanti
Site number	24062022
Operator(s)	Lfs
File name	Upper Curecanti_20220624-112835.ft
Comment	

Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q	
0	10:59 AM	10.600	None	0.010	0.0000	0.000	0	0.0000	1.0000	0.2117	0.0040	0.0008	0.00	✓
1	11:00 AM	11.400	0.6	0.300	0.6000	0.180	80	0.2117	1.0000	0.2117	0.2700	0.0572	0.30	✓
2	11:01 AM	12.400	0.6	0.310	0.6000	0.186	80	0.7724	1.0000	0.7724	0.4030	0.3113	1.64	✓
3	11:02 AM	14.000	0.6	0.650	0.6000	0.390	80	0.9473	1.0000	0.9473	0.8450	0.8005	4.21	✓
4	11:03 AM	15.000	0.6	0.770	0.6000	0.462	80	0.8003	1.0000	0.8003	0.7700	0.6162	3.24	✓
5	11:05 AM	16.000	0.6	0.770	0.6000	0.462	80	1.4766	1.0000	1.4766	0.5775	0.8527	4.48	✓
6	11:06 AM	16.500	0.6	0.900	0.6000	0.540	80	1.7570	1.0000	1.7570	0.4500	0.7906	4.16	✓
7	11:07 AM	17.000	0.6	1.000	0.6000	0.600	80	1.2358	1.0000	1.2358	0.5000	0.6179	3.25	✓
8	11:08 AM	17.500	0.6	1.080	0.6000	0.648	80	1.0313	1.0000	1.0313	0.5400	0.5569	2.93	✓
9	11:10 AM	18.000	0.6	1.000	0.6000	0.600	80	1.8668	1.0000	1.8668	0.5000	0.9334	4.91	✓
10	11:11 AM	18.500	0.6	0.900	0.6000	0.540	80	1.7811	1.0000	1.7811	0.4500	0.8015	4.21	✓
11	11:12 AM	19.000	0.6	1.000	0.6000	0.600	80	1.8894	1.0000	1.8894	0.5000	0.9447	4.97	✓
12	11:13 AM	19.500	0.6	1.000	0.6000	0.600	80	1.7776	1.0000	1.7776	0.5000	0.8888	4.67	✓
13	11:14 AM	20.000	0.6	0.900	0.6000	0.540	80	1.7825	1.0000	1.7825	0.4500	0.8021	4.22	✓
14	11:15 AM	20.500	0.6	0.900	0.6000	0.540	80	1.9193	1.0000	1.9193	0.4500	0.8637	4.54	✓
15	11:16 AM	21.000	0.6	1.100	0.6000	0.660	80	2.0117	1.0000	2.0117	0.5500	1.1064	5.82	✓
16	11:18 AM	21.500	0.6	0.850	0.6000	0.510	80	2.1316	1.0000	2.1316	0.4250	0.9059	4.76	✓
17	11:19 AM	22.000	0.6	0.850	0.6000	0.510	80	2.0293	1.0000	2.0293	0.4250	0.8624	4.53	✓
18	11:20 AM	22.500	0.6	1.260	0.6000	0.756	80	1.5365	1.0000	1.5365	0.6300	0.9680	5.09	✓
19	11:21 AM	23.000	0.6	1.150	0.6000	0.690	80	1.4749	1.0000	1.4749	0.5750	0.8481	4.46	✓
20	11:27 AM	23.500	0.6	1.200	0.6000	0.720	80	1.2016	1.0000	1.2016	0.6000	0.7210	3.79	✓
21	11:22 AM	24.000	0.6	1.050	0.6000	0.630	80	1.2656	1.0000	1.2656	1.3125	1.6611	8.73	✓
22	11:23 AM	26.000	0.6	0.720	0.6000	0.432	80	0.8682	1.0000	0.8682	2.1600	1.8752	9.86	✓
23	11:25 AM	30.000	0.6	0.370	0.6000	0.222	80	0.2147	1.0000	0.2147	1.1100	0.2383	1.25	✓
24	11:26 AM	32.000	None	0.010	0.0000	0.000	0	0.0000	1.0000	0.2147	0.0100	0.0021	0.01	✓

