



October 27, 2022

Mr. Robert Viehl
Colorado Water Conservation Board
1313 Sherman Street
Denver, CO 80203

Dear Mr. Viehl,

High Country Conservation Advocates (HCCA) submits this instream flow recommendation for Cross Creek, located in Gunnison County, Water Division 4.

HCCA's mission is to protect the health and natural beauty of the land, rivers, and wildlife in and around Gunnison County. Many of our members live and work here and enjoy recreational opportunities and a quality of life that is preserved by our valley's wildlife, habitat, and water resources. HCCA's 29 year-old water program has a long history of protecting waters in the Upper Gunnison Basin and in developing an environmental voice within key regional and state forums. In the past HCCA has partnered with the Bureau of Land Management to support instream flow proposals on the Slate River and Oh-Be-Joyful Creek. In 2016 HCCA submitted proposals to protect updated instream flows for Coal Creek and Brush Creek. HCCA partnered with Western Resource Advocates in 2017 to submit an instream flow proposal on Dutchman Creek. More recently HCCA submitted instream flow proposals for Gold Creek, Cement Creek, Spring Creek, Elk Creek and Wildcat Creek, all in Division 4.

The headwaters of Cross Creek originate on United States Forest Service lands in Gunnison County. The Cameron Creek riparian area supports diverse habitat including beaver pond complexes with ample high-quality habitat dominated by willows. HCCA staff observed several small trout and macroinvertebrates when completing R2Cross assessments in 2021. In 2022, CPW staff conducted a fish survey in Cross Creek.

HCCA has coordinated with local consultants to arrive at a preliminary instream flow recommendation. In considering this application, the Colorado Water Conservation Board (CWCB) has an opportunity to protect an important stream ecosystem by moving forward with an instream flow protection that would preserve the natural environment to a reasonable degree.

Enclosed you will find the preliminary instream flow proposal, R2Cross modeling runs, stream photos, and maps of the relevant reach. If you have any further questions regarding this recommendation, please feel free to contact Julie Nania at (509) 999-0012. HCCA thanks CPW and the CWCB for their support in developing this recommendation.

Sincerely,

A handwritten signature in cursive script that reads "Julie Nania".

Julie Nania
High Country Conservation Advocates
Water Director

Enclosure

ENCLOSURE - INSTREAM FLOW RECOMMENDATIONS FOR CROSS CREEK

Below is a description of the proposed instream flow. Additional details can be found in Attachments A-D.

Location

Cross Creek is located within the Upper Taylor Watershed (HUC-12: 140200010202) in Gunnison County, Water Division 4. The headwaters form on the north side of Cross Mountain. Cross Creek flows north to the confluence with the Lottis Creek, a tributary to the Taylor Fork of the Gunnison River. The Cross Creek Watershed is 1.89 square miles and is on the Taylor Park Reservoir and Fairview Peak United States Geologic Survey quad maps (Attachment A).

The stream segment identified for the proposed instream flow appropriation is approximately 2.28 miles long from its headwaters to the confluence with Lottis Creek.

Table 1. Land Status in the Cross Creek Watershed.

Upper Terminus	Lower Terminus	Total Length (miles)	Land Ownership	
			Private (%)	Public (%) ¹
Headwaters	Confluence with Lottis Creek	2.3	Riparian Corridor ² 0%	Riparian Corridor 100%
			Watershed Composition 3%	Watershed Composition 97%

1. The public land in the Cross Creek Watershed is managed by the USFS.
2. The riparian corridor ownership percentages were estimated using stream length.

The Cross Creek watershed is approximately 97 percent public land managed by the United States Forest Service (USFS). The riparian corridor of the proposed segment is all public land managed by the USFS.

Existing Instream Flow Rights

Cross Creek does not have an existing instream flow water right.

Water Availability

Physical Availability

Cross Creek does not have a gage. The nearest downstream gage is the Taylor River at Almont; with a period of record of 1986 to present (USGS ID = 09110000).

Legal Availability

There are no diversions on Cross Creek. A water rights search on Colorado's Decision Support System (CDSS) did not identify any existing water rights on Cross Creek. However, there is a privately held

instream flow right for Cross Creek. This private right appears in connection with Lottis Creek in Case No. W1987.

Case No. W1987 details privately held instream flow rights for Lottis Creek and three of its tributaries (Cameron, Cross, and Union creeks). The private instream flow right for Cross Creek is 5 cfs. The priority date for these flows is 1910 and the beneficial use is for stock water, recreation, fish culture, wildlife procreation, and heritage preservation. This use was recognized as non-exclusive and to be used in common with the State of Colorado (See Case No. W-1987). Although these private flow rights are extensive, they do not afford the same protections offered by instream flow rights held by the CWCB. Rights held by the CWCB are monitored and enforced by CWCB staff and the State can join as a party to protect potential harm to these appropriations. They are non-transferable and cannot be sold. The water rights are summarized in Attachment B.

Biological Summary

The headwaters of Cross Creek form above treeline as a cold-water, high gradient stream. There are both active and abandoned beaver ponds at several locations alongside the creek. The riparian area of the creek is primarily composed of willows and wet meadow vegetation. The confluence of Cameron and Lottis creeks also supports high-quality wetlands.

Generally, Cross Creek has gravel and cobble-sized substrate. Flows from Cameron Creek support a robust riparian area that provides shade and cover for the extant fish community. While conducting R2Cross assessments, we saw numerous macroinvertebrates and small fish (unknown species). CPW surveyed Cross Creek in October 2022 and found numerous brown trout (Attachment C).

Preliminary R2Cross Analysis

HCCA relied on the expertise of Alpine Environmental Consultants LLC to interpret output from the R2Cross model and develop a preliminary instream flow recommendation that will protect Cross Creek's natural environment to a reasonable degree.

One R2Cross field survey was completed on June 28, 2021. The cross-section is in Cross Creek approximately 0.2 miles upstream of the confluence with Lottis Creek. R2Cross data entry, analysis, and interpretation were completed following fieldwork. These data were used to create the preliminary instream flow recommendations for Cross Creek (Table 2). The R2Cross output and field forms are attached for review (Attachment D).

Table 2. R2CROSS analysis summary and preliminary instream flow recommendations.

Cross Section (Date)	Measured Discharge (cfs)	Bankfull Top Width (ft)	Winter Flow (2 of 3 criteria) (cfs)	Summer Flow Recommendation (3 of 3 criteria) (cfs)
Cross Creek #1 (6-28-21)	1.41	7.7	0.97	1.4
Preliminary Proposed ISF Rate:			0.85*	1.4

Following further analysis, the preliminary instream flow rates and seasons were revised based upon water availability to create the following instream flow seasons and rates:

- **April 1 to April 30: 0.72 cfs***
- **May 1 to July 31: 1.4 cfs**
- **August 1 to August 31: 0.85 cfs***
- **September 1 to September 30: 0.63 cfs***
- **October 1 to March 31: 0.27 cfs***

***Water availability limited, R2Cross output reduced to be consistent with physical water availability.**

Photographs



Photo 1. Cross Creek near cross-section looking downstream (6-28-2021).



Photo 2. Cross Creek near cross-section looking upstream (6-28-2021).



Photo 3. Cross Creek cross-section view from the river-left bank (6-28-2021).



Photo 4. Cross Creek cross-section view from the river-right bank (6-28-2021).

Relationship to Existing State Policy

HCCA is proposing this instream flow to the CWCB in furtherance of the State of Colorado's policy "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." C.R.S. 33-1-101(1).

Attachments

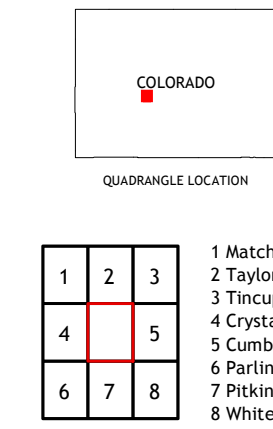
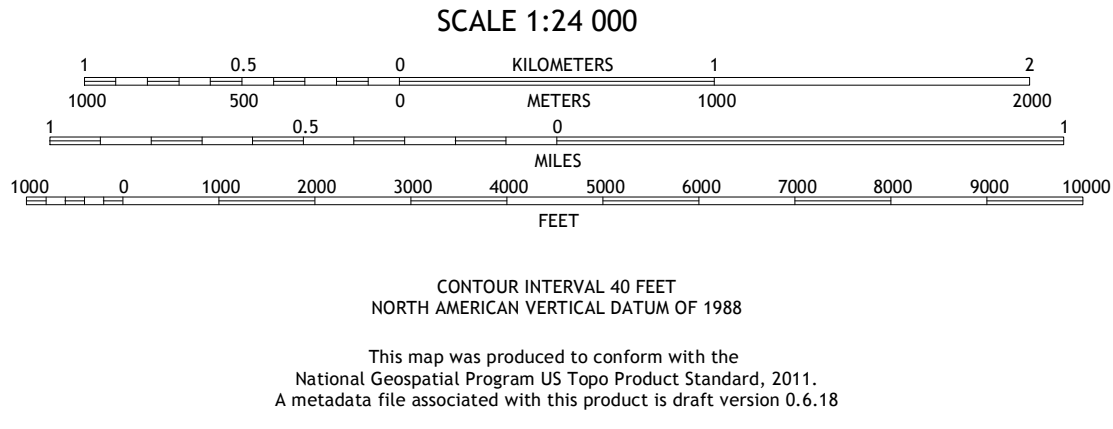
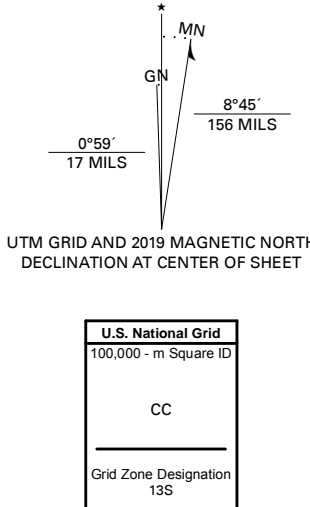
- A – USGS Topographic Quadrangle Map
- B – Water Rights Summary
- C – CPW Fish Survey
- D – R2Cross Analysis

