United States Department of the Interior
BUREAU OF LAND MANAGEMENT

Colorado State Office
Denver Federal Center, Building 40
Lakewood, Colorado 80225
www.blm.gov/colorado

In Reply Refer To:
CO-932 (7250)

Mr. Rob Viehl
Colorado Water Conservation Board
1313 Sherman Street, Room 721
Denver, Colorado 80203

Dear Mr. Viehl:

The Bureau of Land Management (BLM) is writing this letter to formally communicate its instream flow recommendation for Vermillion Creek, located in Water Division 6.

Location and Land Status. Vermillion Creek is tributary to the Green River in Brown's Park. This recommendation covers two stream reaches on Vermillion Creek as follows:

> Reach #1 - Confluence with Talamantes Creek to Ink Springs Stream Flow Gage (Colorado Division of Water Resources Gage VERINKCO; U.S. Geological Survey Gage 09235450) – This reach is approximately 18.6 miles in length. BLM manages 15.7 miles of this reach while the Colorado State Land Board manages 2.6 miles.
>
> Reach #2 - Ink Springs Stream Flow Gage to Headgate of Vermillion Ditch – This reach is approximately 10.1 miles in length. BLM manages 7.5 miles of this reach, the Colorado State Land Board manages 1.0 miles, and 1.9 miles are in private ownership.

Biological Summary. The biological and physical characteristics of each reach is described below:

> Reach #1 - Confluence with Talamantes Creek to Ink Springs Stream Flow Gage – Overall, this reach has high sinuosity, low gradient, and generally small substrate size. Riffles are limited and high percentage of the habitat is comprised of runs. An exception to this character occurs in Vermillion Canyon, where the creek is confined by bedrock, has higher gradient, and contains more riffle habitat. The riparian community includes cottonwood, willow, Russian olive and Phragmites. Cattle usage of the creek is evident, but the banks and riparian area appear to be stable. Water temperatures and conductivity are close to the upper range of tolerance for native fishes. Fishery surveys indicate a self-sustaining population of native mountain suckers.
>
> Reach #2 - Ink Springs Stream Flow Gage to Headgate of Vermillion Ditch – This reach flows through a canyon that ranges from ¼ to ½ mile in width. The stream has low

gradient and small to medium substrate size. Riffles are limited and high percentage of the habitat is comprised of runs. The riparian community includes cottonwood, willow, Russian olive and Phragmites. Cattle usage of the creek is evident, but the banks and riparian area appear to be stable. Water temperatures and conductivity are well within the ranges tolerated by native fishes. Fishery surveys indicate a self-sustaining population of mottled sculpin, speckled dace, and mountain suckers.

R2Cross Analysis. This section summarizes the data that BLM collected from each stream reach on Vermillion Creek and provides BLM's recommended flow rates for an instream flow appropriation.

Reach 1 - Confluence with Talamantes Creek to Ink Springs Stream Flow Gage

Cross Section Date	Discharge Rate	Top Width	Winter Flow Recommendation (meets 2 of 3 hydraulic criteria)	Summer Flow Recommendation (meets 3 of 3 hydraulic criteria)
4/01/2021 #2	0.86 cfs	17.25 feet	1.00 cfs	4.23 cfs
5/13/2021 #1	0.63 cfs	8.70 feet	0.98 cfs	0.99 cfs
		Averages:	**0.99 cfs**	**2.61 cfs**

BLM's data analysis indicates that the following flows are needed to protect the fishery and natural environment to a reasonable degree:

2.60 cubic feet per second is recommended during the warm portion of the year, from April 16 to September 30. This period covers spawning activities by native fishes. The recommended flow rate is driven by the average velocity criteria. Protecting average velocity for spawning habitat is important because many portions of this reach that have very low velocities. Without suitable velocity, the limited riffles may be unsuitable for spawning.

1.0 cubic feet per second is recommended from October 1 to April 15, the base flow period during the cold portion of the year. This recommendation is driven by the average depth criteria and wetted perimeter criteria. During low flow periods, it is important that the fish population be able to move between pools, and during winter, this flow rate should prevent pools from freezing.