Discharge Measurement Summary

Site name	Upper Curecanti
Site number	24062022
Operator(s)	Lfs
File name	Upper Curecanti_20220624-112835.ft
Comment	

Quality Control Settings	
Maximum depth change	50.00%
Maximum spacing change	100.00%
SNR threshold	10 dB
Standard error threshold	0.0328 ft/s
Spike threshold	10.00%
Maximum velocity angle	20.0 deg
Maximum tilt angle	5.0 deg

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
4	11:03 AM	15.000	0.6	0.770	0.6000	0.462	Standard Error > QC,Velocity Angle > QC
5	11:05 AM	16.000	0.6	0.770	0.6000	0.462	Standard Error > QC
6	11:06 AM	16.500	0.6	0.900	0.6000	0.540	Standard Error > QC
7	11:07 AM	17.000	0.6	1.000	0.6000	0.600	Standard Error > QC
8	11:08 AM	17.500	0.6	1.080	0.6000	0.648	Standard Error > QC
9	11:10 AM	18.000	0.6	1.000	0.6000	0.600	Standard Error > QC
10	11:11 AM	18.500	0.6	0.900	0.6000	0.540	Standard Error > QC
11	11:12 AM	19.000	0.6	1.000	0.6000	0.600	Standard Error > QC
12	11:13 AM	19.500	0.6	1.000	0.6000	0.600	Standard Error > QC
13	11:14 AM	20.000	0.6	0.900	0.6000	0.540	Standard Error > QC
14	11:15 AM	20.500	0.6	0.900	0.6000	0.540	Standard Error > QC
15	11:16 AM	21.000	0.6	1.100	0.6000	0.660	Standard Error > QC
16	11:18 AM	21.500	0.6	0.850	0.6000	0.510	Standard Error > QC
17	11:19 AM	22.000	0.6	0.850	0.6000	0.510	Standard Error > QC
18	11:20 AM	22.500	0.6	1.260	0.6000	0.756	Standard Error > QC
19	11:21 AM	23.000	0.6	1.150	0.6000	0.690	Standard Error > QC
20	11:27 AM	23.500	0.6	1.200	0.6000	0.720	Standard Error > QC
21	11:22 AM	24.000	0.6	1.050	0.6000	0.630	Standard Error > QC
22	11:23 AM	26.000	0.6	0.720	0.6000	0.432	Standard Error > QC

Discharge Measurement Summary

Site name	Upper Curecanti
Site number	24062022
Operator(s)	Lfs
File name	Upper Curecanti_20220624-112835.ft
Comment	

Supplemental data summary

Gauge height time	Gauge height (ft)	Rated discharge (ft³/s)	Temperature (°F)	Salinity (PSS-78)	Gauge height comments
6/24/2022 10:58 AM	0.000		50.000		

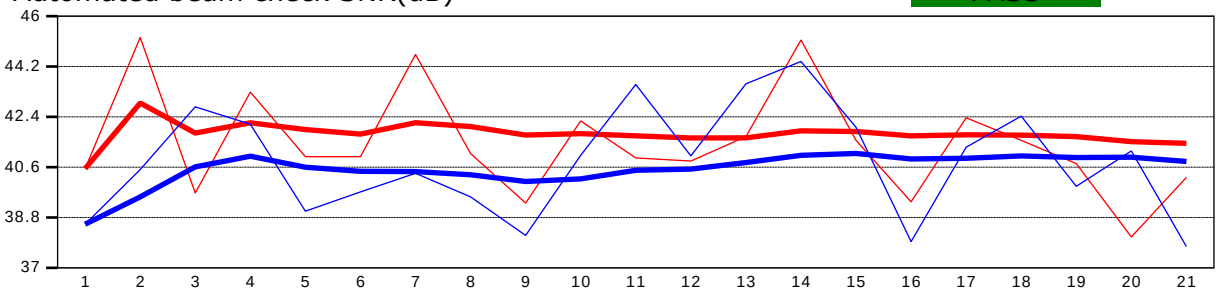
Discharge Measurement Summary

Site name	Upper Curecanti
Site number	24062022
Operator(s)	Lfs
File name	Upper Curecanti_20220624-112835.ft
Comment	