Attachment A- USGS Topographic Quadrangle Map



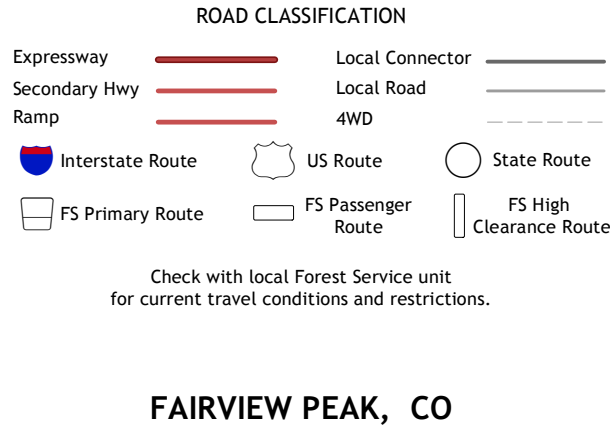
Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and
1 000-meter grid/Universal Transverse Mercator, Zone 13S
This map is not a legal document. Boundaries may be
generalized for this map scale. Private lands within government
reservations may not be shown. Obtain permission before
entering private lands.

Imagery.....N.A.P., October 2017 - January 2018
Roads.....U.S. Census Bureau, 2016
Roads within US Forest Service Lands.....FS Topo Data
with limited Forest Service updates, 2013
Names.....GNIS, 1978 - 2019
Hydrography.....National Hydrography Dataset, 1899 - 2019
Contours.....National Elevation Dataset, 2004
Boundaries.....Multiple sources; see
Public Land Survey System.....BLM, 2018
Wetlands.....FWS National Wetlands Inventory 1983 - 2011



1	2	3
4	5	6
7	8	9

1 Matchless Mountain
2 Taylor Park Reservoir
3 Tincup
4 Crystal Creek
5 Cumberland Pass
6 Parlin
7 Pitkin
8 Whitepine



FAIRVIEW PEAK, CO
2019





U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY



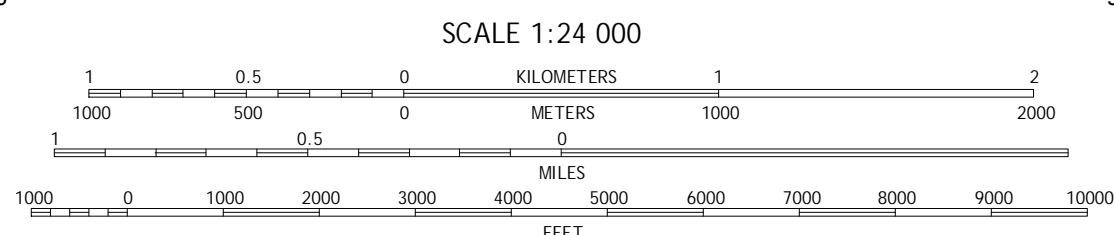
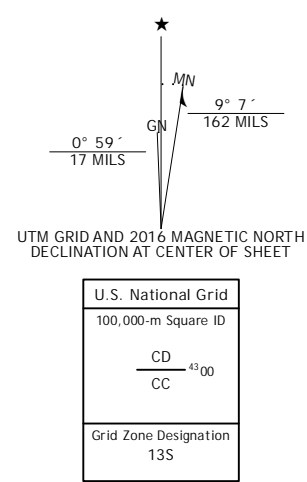
TAYLOR PARK RESERVOIR QUADRANGLE
COLORADO-GUNNISON CO.
7.5-MINUTE SERIES



Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84) Projection and
1000-meter grid: Universal Transverse Mercator, Zone 13S
10 000-foot ticks: Colorado Coordinate System of 1983 (central zone)

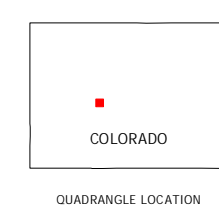
This map is not a legal document. Boundaries may be generalized for this map scale. Private lands within government reservations may not be shown. Obtain permission before entering private lands.

Imagery.....NAIP, September 2013
Roads.....U.S. Census Bureau, 2015 - 2016
Roads within US Forest Service Lands.....FSTopo Data with limited Forest Service updates, 2012 - 2016
Names.....GNS, 2016
Hydrography.....National Hydrography Dataset, 2013
Contours.....National Elevation Dataset, 2004
Boundaries.....Multiple sources: see metadata file 1972 - 2016
Public Land Survey System.....BLM, 2011
Wetlands.....FWS National Wetlands Inventory 1977 - 2014



CONTOUR INTERVAL 40 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

This map was produced to conform with the
National Geospatial Program US Topo Product Standard, 2011.
A metadata file associated with this product is draft version 0.6.19



1	2	3
4	5	6
7	8	9

ADJOINING QUADRANGLES

ROAD CLASSIFICATION

Expressway
Secondary Hwy
Ramp

Local Connector
Local Road
4WD

FS Primary Route
FS Passenger Route
FS High Clearance Route

US Route
State Route

Check with local Forest Service unit for current travel conditions and restrictions.

TAYLOR PARK RESERVOIR, CO
2016



Attachment B- Water Rights Summary

987 13137-

Key Phillips

IN THE DISTRICT COURT IN AND FOR

WATER DIVISION NO. 4

STATE OF COLORADO

Case No. W-1987

IN THE MATTER OF THE APPLICATION FOR)
WATER RIGHTS OF JOE VADER, E. C. COLLARD,)
LOUIS F. VAN TUYL, RAYMOND P. VAN TUYL, and)
JOAN BLUMEL, d/b/a UNION PARK POOL) RULING OF REFEREE
ASSOCIATION, IN GUNNISON COUNTY.)

The applicants, Joe Vader, E. C. Collard, Louis F. Van Tuyl, Raymond P. Van Tuyl and Joan Blumel, d/b/a Union Park Pool Association, c/o their attorneys, Klingsmith and Russell, P.C., 110 East Virginia Avenue, Gunnison, Colorado 81230, request the right to use surface water for stockwater, recreation, wildlife procreation, fish culture and heritage preservation purposes, all non-consumptive in nature. Filed September 13, 1973.

IN OPPOSITION - The United States of America, c/o Kenneth J. Burke, Department of Justice, P. O. Box 1656, Denver, Colorado 80201, claiming possible impairment of Federal rights. Filed November 30, 1973.

IN APPEARANCE - The Colorado River Water Conservation District, c/o Kenneth Balcomb, P. O. Drawer 790, Glenwood Springs, Colorado 81601. Filed November 30, 1973.

GENERAL INFORMATION relative to Cases No. 1985 through 1987, and 1991 and 1992.

The applicants in the above numbered cases have applied for water rights in several streams and natural lakes in the Taylor Park area of Gunnison County. They are land owners and Government permit holders and use their lands for agricultural, livestock and recreational purposes. Their use of such lands for such purposes dates back to the early 1900's. From the standpoint of the appropriations here, each of the uses which claimants have alleged are beneficial to them. They own lands which they use for grazing purposes and, of course, the watering of livestock is essential in order to properly utilize their lands for this purpose. Their lands are highly suitable for recreational purposes. They are situate in a park which is served by improved roads leading into the park from three directions, and said park is heavily used by tourists and other people for fishing, boating, swimming, and other recreational purposes. The applicants themselves use their lands for these purposes and allow other persons to do so for profit.

It is necessary for the proper present use of their lands to be able to protect the waters in the streams and lakes claimed by them for the continued use by themselves and their clients.

The Constitution of the State of Colorado clearly provides that the waters of every natural stream not heretofore appropriated are subject to appropriation as provided by law. Art. XVI, Sec. 5.

The Supreme Court has held that this right applies to the waters of natural lakes. Denver, et al, v. Dotson, 20 Colo 304, 38 Pac. 322.

The Colorado State Legislature, in 1973, defined the term "appropriation" so as to delete the requirement of a diversion, C.R.S. 148-21-3(6). No longer is there any requirement in the determination of whether an appropriation has been made that waters have been diverted. A valid appropriation, on the

other hand, can be made by applying the waters of the State to beneficial use, in place, without an actual diversion.

The Constitution of Colorado requires that in order to appropriate waters, such waters must be applied to a beneficial use. The Legislature has never attempted to define exclusively what the term "beneficial" means. The Colorado Supreme Court has held that a "beneficial use" is a question of fact and depends upon the circumstances of each individual case. Websters New Collegiate Dictionary says, "any use which to the appropriator is profitable, good, useful, advantageous, helpful or gainful." The State Legislature, in the Statutes, has stated certain uses as beneficial; for example, 148-21-8(7) includes impoundment of water for recreational purposes, including fishery or wildlife. 148-2-3 uses are stated to include domestic use, uses for private and public bathing, bottling, commerce, irrigation, etc., and others could be found and cited.

Only in recent years has the true esthetic value of water through, near or under the land been recognized in relation to the value of the land and its uses. Land use cannot be defined without water because, without water there is no land use.