Reach 2 - Ink Springs Stream Flow Gage to Headgate of Vermillion Ditch

Cross Section Date	Discharge Rate	Top Width	Winter Flow Recommendation (meets 2 of 3 hydraulic criteria)	Summer Flow Recommendation (meets 3 of 3 hydraulic criteria)
6/14/2018 #1	0.96 cfs	14.00 feet	1.52 cfs	2.67 cfs
6/14/2018 #2	0.78 cfs	15.06 feet	1.91 cfs	2.21 cfs
4/01/2021 #1	2.76 cfs	9.28 feet	0.75 cfs	2.19 cfs
		Averages:	**1.39 cfs**	**2.36 cfs**

BLM's data analysis indicates that the following flows are needed to protect the fishery and natural environment to a reasonable degree:

> 2.4 cubic feet per second is recommended from May 1 to July 31. This period covers spawning activities by native fishes. The recommended flow rate is driven by the average velocity criteria. Protecting average velocity for spawning habitat is important because many portions of this reach that have very low velocities. Without suitable velocity, the limited riffles may be unsuitable for spawning.
>
> 1.40 cubic feet per second is recommended from August 1 to April 30, the base flow period. This recommendation is driven by the average depth criteria. BLM believes that maintaining 1.60 cfs will prevent stress on the fish population during high temperature periods during late summer, and 1.60 cfs should keep pools sufficiently free of ice to allow overwintering of fish.

Water Availability. Vermillion Creek has three hydrologic variables that must be considered in any water availability analysis:

- Reach #1 receives flows from multiple tributaries to Vermillion Creek, including Talamantes Creek, Canyon Creek and Shell Creek. Flow in Talamantes Creek is heavily diverted, but even when existing water rights sweep Talamantes Creek, BLM has observed irrigation returns flow reaching Vermillion Creek. Water does not appear to be diverted from Canyon Creek or Shell Creek within Colorado, but there are numerous water rights in upstream location in Wyoming.

- Multiple springs in the vicinity of Ink Springs contribute substantial flow to Reach #1 and Reach #2. In early April 2021, before irrigation season began, BLM measured flows in Vermillion Creek slightly above Ink Springs and at the Highway 318 crossing below Ink Springs. The additional flow that accrued to the creek between these two points was 1.90 cfs, and BLM believes almost all of that increase is attributable to spring discharge.

- Vermillion Ditch can sweep the creek during much of the irrigation season.

When calculating water availability, BLM is aware of four data sources that may be useful:

- USGS Gage 09235490 (Vermillion Creek below Douglas Draw) operated for a short period in 1994 and 1995. The gage was located upstream from Vermillion Ditch.

- USGS Gage 09235450 (Vermillion Creek at Ink Springs Ranch) was operated from 1977 through 1981. This gage was located downstream from the springs described above in and upstream from Vermillion Ditch.

- Vermillion Ditch (WDID 5601180) has a long history of diversion records from 1989 through 2024.

- Upper Buffham Ditch (WDID 5600528) and Middle Buffham Ditch (WDID 5600527) have a long history of diversion records from 1970 through 2024, but there are many years in which diversion data was not collected.

BLM is aware of the following rights within the two reaches:

Reach #1:

Upper Buffham Ditch – 3.0 cfs, absolute

Reach #2:

Middle Buffham Ditch – 1.0 cfs, absolute
Moffat County Pump Diversion – 2.0 cfs, absolute

Relationship to Management Plans. The Little Snake Resource Management Plan identifies management of streams supporting native fish species as a priority for BLM. The plan specifies that BLM will work to improve aquatic conditions in these streams and will also work to prevent surface disturbances close to them. In addition, the plan specifies that BLM will work with the Colorado Water Conservation Board to appropriate instream flow water rights to protect these fisheries. Vermillion Creek also represents a major riparian habitat resource in an extremely arid area. BLM's plan specifies that BLM will take actions to stabilize and improve riparian habitat. Appropriation of an instream flow water right would assist BLM in meeting its aquatic and riparian management objectives.