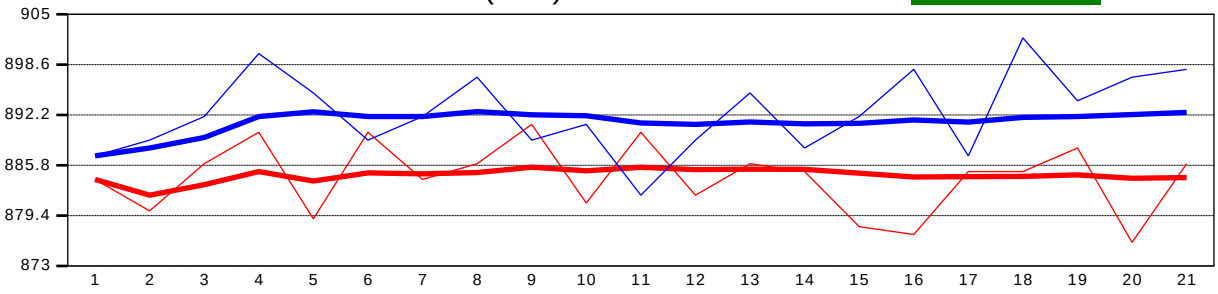
Beam 1	
Beam 2	

Automated beam check Start time 6/24/2022 10:58:29 AM

Automated beam check SNR(dB) PASS



Automated beam check Noise level(cnts) PASS



Automated beam check Quality control warnings

No quality control warnings

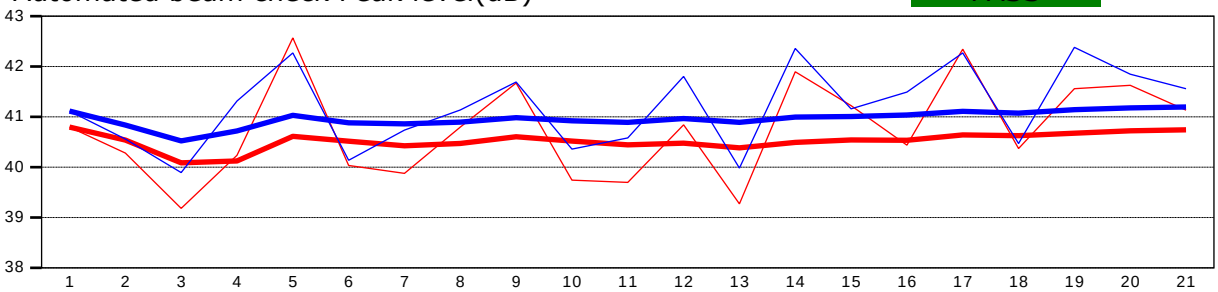
Discharge Measurement Summary

Site name	Upper Curecanti
Site number	24062022
Operator(s)	Lfs
File name	Upper Curecanti_20220624-112835.ft
Comment	

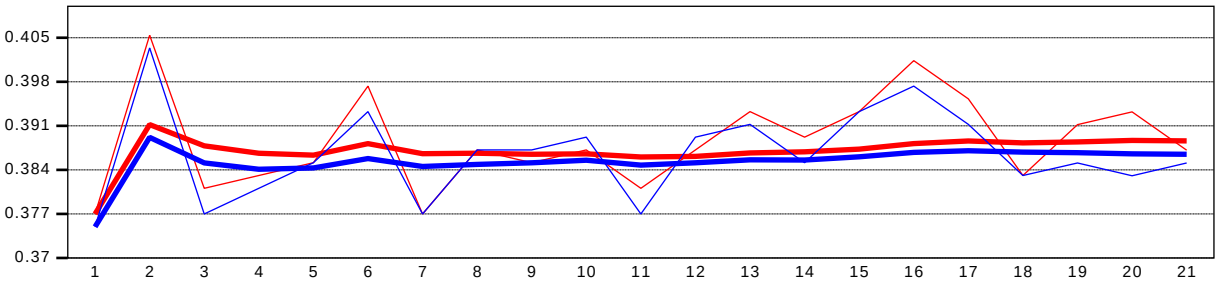
Beam 1	
Beam 2	

Automated beam check Start time 6/24/2022 10:58:29 AM

Automated beam check Peak level(dB) PASS



Automated beam check Peak position(ft) PASS



Automated beam check Quality control warnings

No quality control warnings