The definition of "beneficial use" contained in 148-21-3 is as follows:

"(7) 'Beneficial use' is the use of that amount of water that is reasonable and appropriate under the reasonably efficient practices to accomplish, without waste, the purpose for which the appropriation is lawfully made and without limiting the generality of the foregoing, shall include the impoundment of water for recreational purposes, including fishery or wildlife. For the benefit and enjoyment of present and future generations, 'beneficial use' shall also include the appropriation by the State of Colorado in the manner prescribed by law of such minimum flows between specific points or levels for and on natural streams and lakes as are required to preserve the natural environment to a reasonable degree."

The question then arises whether a private individual or group of individuals, a political subdivision, or the United States of America, may have the right, along with the State of Colorado, to obtain a decree for stream flow maintenance.

It is the opinion herein that such a right is contemplated by the new law for several reasons. The first is that the deletion of the requirement of a diversion for all appropriators, rather than for the State alone, is most consonant with the allowance of stream-flow maintenance decrees for private appropriators, as well as the State of Colorado; otherwise, there is no evident reason for not continuing to require the traditional diversion and application to beneficial use for private appropriators in order to constitute a valid appropriation, as had been clearly established by law in Colorado for almost a hundred years. Secondly, the definition of "beneficial use" does not purport to limit or classify those uses which are, in fact, beneficial; thus, we are left to case law, and the cases are numerous allowing instream appropriations. Thirdly, it has been suggested in this matter that the provisions contained in the second sentence of 148-21-3(7), which confers standing upon the State of Colorado, is an exclusive right of the State and, therefore, should be interpreted as denying the right to private citizens or any other entity. It appears, however, that the wording suggests that it is not an exclusive right in any way limiting, but, instead, enunciates a new right or standing of the State of Colorado itself to obtain such a decree. Had this not been the intent, the Legislature could very easily have drafted the section in such a manner that no question could have been left. Instead, the Legislature has deleted the diversion requirement for all appropriators. The

State of Colorado might well have made these filings or be a party to these filings, and accomplish the same intent as that of the applicants, and they filed no opposition to this case.

As to "reasonable and appropriate under reasonably efficient practices", as found in 148-21-3, the locations claimed are reasonable in that they are on or flow through, or border properties owned or leased by the claimants. The amounts of water claimed in storage is by survey and measurement and, as to stream flow, the amounts claimed in relation to use is not determinable. The intent is to claim for those stated purposes the normal flow of the streams, discounting weather conditions and fully recognizing all prior appropriations, contracts and agreements between governing agencies insofar as stream flow is a question or a right.

The applicants, as land owners and permittees, in the vicinity of the waters sought, have accomplished a valid, lawful appropriation of waters by using the same and applying them to the beneficial use as stated. These purposes are all beneficial, in that they bring a valuable asset to the appropriators and are useful, advantageous, helpful and gainful to them. None of the uses sought would in any way impair either the decreed or vested rights of any other appropriators under the Constitution and the laws of the State of Colorado. Applicants do not claim the exclusive use of said water, nor a consumptive use, and plan to use it in common with the general public and/or the State of Colorado, provided only that the public use thereof does not interfere with the applicants' appropriation and use.

It is obvious that in order to prevent adverse affect to existing rights on the river system that such a decree must and, in this case, is limited to the upper reaches of the streams concerned and located above all other appropriations or decreed rights. To do otherwise would make it extremely difficult, if not impossible, to effectively administer the overall water rights and water use situation.

FINDING OF FACT

Name and Location of Streams: LOTTIS CREEK, together with its tributaries, Cross Creek, Cameron Creek and Union Creek.

The mouth of Lottis Creek at its confluence with the Taylor River is situate in the SW $\frac{1}{4}$ NE $\frac{1}{4}$ of Section 2, Township 15 South, Range 83 West of the Sixth Principal Meridian, from whence the Northeast Corner of said Section bears North 45° East 2,750 feet. The principal tributaries to Lottis Creek to which claim is made herein join Lottis Creek at the following points:

(a) Cross Creek - Confluence with Lottis Creek is in the NE $\frac{1}{4}$ NE $\frac{1}{4}$ NE $\frac{1}{4}$ of Section 8, Township 15 South, Range 82 West, 6th P.M., from whence the Northeast Corner of said Section bears North 52°30' East 660 feet.

(b) Cameron Creek - Confluence with Lottis Creek is in the SE $\frac{1}{4}$ NW $\frac{1}{4}$ SW $\frac{1}{4}$ of Section 15, Township 15 South, Range 82 West, 6th P.M., from whence the summit of Cross Mountain bears South 65° 36' West 14,190 feet.

(c) Union Creek - Confluence with Lottis Creek is in the NE $\frac{1}{4}$ NE $\frac{1}{4}$ NW $\frac{1}{4}$ of Section 8, Township 15 South, Range 82 West, 6th P.M., from whence the Northeast Corner of said Section bears North 89° 30' East 3,035 feet.

Source of Water: Lottis Creek is fed by snow melt and runoff from its principal tributaries, South Lottis Creek, Cross Creek, Cameron Creek and Union Creek, which drain the Union Park portion of Gunnison County and all tributaries of the Taylor River, which is a tributary to the Gunnison River, all in Gunnison County and in old Water District No. 59.

Date of Initiation of Appropriation: August 1, 1910

Date Water First Applied to Beneficial Use: August 1, 1910

How Appropriation was Initiated: By appropriating water and applying the same to beneficial use.

Amount of Water Claimed: Absolute, Lottis Creek, 60.0 c.f.s.; total from tributaries:

- (a) Cross Creek 5.0 c.f.s.;
- (b) Cameron Creek, 12.5 c.f.s.;
- (c) Lottis Creek above Cameron Creek, 10.0 c.f.s.; and
- (d) Union Creek, 12.5 c.f.s.:

and the claimants claim the following amounts of water in Lottis Creek at the following locations:

Above the confluence of Cameron Creek	10.0 c.f.s.
Below the confluence of Cameron Creek	22.5 c.f.s.
Below the confluence of Cross Creek	27.5 c.f.s.
Below the confluence of Union Creek	40.0 c.f.s.
Below the confluence of South Lottis Creek	60.0 c.f.s.

Use or Proposed Use of Water: Stockwater, recreation, fish culture, wildlife procreation and heritage preservation.

Applicants do not claim the exclusive use of said water, nor a consumptive use, and plan to use it in common with the general public and/or the State of Colorado, provided only that the public use thereof does not interfere with the applicants' appropriation and use.

It is obvious that in order to prevent adverse affect to existing rights on the river system that such a decree must and, in this case, is limited to the upper reaches of the streams concerned and located above all other appropriations or decreed rights. To do otherwise would make it extremely difficult, if not impossible, to effectively administer the overall water rights and water use situation.

R U L I N G

IT IS THE RULING OF THE REFEREE that LOTTIS CREEK, together with its tributaries, Cross Creek, Cameron Creek and Union Creek, is APPROVED AND GRANTED an ABSOLUTE DECREE for the use and benefit of the parties lawfully entitled thereto, for an amount of water not to exceed 60.0 c.f.s. for stockwater, recreation, fish culture, wildlife procreation and heritage preservation, with an appropriation date of August 1, 1910.

AND FURTHER, that the same shall, within that total, be entitled to the quantities at each confluence with its tributaries, as outlined in the findings above.

Applicants' rights are subject to all such rights of the United States of America in the subject sources, including reserved rights, as are now or will hereafter be determined by law.

Within one year from the date on which the decree herein becomes final, applicants shall apply for the special use permits or rights-of-way, as the case may be, which are required by law for the use of public resources, and shall abide by the conditions set forth therein.

DATED 10-15-74

E. L. WILSON

No protest was filed in this matter.
The foregoing ruling is confirmed
and approved, and is made the
Judgment and Decree of this court.

E. L. Wilson
WATER REFEREE - DIVISION 4

Dated:

11-8-74
Fred Falkow
Water Judge

OCT 16 1974

IN THE DISTRICT COURT IN AND FOR
WATER DIVISION NO. 4
STATE OF COLORADO
Case No. W-1987

Kay Phillips
By _____ DEPUTY CLERK

IN THE MATTER OF THE APPLICATION FOR
WATER RIGHTS OF JOE VADER, E. C. COLLARD,
LOUIS F. VAN TUYL, RAYMOND P. VAN TUYL, and
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The question then arises whether a private individual or group of individuals, a political subdivision, or the United States of America, may have the right, along with the State of Colorado, to obtain a decree for stream flow maintenance.

It is the opinion herein that such a right is contemplated by the new law for several reasons. The first is that the deletion of the requirement of a diversion for all appropriators, rather than for the State alone, is most consonant with the allowance of stream-flow maintenance decrees for private appropriators, as well as the State of Colorado; otherwise, there is no evident reason for not continuing to require the traditional diversion and application to beneficial use for private appropriators in order to constitute a valid appropriation, as had been clearly established by law in Colorado for almost a hundred years. Secondly, the definition of "beneficial use" does not purport to limit or classify those uses which are, in fact, beneficial; thus, we are left to case law, and the cases are numerous allowing instream appropriations. Thirdly, it has been suggested in this matter that the provisions contained in the second sentence of 148-21-3(7), which confers standing upon the State of Colorado, is an exclusive right of the State and, therefore, should be interpreted as denying the right to private citizens or any other entity. It appears, however, that the wording suggests that it is not an exclusive right in any way limiting, but, instead, enunciates a new right or standing of the State of Colorado itself to obtain such a decree. Had this not been the intent, the Legislature could very easily have drafted the section in such a manner that no question could have been left. Instead, the Legislature has deleted the diversion requirement for all appropriators. The

State of Colorado might well have made these filings or be a party to these filings, and accomplish the same intent as that of the applicants, and they filed no opposition to this case.