Data sheets, R2Cross output, fishery survey information, and photographs of the cross section were included with BLM's draft recommendation in February 2022. BLM thanks both Colorado Parks and Wildlife and the CWCB for their cooperation in this effort.

If you have any questions regarding this instream flow recommendation, please contact Roy Smith at 303-239-3940.

Sincerely,

ALAN BITTNER

Digitally signed by ALAN BITTNER
Date: 2025.02.18 09:28:50 -07'00'

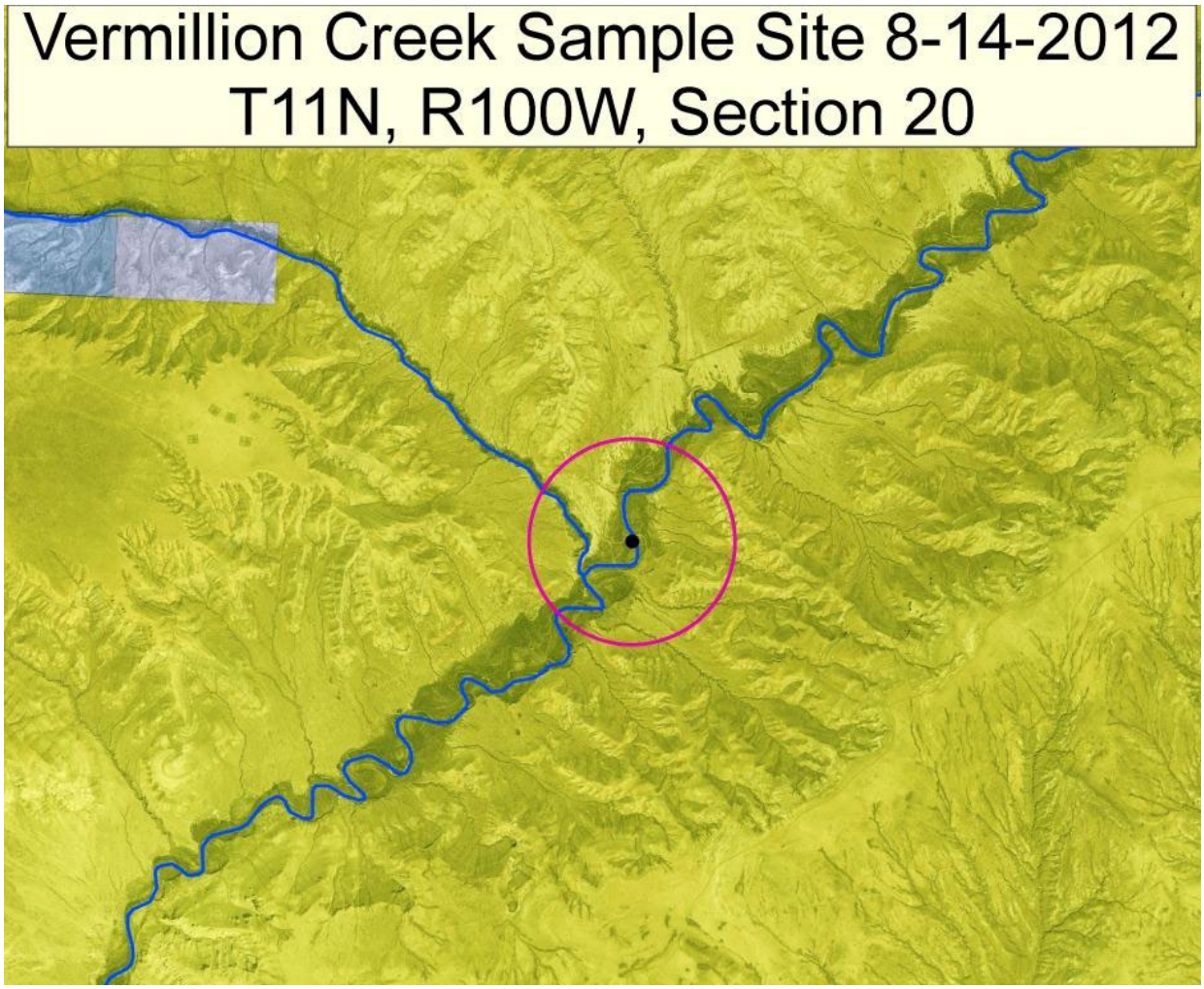
Alan Bittner
Deputy State Director
Resources

cc: Kymm Gresset, Little Snake Field Office
Eric Scherff, Little Snake Field Office
District Manager, Northwest District Office