As to "reasonable and appropriate under reasonably efficient practices", as found in 148-21-3, the locations claimed are reasonable in that they are on or flow through, or border properties owned or leased by the claimants. The amounts of water claimed in storage is by survey and measurement and, as to stream flow, the amounts claimed in relation to use is not determinable. The intent is to claim for those stated purposes the normal flow of the streams, discounting weather conditions and fully recognizing all prior appropriations, contracts and agreements between governing agencies insofar as stream flow is a question or a right.

The applicants, as land owners and permittees, in the vicinity of the waters sought, have accomplished a valid, lawful appropriation of waters by using the same and applying them to the beneficial use as stated. These purposes are all beneficial, in that they bring a valuable asset to the appropriators and are useful, advantageous, helpful and gainful to them. None of the uses sought would in any way impair either the decreed or vested rights of any other appropriators under the Constitution and the laws of the State of Colorado. Applicants do not claim the exclusive use of said water, nor a consumptive use, and plan to use it in common with the general public and/or the State of Colorado, provided only that the public use thereof does not interfere with the applicants' appropriation and use.

It is obvious that in order to prevent adverse affect to existing rights on the river system that such a decree must and, in this case, is limited to the upper reaches of the streams concerned and located above all other appropriations or decreed rights. To do otherwise would make it extremely difficult, if not impossible, to effectively administer the overall water rights and water use situation.

FINDING OF FACT

Name and Location of Streams: LOTTIS CREEK, together with its tributaries, Cross Creek, Cameron Creek and Union Creek.

The mouth of Lottis Creek at its confluence with the Taylor River is situate in the SW $\frac{1}{4}$ NE $\frac{1}{4}$ of Section 2, Township 15 South, Range 83 West of the Sixth Principal Meridian, from whence the Northeast Corner of said Section bears North 45° East 2,750 feet. The principal tributaries to Lottis Creek to which claim is made herein join Lottis Creek at the following points:

- (a) Cross Creek - Confluence with Lottis Creek is in the NE $\frac{1}{4}$ NE $\frac{1}{4}$ NE $\frac{1}{4}$ of Section 8, Township 15 South, Range 82 West, 6th P.M., from whence the Northeast Corner of said Section bears North 52°30' East 660 feet.
- (b) Cameron Creek - Confluence with Lottis Creek is in the SE $\frac{1}{4}$ NW $\frac{1}{4}$ SW $\frac{1}{4}$ of Section 15, Township 15 South, Range 82 West, 6th P.M., from whence the summit of Cross Mountain bears South 65° 36' West 14,190 feet.
- (c) Union Creek - Confluence with Lottis Creek is in the NE $\frac{1}{4}$ NE $\frac{1}{4}$ NW $\frac{1}{4}$ of Section 8, Township 15 South, Range 82 West, 6th P.M., from whence the Northeast Corner of said Section bears North 89° 30' East 3,035 feet.

Source of Water: Lottis Creek is fed by snow melt and runoff from its principal tributaries, South Lottis Creek, Cross Creek, Cameron Creek and Union Creek, which drain the Union Park portion of Gunnison County and all tributaries of the Taylor River, which is a tributary to the Gunnison River, all in Gunnison County and in old Water District No. 59.

Date of Initiation of Appropriation: August 1, 1910

Date Water First Applied to Beneficial Use: August 1, 1910

How Appropriation was Initiated: By appropriating water and applying the same to beneficial use.

Amount of Water Claimed: Absolute, Lottis Creek, 60.0 c.f.s.; total from tributaries:

- (a) Cross Creek 5.0 c.f.s.;
- (b) Cameron Creek, 12.5 c.f.s.;
- (c) Lottis Creek above Cameron Creek, 10.0 c.f.s.; and
- (d) Union Creek, 12.5 c.f.s.:

and the claimants claim the following amounts of water in Lottis Creek at the following locations:

Above the confluence of Cameron Creek	10.0 c.f.s.
Below the confluence of Cameron Creek	22.5 c.f.s.
Below the confluence of Cross Creek	27.5 c.f.s.
Below the confluence of Union Creek	40.0 c.f.s.
Below the confluence of South Lottis Creek	60.0 c.f.s.

Use or Proposed Use of Water: Stockwater, recreation, fish culture, wildlife procreation and heritage preservation.

Applicants do not claim the exclusive use of said water, nor a consumptive use, and plan to use it in common with the general public and/or the State of Colorado, provided only that the public use thereof does not interfere with the applicants' appropriation and use.

It is obvious that in order to prevent adverse affect to existing rights on the river system that such a decree must and, in this case, is limited to the upper reaches of the streams concerned and located above all other appropriations or decreed rights. To do otherwise would make it extremely difficult, if not impossible, to effectively administer the overall water rights and water use situation.

R U L I N G

IT IS THE RULING OF THE REFEREE that LOTTIS CREEK, together with its tributaries, Cross Creek, Cameron Creek and Union Creek, is APPROVED AND GRANTED an ABSOLUTE DECREE for the use and benefit of the parties lawfully entitled thereto, for an amount of water not to exceed 60.0 c.f.s. for stockwater, recreation, fish culture, wildlife procreation and heritage preservation, with an appropriation date of August 1, 1910.

AND FURTHER, that the same shall, within that total, be entitled to the quantities at each confluence with its tributaries, as outlined in the findings above.

Applicants' rights are subject to all such rights of the United States of America in the subject sources, including reserved rights, as are now or will hereafter be determined by law.

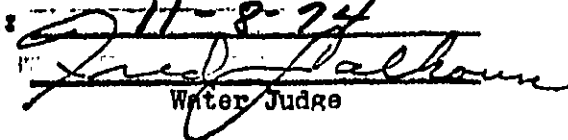
Within one year from the date on which the decree herein becomes final, applicants shall apply for the special use permits or rights-of-way, as the case may be, which are required by law for the use of public resources, and shall abide by the conditions set forth therein.

DATED 10-15-74

E. L. WILSON

No protest was filed in this matter.
The foregoing ruling is confirmed
and approved, and is made the
Judgment and Decree of this court.


WATER REFEREE - DIVISION 4

Dated: 11-8-74

Water Judge

Attachment C- CPW Fish Survey



Combined Summaries cutoffs applied

Water **45046** Cross Creek

Date **10/12/2022**

Station **GU4308** 7 M above confluence with Lottis Creek

Drainage **Gunnison River**

UtmX **363647**

UtmY **4290953**

Elevation

Length **150 ft**

Width **3.56 ft**

Area **0.01 acre**

Surveyors **Brauch, Charlebois, Neal**

Gear **1 BPEF**

Effort

Metric

Protocol **TWO-PASS REMOVAL**

Proportional Stocking Density and Catch/Unit Effort

Species	Total Catch	Min Cut inch	Max Cut inch	Total used	Proportional Stock Density (%)	Percent Stock Size	Percent Quality Size	Percent Preferred Size	Percent Memorable Size	Percent Trophy Size	Max Length inches
BROWN TROUT	16	3.94		12	0.00	100.00					13.03

Mean, Minimum and Maximum Length and Weight

Species	Total Catch	Min cut inch	Max cut inch	Total Used	Mean	Length (inches) Minimum	Maximum	Mean	Weight (lb) Minimum	Maximum
BROWN TROUT	16	3.94		12	13.03	13.03	13.03	0.69	0.69	0.69

Relative Abundance and Catch/Unit Effort

Species	Total Catch	Min.Cut inch	Max.Cut inch	Total used	Weight Lbs	Number	Percent Weight	Catch per Unit Effort Number/Effort	Lbs/Effort
BROWN TROUT	16	3.94		1	0.17	8.33	100.00		

Abundance and Biomass

Species	Total Catch	Min.Cut inch	Max.Cut inch	Total Used	Population estimate	Biomass Lbs	Percent Number	Weight	Density estimates Lb/Acre	Fish/Acre	Fish/Mile
BROWN TROUT	16	3.94		1	1	0.17	8.33	100.00	13.54	81.57	35.20

Notes: 4 fish shocked in stream below road crossing, 12 fish sampled with electrofisher from uppermost beaver pond below the road crossing. No fish seen above road crossing in ~6 beaver pools into a steeper gradient stream type. Upper stream had limited habitat, pools were not deep and riffles were prominent.

Attachment D- R2Cross Analysis

R2Cross RESULTS

Stream Name: Cross Creek

Stream Locations: Cross Creek upstream of the confluence with Lottis Creek

Fieldwork Date: 06/28/2021

Cross-section: 1

Observers: J. Nania, A. Bembenek

Coordinate System: UTM Zone 13

X (easting): 363793

Y (northing): 4291727

Date Processed: 08/22/2022

Slope: 0.0216

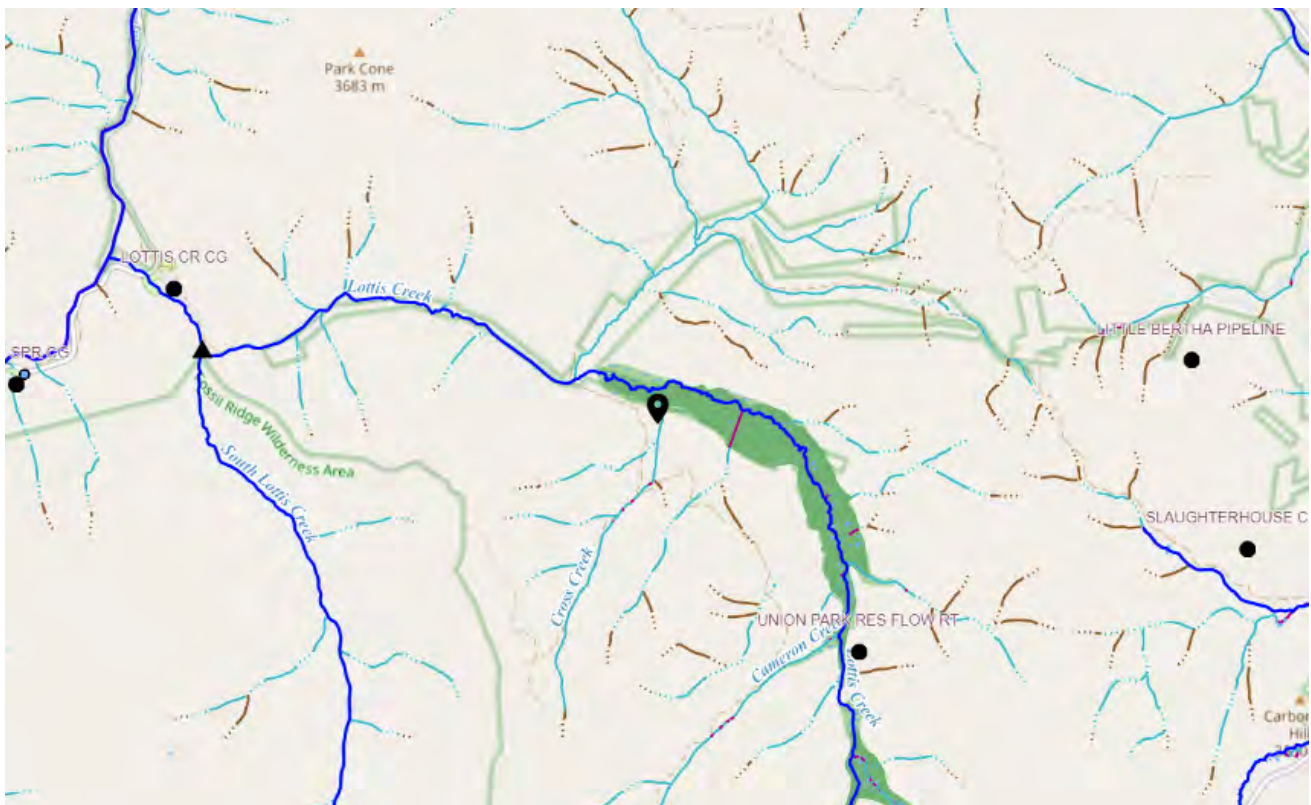
Discharge: R2Cross data file: 1.41 (cfs)

Computation method: Ferguson VPE

R2Cross data filename: 6-28-21 Cross Creek R2CrossData.xlsx

R2Cross version: 2.0.0

LOCATION



ANALYSIS RESULTS

Habitat Criteria Results

Bankfull top width (ft) = 7.7

	Habitat Criteria	Discharge (cfs) Meeting Criteria
Mean Depth (ft)	0.2	0.85
Percent Wetted Perimeter (%)	50.0	0.06
Mean Velocity (ft/s)	1.0	1.39

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	1.4	7.7	0.57	0.8	4.36	8.28	100.0	0.53	0.05	2.87	12.49
	1.42	7.65	0.55	0.78	4.21	8.21	99.2	0.51	0.05	2.77	11.67
	1.44	7.6	0.53	0.76	4.05	8.15	98.39	0.5	0.05	2.68	10.87
	1.46	7.55	0.52	0.74	3.9	8.08	97.59	0.48	0.05	2.59	10.09
	1.48	7.5	0.5	0.72	3.75	8.01	96.78	0.47	0.05	2.49	9.35
	1.5	7.46	0.48	0.7	3.6	7.95	95.98	0.45	0.05	2.4	8.63
	1.52	7.35	0.47	0.68	3.45	7.82	94.48	0.44	0.05	2.32	8.01
	1.54	7.24	0.46	0.66	3.31	7.7	92.99	0.43	0.06	2.24	7.42
	1.56	7.13	0.44	0.64	3.16	7.58	91.49	0.42	0.06	2.17	6.86
	1.58	7.02	0.43	0.62	3.02	7.45	90.0	0.41	0.06	2.09	6.31
	1.6	6.91	0.42	0.6	2.88	7.33	88.5	0.39	0.06	2.01	5.8
	1.62	6.8	0.4	0.58	2.75	7.2	87.0	0.38	0.06	1.93	5.3
	1.64	6.69	0.39	0.56	2.61	7.08	85.51	0.37	0.06	1.85	4.84
	1.66	6.58	0.38	0.54	2.48	6.96	84.01	0.36	0.06	1.77	4.39
	1.68	6.48	0.36	0.52	2.35	6.83	82.52	0.34	0.06	1.69	3.97
	1.7	6.37	0.35	0.5	2.22	6.71	81.02	0.33	0.06	1.61	3.57
	1.72	6.28	0.33	0.48	2.09	6.61	79.76	0.32	0.07	1.52	3.18
	1.74	6.19	0.32	0.46	1.97	6.5	78.5	0.3	0.07	1.43	2.82
	1.76	6.1	0.3	0.44	1.85	6.4	77.24	0.29	0.07	1.34	2.48
	1.78	6.01	0.29	0.42	1.72	6.29	75.98	0.27	0.07	1.25	2.16
	1.8	5.92	0.27	0.4	1.61	6.19	74.72	0.26	0.08	1.16	1.87
	1.82	5.83	0.26	0.38	1.49	6.08	73.46	0.24	0.08	1.07	1.6
Waterline	1.83	5.78	0.25	0.37	1.42	6.02	72.72	0.24	0.08	1.02	1.45
	1.84	5.74	0.24	0.36	1.37	5.98	72.2	0.23	0.08	0.98	1.35
	1.86	5.65	0.22	0.34	1.26	5.87	70.88	0.21	0.09	0.89	1.12

1.88	5.54	0.21	0.32	1.15	5.76	69.51	0.2	0.09	0.81	0.92
1.9	5.44	0.19	0.3	1.04	5.64	68.14	0.18	0.1	0.72	0.75
1.92	5.34	0.17	0.28	0.93	5.53	66.76	0.17	0.1	0.63	0.59
1.94	5.23	0.16	0.26	0.82	5.42	65.39	0.15	0.11	0.55	0.45
1.96	4.74	0.15	0.24	0.72	4.91	59.3	0.15	0.12	0.52	0.38
1.98	4.65	0.14	0.22	0.63	4.82	58.16	0.13	0.13	0.44	0.28
2.0	4.57	0.12	0.2	0.54	4.72	57.02	0.11	0.14	0.36	0.19
2.02	4.49	0.1	0.18	0.45	4.63	55.88	0.1	0.16	0.28	0.13
2.04	4.4	0.08	0.16	0.36	4.53	54.74	0.08	0.19	0.21	0.08
2.06	3.75	0.07	0.14	0.28	3.86	46.64	0.07	0.21	0.18	0.05
2.08	3.32	0.06	0.12	0.2	3.42	41.25	0.06	0.24	0.14	0.03
2.1	2.3	0.06	0.1	0.14	2.37	28.62	0.06	0.24	0.14	0.02
2.12	2.02	0.05	0.08	0.1	2.08	25.07	0.05	0.29	0.1	0.01
2.14	1.74	0.04	0.06	0.06	1.78	21.53	0.03	0.37	0.06	0.0
2.16	1.08	0.03	0.04	0.03	1.11	13.39	0.03	0.42	0.05	0.0
2.18	0.84	0.02	0.02	0.01	0.85	10.32	0.02	0.68	0.02	0.0

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

MODEL SUMMARY

Measured Flow (Qm) =	1.41	(cfs)
Calculated Flow (Qc) =	1.43	(cfs)
$(Qm-Qc)/Qm * 100 =$	-1.23%	
Measured Waterline (WLm) =	1.82	(ft)
Calculated Waterline (WLc) =	1.83	(ft)
$(WLm-WLc)/WLm * 100 =$	-0.37%	
Max Measured Depth (Dm) =	0.35	(ft)
Max Calculated Depth (Dc) =	0.37	(ft)
$(Dm-Dc)/Dm * 100 =$	-5.23%	
Mean Velocity =	1.01	(ft/s)
Manning's n =	0.083	
$0.4 * Qm =$	0.57	(cfs)
$2.5 * Qm =$	3.53	(cfs)

FIELD DATA

Feature	Station (ft)	Rod Height (ft)	Water depth (ft)	Velocity (ft/s)
	1.5	0.35		
	2	0.45		
	2.5	0.55		
	3	0.65		
	3.5	0.75		
	4	0.85		
	4.5	1.15		
	5	1.25		
	5.5	1.3		
Bankfull	5.8	1.4		
	6	1.5		
	6.5	1.6		
	7	1.7		
Waterline	7.4	1.8	0	0
	8	1.95	0.15	0.34
	8.4	1.95	0.15	0.53
	8.7	2.05	0.25	1.04
	9	2.1	0.3	1.1
	9.3	2.05	0.25	0.93
	9.5	2.05	0.25	0.89
	9.7	2.05	0.2	0.79
	9.9	2.1	0.25	1.11
	10.1	2.15	0.3	1.18
	10.3	2.15	0.3	1.33
	10.5	2.2	0.35	1.37
	10.8	2.05	0.2	1.14
	11.1	2.2	0.35	1.39
	11.4	2.2	0.35	1.2
	11.7	2.2	0.35	1.36
	11.9	2.15	0.3	1.14

	12.1	2.15	0.3	0.91
	12.4	2.1	0.25	0.44
	12.7	2.1	0.25	0.62
	13	2.1	0.25	0.62
Waterline	13.3	1.85	0	0
Bankfull	13.5	1.4		
	14	1.2		
	14.5	1.1		
	15	0.95		
	15.5	0.8		
	16	0.7		
	16.5	0.65		
	17	0.6		
	17.5	0.5		
	18	0.45		
	18.5	0.4		

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
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
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0.62	0.15	0.07	0.03	1.8
0.4	0.15	0.05	0.03	1.97
0.32	0.25	0.07	0.08	5.52
0.3	0.3	0.09	0.1	7.01
0.3	0.25	0.06	0.06	4.12
0.2	0.25	0.05	0.04	3.15
0.2	0.2	0.04	0.03	2.24
0.21	0.25	0.05	0.06	3.93
0.21	0.3	0.06	0.07	5.01
0.2	0.3	0.06	0.08	5.65
0.21	0.35	0.09	0.12	8.49
0.34	0.2	0.06	0.07	4.84
0.34	0.35	0.1	0.15	10.33
0.3	0.35	0.1	0.13	8.92
0.3	0.35	0.09	0.12	8.43
0.21	0.3	0.06	0.07	4.84

0.2	0.3	0.07	0.07	4.83
0.3	0.25	0.07	0.03	2.34
0.3	0.25	0.07	0.05	3.29
0.3	0.25	0.08	0.05	3.29
0.39	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	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	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.