Little Snake Field Office Stream Surveys
August 2012

Vermillion Creek - Water Code #21503

Vermillion Creek, located northwest of Maybell, Colorado on BLM lands managed by the Little Snake Field Office was sampled on August 14, 2012. Vermillion Creek is tributary to the Green River. Work was initiated to look at road stream crossings along the creek but a brief netting effort was conducted in an isolated pool at one of the crossings and two fish were collected. The sample was done just upstream of the confluence with Talamantes Creek. Personnel present were Tom Fresques, and Andrea Sponseller, BLM.



Road Crossing looking upstream into isolated pool

Close-up of isolated pool habitat

Small Bluehead sucker


Close-up of small Bluehead sucker mouth

Slightly larger Bluehead sucker

Close-up of larger Bluehead sucker mouth

Discussion:
The upper portions of Vermillion Creek and portions of the larger tributaries (Canyon Creek, Shell Creek, Talamantes Creek) were all very low and contained no flowing water at the time of the visit. This was a dry year but these systems typically get low. By late summer Vermillion Creek is a series of isolated pools that appear to persist throughout much of its length. The pool we sampled contained fish and what visually appeared to be two bluehead suckers were collected.

Riparian vegetation consisted of primarily willow and common reedgrass. The stream at the time of the visit was a series of unconnected isolated pools. This particular pool was nearly 3+ feet deep at the deepest point and approximately 60 feet long. Substrate was silt over a gravel and cobble bottom. Water was relatively cool considering the lack of flow and time of year. Good vegetative cover is shading this particular pool.

Recommendations:

- Sample more of these isolated pools within the watershed to determine fish species composition and relative abundance – seine hauls, minnow traps, backpack shockers, or hoop nets

- Collect some water quality data at sampled pools

COLORADO WATER CONSERVATION BOARD

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

COLORADO DIVISION OF WILDLIFE

LOCATION INFORMATION

STREAM NAME: Vermillion Creek						CROSS-SECTION NO.: 1
CROSS-SECTION LOCATION: Approx. 0.3 miles downstream from Vermillion Falls						
DATE: 6-14-18	OBSERVERS: N. Smith, E. Scharff					
LEGAL DESCRIPTION	¼ SECTION: SW	SECTION: 21	TOWNSHIP: 9 (N)/S	RANGE: 101 (E)/W	PM: 6th	
COUNTY: Moffat	WATERSHED: Green River	WATER DIVISION: 6	DOW WATER CODE: 21503			
MAP(S): USGS:			GPS 689157		Zone 12	
USFS:			4510541			

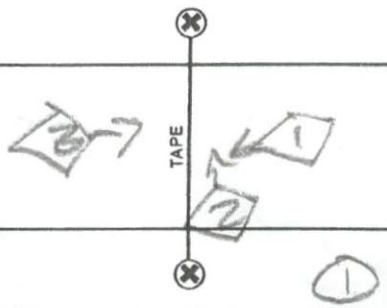
SUPPLEMENTAL DATA

SAG TAPE SECTION SAME AS DISCHARGE SECTION: YES / NO	METER TYPE: M-M			
METER NUMBER:	DATE RATED:	CALIB/SPIN: ____ sec	TAPE WEIGHT: surveyed ____ lbs/foot	TAPE TENSION: surveyed ____ lbs
CHANNEL BED MATERIAL SIZE RANGE: silt to 3" cobbles	PHOTOGRAPHS TAKEN: (YES)/NO	NUMBER OF PHOTOGRAPHS: 3		