DISCHARGE/CROSS SECTION NOTES

STREAM NAME: <u>Cross Creek</u>					CROSS-SECTION NO. <u>#1</u>		DATE <u>06/28/21</u>		SHEET <u>2</u> OF <u>4</u>			
BEGINNING OF MEASUREMENT			EDGE OF WATER LOOKING DOWNSTREAM: (0.0 AT STAKE)		LEFT / RIGHT		Gage Reading: <u>NA</u> ft		TIME <u>11:30am to 12:20pm</u>			
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)		Area (ft ²)	Discharge (cfs)
									At Point	Mean in Vertical		
(S)		1.5		0.35								
		2.0		0.45								
		2.5		0.55								
		3.0		0.65								
		3.5		0.75								
		4.0		0.85								
		4.5		1.15								
		5.0		1.25								
		5.5		1.30								
(G)		5.8		1.40								
		6.0		1.50								
		6.5		1.60								
		7.0		1.70								
(W)		7.4		1.80	Ø				Ø			
		8.0		1.95	0.15				0.34			
		8.4		1.95	0.15				0.53			
		8.7		2.05	0.25				1.04			
		9.0		2.10	0.30				1.10			
		9.3		2.05	0.25				0.93			
		9.5		2.05	0.25				0.89			
(rock)		9.7		2.05	0.20				0.79			
		9.9		2.10	0.25				1.11			
		10.1		2.15	0.30				1.18			
		10.3		2.15	0.30				1.33			
		10.5		2.20	0.35				1.37			
(rock)		10.8		2.05	0.20				1.14			
		11.1		2.20	0.35				1.39			
		11.4		2.20	0.35				1.20			
		11.7		2.20	0.35				1.36			
		11.9		2.15	0.30				1.14			
		12.1		2.15	0.30				0.91			
		12.4		2.10	0.25				0.44			
		12.7		2.10	0.25				0.62			
		13.0		2.10	0.25				0.62			
(W)		13.3		1.85	Ø				Ø			
(G)		13.5		1.40								
		14.0		1.20								
		14.5		1.10								
		15.0		0.95								
		15.5		0.80								
		16.0		0.70								
		16.5		0.65								
TOTALS												

End of Measurement	Time	Gage Reading	ft	CALCULATIONS PERFORMED BY:	CALCULATIONS CHECKED BY:
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DISCHARGE/CROSS SECTION NOTES

[illegible]

****Please be sure to measure at least 100 pebbles (10 in 10 transects or 5 in 20 transects- depending on stream size, for accurate distributional representation.****

If intermediate particle axis is less than 32 mm chose the nearest cobble for embeddedness.

[illegible]

D(e) = embedded depth; D(t) = total depth

DISCHARGE/CROSS SECTION NOTES

STREAM NAME: <u>Cross Creek</u>					CROSS-SECTION NO. <u>#1</u>		DATE <u>06/28/21</u>		SHEET <u>2</u> OF <u>4</u>			
BEGINNING OF MEASUREMENT			EDGE OF WATER LOOKING DOWNSTREAM: (0.0 AT STAKE)		LEFT / RIGHT		Gage Reading: <u>NA</u> ft		TIME <u>11:30am to 12:20pm</u>			
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)		Area (ft ²)	Discharge (cfs)
									At Point	Mean in Vertical		
(S)		1.5		0.35								
		2.0		0.45								
		2.5		0.55								
		3.0		0.65								
		3.5		0.75								
		4.0		0.85								
		4.5		1.15								
		5.0		1.25								
		5.5		1.30								
(G)		5.8		1.40								
		6.0		1.50								
		6.5		1.60								
		7.0		1.70								
(W)		7.4		1.80	Ø				Ø			
		8.0		1.95	0.15				0.34			
		8.4		1.95	0.15				0.53			
		8.7		2.05	0.25				1.04			
		9.0		2.10	0.30				1.10			
		9.3		2.05	0.25				0.93			
		9.5		2.05	0.25				0.89			
(rock)		9.7		2.05	0.20				0.79			
		9.9		2.10	0.25				1.11			
		10.1		2.15	0.30				1.18			
		10.3		2.15	0.30				1.33			
		10.5		2.20	0.35				1.37			
(rock)		10.8		2.05	0.20				1.14			
		11.1		2.20	0.35				1.39			
		11.4		2.20	0.35				1.20			
		11.7		2.20	0.35				1.36			
		11.9		2.15	0.30				1.14			
		12.1		2.15	0.30				0.91			
		12.4		2.10	0.25				0.44			
		12.7		2.10	0.25				0.62			
		13.0		2.10	0.25				0.62			
(W)		13.3		1.85	Ø				Ø			
(G)		13.5		1.40								
		14.0		1.20								
		14.5		1.10								
		15.0		0.95								
		15.5		0.80								
		16.0		0.70								
		16.5		0.65								
TOTALS												

End of Measurement	Time	Gage Reading	ft	CALCULATIONS PERFORMED BY:	CALCULATIONS CHECKED BY:
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DISCHARGE/CROSS SECTION NOTES

[illegible]

Riffle Pebble Count Actual Measurements ^{CM} (mm) Cross Creek X-section #1, 28 JUNE 2021
J. Nania.

1	6.5	26	3.0	51	3.4	76	2.4		
2	7.5	27	0.6	52	3.2	77	1.4		
3	6.0	28	9.0	53	4.3	78	7.3		
4	2.2	29	2.2	54	6.2	79	5.2		
5	9.0	30	3.4	55	1.6	80	8.6(E)	101	3.3
6	8.4	31	5.4(E)	56	3.4	81	7.3	102	1.4
7	7.5	32	2.7	57	5.6	82	1.7	103	3.1
8	4.6	33	2.1	58	5.2	83	1.5	104	5.6
9	2.4	34	1.1	59	6.3	84	2.5	105	
10	3.6	35	18.5	60	7.4	85	1.3	106	
11	2.7	36	16.9	61	6.6	86	3.4	107	
12	1.5	37	12.7	62	6.1	87	2.8	108	
13	3.4	38	3.9	63	2.2	88	1.6	109	
14	1.7	39	4.4	64	5.4	89	1.3	110	
15	fines	40	3.4	65	2.9	90	2.1	111	
16	fines	41	4.8	66	fines	91	1.6	112	
17	3.0	42	3.1	67	fines	92	3.4	113	
18	1.2	43	5.4	68	3.2	93	3.2	114	
19	2.6	44	5.6	69	1.8	94	1.6	115	
20	6.8(E)	45	7.8	70	2.8	95	1.8		
21	3.2	46	3.0	71	2.3	96	9.0		
22	1.8	47	2.3	72	2.4	97	4.6		
23	8.6	48	0.4	73	3.4	98	5.4		
24	2.8	49	4.6	74	5.6	99	1.1		
25	3.4	50	5.3	75	1.8	100	4.8		

****Please be sure to measure at least 100 pebbles (10 in 10 transects or 5 in 20 transects- depending on stream size, for accurate distributional representation.****

EMBEDDEDNESS:

If intermediate particle axis is less than 32 mm chose the nearest cobble for embeddedness.

If no cobble >32 mm is present without taking a step, record 100% embedded.

Random pebble for Percent Embeddedness (one per transect)										
5	7	10	9	3	8	5	2	1	7	#
										D(e)/ D(t)

D(e) = embedded depth; D(t) = total depth

R2Cross RESULTS

Stream Name: Cross Creek

Stream Locations: Cross Creek upstream of the confluence with Lottis Creek

Fieldwork Date: 06/28/2021

Cross-section: 1

Observers: J. Nania, A. Bembenek

Coordinate System: UTM Zone 13

X (easting): 363793

Y (northing): 4291727

Date Processed: 08/22/2022

Slope: 0.0216

Discharge: R2Cross data file: 1.41 (cfs)

Computation method: Ferguson VPE

R2Cross data filename: 6-28-21 Cross Creek R2CrossData.xlsx

R2Cross version: 2.0.0

LOCATION



ANALYSIS RESULTS

Habitat Criteria Results

Bankfull top width (ft) = 7.7

	Habitat Criteria	Discharge (cfs) Meeting Criteria
Mean Depth (ft)	0.2	0.85
Percent Wetted Perimeter (%)	50.0	0.06
Mean Velocity (ft/s)	1.0	1.39

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	1.4	7.7	0.57	0.8	4.36	8.28	100.0	0.53	0.05	2.87	12.49
	1.42	7.65	0.55	0.78	4.21	8.21	99.2	0.51	0.05	2.77	11.67
	1.44	7.6	0.53	0.76	4.05	8.15	98.39	0.5	0.05	2.68	10.87
	1.46	7.55	0.52	0.74	3.9	8.08	97.59	0.48	0.05	2.59	10.09
	1.48	7.5	0.5	0.72	3.75	8.01	96.78	0.47	0.05	2.49	9.35
	1.5	7.46	0.48	0.7	3.6	7.95	95.98	0.45	0.05	2.4	8.63
	1.52	7.35	0.47	0.68	3.45	7.82	94.48	0.44	0.05	2.32	8.01
	1.54	7.24	0.46	0.66	3.31	7.7	92.99	0.43	0.06	2.24	7.42
	1.56	7.13	0.44	0.64	3.16	7.58	91.49	0.42	0.06	2.17	6.86
	1.58	7.02	0.43	0.62	3.02	7.45	90.0	0.41	0.06	2.09	6.31
	1.6	6.91	0.42	0.6	2.88	7.33	88.5	0.39	0.06	2.01	5.8
	1.62	6.8	0.4	0.58	2.75	7.2	87.0	0.38	0.06	1.93	5.3
	1.64	6.69	0.39	0.56	2.61	7.08	85.51	0.37	0.06	1.85	4.84
	1.66	6.58	0.38	0.54	2.48	6.96	84.01	0.36	0.06	1.77	4.39
	1.68	6.48	0.36	0.52	2.35	6.83	82.52	0.34	0.06	1.69	3.97
	1.7	6.37	0.35	0.5	2.22	6.71	81.02	0.33	0.06	1.61	3.57
	1.72	6.28	0.33	0.48	2.09	6.61	79.76	0.32	0.07	1.52	3.18
	1.74	6.19	0.32	0.46	1.97	6.5	78.5	0.3	0.07	1.43	2.82
	1.76	6.1	0.3	0.44	1.85	6.4	77.24	0.29	0.07	1.34	2.48
	1.78	6.01	0.29	0.42	1.72	6.29	75.98	0.27	0.07	1.25	2.16
	1.8	5.92	0.27	0.4	1.61	6.19	74.72	0.26	0.08	1.16	1.87
	1.82	5.83	0.26	0.38	1.49	6.08	73.46	0.24	0.08	1.07	1.6
Waterline	1.83	5.78	0.25	0.37	1.42	6.02	72.72	0.24	0.08	1.02	1.45
	1.84	5.74	0.24	0.36	1.37	5.98	72.2	0.23	0.08	0.98	1.35
	1.86	5.65	0.22	0.34	1.26	5.87	70.88	0.21	0.09	0.89	1.12

1.88	5.54	0.21	0.32	1.15	5.76	69.51	0.2	0.09	0.81	0.92
1.9	5.44	0.19	0.3	1.04	5.64	68.14	0.18	0.1	0.72	0.75
1.92	5.34	0.17	0.28	0.93	5.53	66.76	0.17	0.1	0.63	0.59
1.94	5.23	0.16	0.26	0.82	5.42	65.39	0.15	0.11	0.55	0.45
1.96	4.74	0.15	0.24	0.72	4.91	59.3	0.15	0.12	0.52	0.38
1.98	4.65	0.14	0.22	0.63	4.82	58.16	0.13	0.13	0.44	0.28
2.0	4.57	0.12	0.2	0.54	4.72	57.02	0.11	0.14	0.36	0.19
2.02	4.49	0.1	0.18	0.45	4.63	55.88	0.1	0.16	0.28	0.13
2.04	4.4	0.08	0.16	0.36	4.53	54.74	0.08	0.19	0.21	0.08
2.06	3.75	0.07	0.14	0.28	3.86	46.64	0.07	0.21	0.18	0.05
2.08	3.32	0.06	0.12	0.2	3.42	41.25	0.06	0.24	0.14	0.03
2.1	2.3	0.06	0.1	0.14	2.37	28.62	0.06	0.24	0.14	0.02
2.12	2.02	0.05	0.08	0.1	2.08	25.07	0.05	0.29	0.1	0.01
2.14	1.74	0.04	0.06	0.06	1.78	21.53	0.03	0.37	0.06	0.0
2.16	1.08	0.03	0.04	0.03	1.11	13.39	0.03	0.42	0.05	0.0
2.18	0.84	0.02	0.02	0.01	0.85	10.32	0.02	0.68	0.02	0.0

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

MODEL SUMMARY

Measured Flow (Qm) =	1.41	(cfs)
Calculated Flow (Qc) =	1.43	(cfs)
$(Qm-Qc)/Qm * 100 =$	-1.23%	
Measured Waterline (WLm) =	1.82	(ft)
Calculated Waterline (WLc) =	1.83	(ft)
$(WLm-WLc)/WLm * 100 =$	-0.37%	
Max Measured Depth (Dm) =	0.35	(ft)
Max Calculated Depth (Dc) =	0.37	(ft)
$(Dm-Dc)/Dm * 100 =$	-5.23%	
Mean Velocity =	1.01	(ft/s)
Manning's n =	0.083	
$0.4 * Qm =$	0.57	(cfs)
$2.5 * Qm =$	3.53	(cfs)

FIELD DATA

Feature	Station (ft)	Rod Height (ft)	Water depth (ft)	Velocity (ft/s)
	1.5	0.35		
	2	0.45		
	2.5	0.55		
	3	0.65		
	3.5	0.75		
	4	0.85		
	4.5	1.15		
	5	1.25		
	5.5	1.3		
Bankfull	5.8	1.4		
	6	1.5		
	6.5	1.6		
	7	1.7		
Waterline	7.4	1.8	0	0
	8	1.95	0.15	0.34
	8.4	1.95	0.15	0.53
	8.7	2.05	0.25	1.04
	9	2.1	0.3	1.1
	9.3	2.05	0.25	0.93
	9.5	2.05	0.25	0.89
	9.7	2.05	0.2	0.79
	9.9	2.1	0.25	1.11
	10.1	2.15	0.3	1.18
	10.3	2.15	0.3	1.33
	10.5	2.2	0.35	1.37
	10.8	2.05	0.2	1.14
	11.1	2.2	0.35	1.39
	11.4	2.2	0.35	1.2
	11.7	2.2	0.35	1.36
	11.9	2.15	0.3	1.14

	12.1	2.15	0.3	0.91
	12.4	2.1	0.25	0.44
	12.7	2.1	0.25	0.62
	13	2.1	0.25	0.62
Waterline	13.3	1.85	0	0
Bankfull	13.5	1.4		
	14	1.2		
	14.5	1.1		
	15	0.95		
	15.5	0.8		
	16	0.7		
	16.5	0.65		
	17	0.6		
	17.5	0.5		
	18	0.45		
	18.5	0.4		

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
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
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0.62	0.15	0.07	0.03	1.8
0.4	0.15	0.05	0.03	1.97
0.32	0.25	0.07	0.08	5.52
0.3	0.3	0.09	0.1	7.01
0.3	0.25	0.06	0.06	4.12
0.2	0.25	0.05	0.04	3.15
0.2	0.2	0.04	0.03	2.24
0.21	0.25	0.05	0.06	3.93
0.21	0.3	0.06	0.07	5.01
0.2	0.3	0.06	0.08	5.65
0.21	0.35	0.09	0.12	8.49
0.34	0.2	0.06	0.07	4.84
0.34	0.35	0.1	0.15	10.33
0.3	0.35	0.1	0.13	8.92
0.3	0.35	0.09	0.12	8.43
0.21	0.3	0.06	0.07	4.84

0.2	0.3	0.07	0.07	4.83
0.3	0.25	0.07	0.03	2.34
0.3	0.25	0.07	0.05	3.29
0.3	0.25	0.08	0.05	3.29
0.39	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	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	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.



Combined Summaries cutoffs applied

Water **45046** **Cross Creek**

Date **10/12/2022**

Station **GU4308** **7 M above confluence with Lottis Creek**

Drainage **Gunnison River**

UtmX **363647**

UtmY **4290953**

Elevation

Length **150 ft**

Width **3.56 ft**

Area **0.01 acre**

Surveyors **Brauch, Charlebois, Neal**

Gear **1 BPEF**

Effort

Metric

Protocol **TWO-PASS REMOVAL**

Proportional Stocking Density and Catch/Unit Effort

Species	Total Catch	Min Cut inch	Max Cut inch	Total used	Proportional Stock Density (%)	Percent Stock Size	Percent Quality Size	Percent Preferred Size	Percent Memorable Size	Percent Trophy Size	Max Length inches
BROWN TROUT	16	3.94		12	0.00	100.00					13.03

Mean, Minimum and Maximum Length and Weight

Species	Total Catch	Min cut inch	Max cut inch	Total Used	Mean	Length (inches) Minimum	Maximum	Mean	Weight (lb) Minimum	Maximum
BROWN TROUT	16	3.94		12	13.03	13.03	13.03	0.69	0.69	0.69

Relative Abundance and Catch/Unit Effort

Species	Total Catch	Min.Cut inch	Max.Cut inch	Total used	Weight Lbs	Number	Percent Weight	Catch per Unit Effort Number/Effort	Lbs/Effort
BROWN TROUT	16	3.94		1	0.17	8.33	100.00		

Abundance and Biomass

Species	Total Catch	Min.Cut inch	Max.Cut inch	Total Used	Population estimate	Biomass Lbs	Percent Number	Weight	Density estimates Lb/Acre	Fish/Acre	Fish/Mile
BROWN TROUT	16	3.94		1	1	0.17	8.33	100.00	13.54	81.57	35.20

Notes: 4 fish shocked in stream below road crossing, 12 fish sampled with electrofisher from uppermost beaver pond below the road crossing. No fish seen above road crossing in ~6 beaver pools into a steeper gradient stream type. Upper stream had limited habitat, pools were not deep and riffles were prominent.











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

Div	Name	CWCB Case Number	Segment ID	Meas. Date	UTM	Location	Flow Amount (cfs)	Meas #	Rating	Station ID
4	Cross Creek		23/4/A-002	09/12/2022	UTMx: 363771 UTMy: 4291755	Cross Creek	0.47	1	p	



Discharge Measurement Summary

Site name CrossCreekDiv4
Site number 1
Operator(s) MS RV
File name CrossCreekDiv4_20220912-174607.ft
Comment Probe direction reversed

Start time	9/12/2022 5:26 PM	Sensor type	Top Setting
End time	9/12/2022 5:44 PM	Handheld serial number	FT2H1747037
Start location latitude	38.764	Probe serial number	FT2P1747048
Start location longitude	-106.568	Probe firmware	1.30
Calculations engine	FlowTracker2	Handheld software	1.7

# Stations	Avg interval (s)	Total discharge (ft³/s)
12 [12]	40	0.4731 [-0.4731]

Total width (ft)	Total area (ft²)	Wetted Perimeter (ft)
5.300 [5.300]	2.0365 [2.0365]	5.581 [5.581]

Mean SNR (dB)	Mean depth (ft)	Mean velocity (ft/s)
41 [41]	0.384 [0.384]	0.2323 [-0.2323]

Mean temp (°F)	Max depth (ft)	Max velocity (ft/s)
55.677 [55.677]	0.600 [0.600]	-0.5873 [-0.5873]

Discharge Uncertainty		
Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	0.7%	8.4%
Velocity	9.1%	13.9%
Width	0.2%	0.2%
Method	3.4%	
# Stations	0.0%	
Overall	9.8%	16.3%

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

Configuration settings were modified
10 measurements were edited
Quality control warnings
**The data in brackets [] are the original data before editing*

Configuration changes

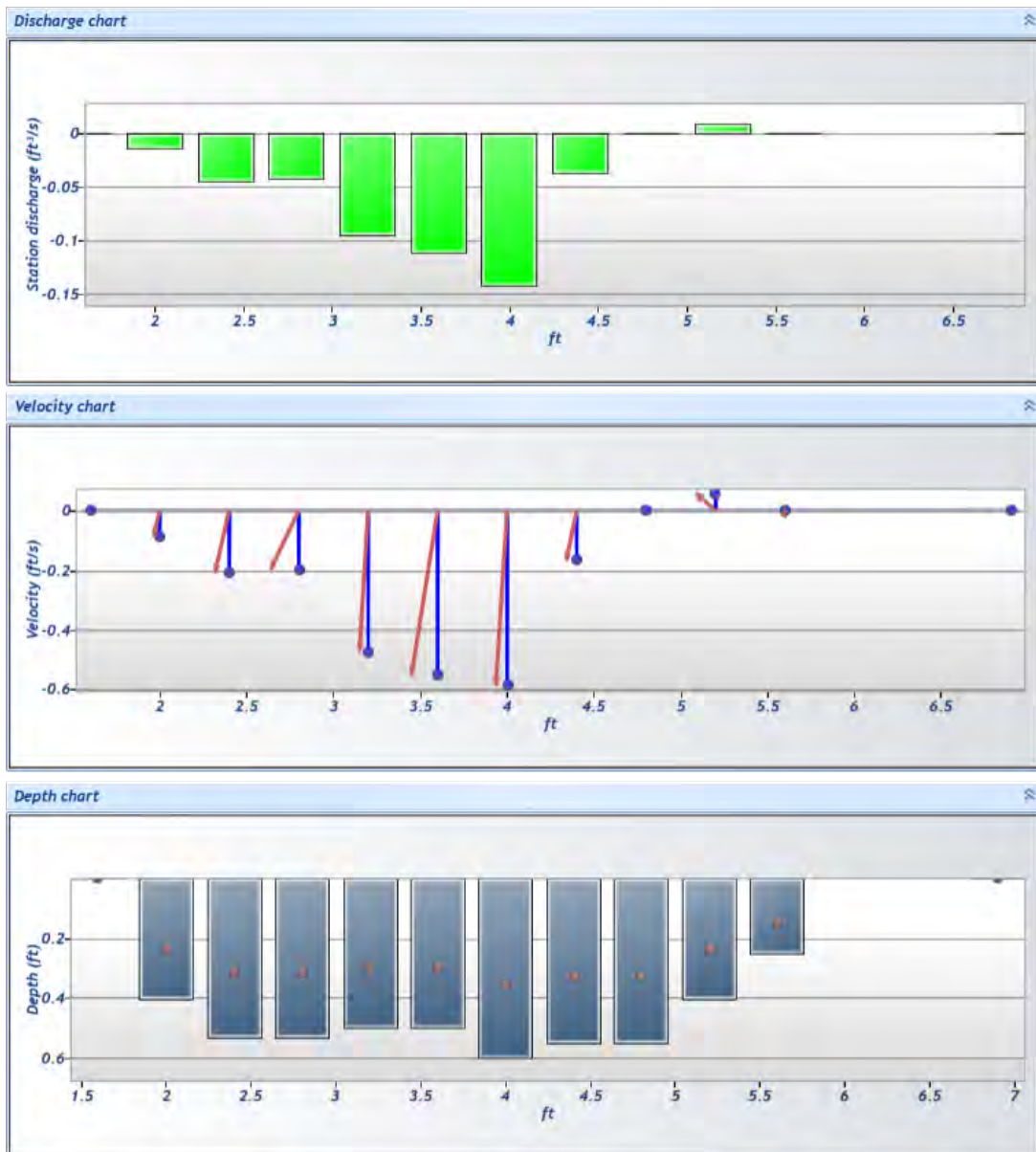


Discharge Measurement Summary

Site name CrossCreekDiv4
Site number 1
Operator(s) MS RV
File name CrossCreekDiv4_20220912-174607.ft
Comment Probe direction reversed

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 CrossCreekDiv4
Site number 1
Operator(s) MS RV
File name CrossCreekDiv4_20220912-174607.ft
Comment Probe direction reversed

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft ²)	Flow (ft ³ /s)	%Q	
0	5:26 PM	1.600	None	0.000	0.0000	0.000	0	0.0000	1.0000	0.0865	0.0000	0.0000	0.00	✓
1	5:26 PM	2.000	Enter Velocity	0.400		0.240	80	-0.0865	1.0000	-0.0865	0.1600	-0.0138	2.93	✓
2	5:28 PM	2.400	Enter Velocity	0.530		0.318	80	-0.2071	1.0000	-0.2071	0.2120	-0.0439	9.86	✓
3	5:30 PM	2.800	Enter Velocity	0.530		0.318	80	-0.1979	1.0000	-0.1979	0.2120	-0.0420	11.74	✓
4	5:32 PM	3.200	Enter Velocity	0.500		0.300	80	-0.4731	1.0000	-0.4731	0.2000	-0.0946	184.11	✓
5	5:33 PM	3.600	Enter Velocity	0.500		0.300	80	-0.5548	1.0000	-0.5548	0.2000	-0.1110	40.60	✓
6	5:35 PM	4.000	Enter Velocity	0.600		0.360	80	-0.5873	1.0000	-0.5873	0.2400	-0.1410	-102.26	✓
7	5:37 PM	4.400	Enter Velocity	0.550		0.330	80	-0.1668	1.0000	-0.1668	0.2200	-0.0367	-8.74	✓
8	5:38 PM	4.800	Enter Velocity	0.550		0.330	80	-0.0007	1.0000	-0.0007	0.2200	-0.0001	0.03	✓
9	5:40 PM	5.200	Enter Velocity	0.400		0.240	80	0.0584	1.0000	0.0584	0.1600	0.0093	1.89	✓
10	5:42 PM	5.600	Enter Velocity	0.250		0.150	80	0.0031	1.0000	0.0031	0.2125	0.0007	0.14	✓
11	5:44 PM	6.900	None	0.000	0.0000	0.000	0	0.0000	1.0000	-0.0031	0.0000	0.0000	0.00	✓



Discharge Measurement Summary

Site name CrossCreekDiv4
Site number 1
Operator(s) MS RV
File name CrossCreekDiv4_20220912-174607.ft
Comment Probe direction reversed

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
1	5:26 PM	2.000	Enter Velocity	0.400		0.240	Large SNR Variation, Velocity Angle > QC
2	5:28 PM	2.400	Enter Velocity	0.530		0.318	Velocity Angle > QC
3	5:30 PM	2.800	Enter Velocity	0.530		0.318	Velocity Angle > QC, High Stn % Discharge
4	5:32 PM	3.200	Enter Velocity	0.500		0.300	Velocity Angle > QC, High Stn % Discharge
5	5:33 PM	3.600	Enter Velocity	0.500		0.300	Velocity Angle > QC, High Stn % Discharge
6	5:35 PM	4.000	Enter Velocity	0.600		0.360	Velocity Angle > QC
7	5:37 PM	4.400	Enter Velocity	0.550		0.330	Velocity Angle > QC
10	5:42 PM	5.600	Enter Velocity	0.250		0.150	Boundary Interference
11	5:44 PM	6.900	None	0.000	0.0000	0.000	Stn Spacing > QC