CHANNEL PROFILE DATA

STATION	DISTANCE FROM TAPE (ft)	ROD READING (ft)
⊗ Tape @ Stake LB	0.0	surveyed
⊗ Tape @ Stake RB	0.0	surveyed
① WS @ Tape LB/RB	0.0	4.55 / 4.55
② WS Upstream	5.0	4.47
③ WS Downstream	19.5	4.72
SLOPE	0.25 / 24.5 = .01	

SKETCH



LEGEND:
Stake ⊗
Station ①
Photo ①→
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

AQUATIC INSECTS IN STREAM SECTION BY COMMON OR SCIENTIFIC ORDER NAME:
caddisfly, mayfly, annelids

COMMENTS

pH = 8.13
Cond = 873
Temp = 23.0° C
Salinity = 0.4

DISCHARGE/CROSS SECTION NOTES

STREAM NAME: Vermillion Creek | CROSS-SECTION NO.: 1 | DATE: 6-14-18 | SHEET ___ OF ___

BEGINNING OF MEASUREMENT | EDGE OF WATER LOOKING DOWNSTREAM: (0.0 AT STAKE) LEFT / RIGHT | Gage Reading: _____ ft | TIME: 1:30 pm

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)
NS	0.0		1.77								
	0.8		2.50								
G	0.9		3.22								
	1.7		4.42								
	3.6		4.46								
RW	5.8		4.55								
	6.0		4.6	0.05				0.13			
	6.3		4.6	0.05				0.14			
	6.6		4.65	0.10				0.34			
	6.9		4.7	0.15				0.52			
	7.2		4.7	0.15				0.52			
	7.5		4.75	0.20				0.68			
	7.8		4.75	0.20				0.81			
	8.1		4.75	0.20				0.81			
	8.4		4.75	0.20				0.80			
	8.7		4.8	0.25				0.84			
	9.0		4.8	0.25				0.79			
	9.3		4.85	0.30				0.79			
	9.6		4.85	0.30				0.76			
	9.9		4.8	0.25				0.98			
	10.2		4.8	0.25				0.99			
	10.5		4.8	0.25				1.02			
	10.8		4.85	0.30				1.16			
	11.1		4.8	0.25				0.98			
	11.4		4.75	0.20				0.65			
	11.7		4.65	0.10				0.20			
LW	12.3		4.55								
	13.9		4.35								
	14.7		4.00								
G	14.9		3.72								
LS	15.9		2.30								
TOTALS:											

End of Measurement | Time: 1340 | Gage Reading: _____ ft | CALCULATIONS PERFORMED BY: | CALCULATIONS CHECKED BY:

COLORADO WATER CONSERVATION BOARD

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

COLORADO DIVISION OF WILDLIFE

LOCATION INFORMATION

STREAM NAME: Vermillion Creek | CROSS-SECTION NO.: 2

CROSS-SECTION LOCATION: Approx 0.25 miles downstream from Vermillion Falls

DATE: 6-14-18 | OBSERVERS: R. Smith, E. Schaff

LEGAL DESCRIPTION | ¼ SECTION: SW | SECTION: 21 | TOWNSHIP: 9 N/S | RANGE: 101 E/W | PM: 6th

COUNTY: Moffat | WATERSHED: Green River | WATER DIVISION: 6 | DOW WATER CODE: 21503

MAP(S): USGS: GPS Zone 12 689247

USFS: 4510504

SUPPLEMENTAL DATA

SAG TAPE SECTION SAME AS DISCHARGE SECTION: (YES)/NO | METER TYPE: M-M

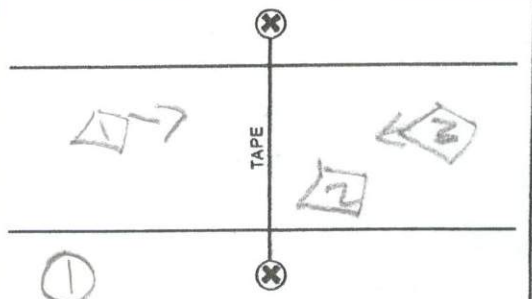
METER NUMBER: | DATE RATED: | CALIB/SPIN: ____ sec | TAPE WEIGHT: surveyed ____ lbs/foot | TAPE TENSION: surveyed ____ lbs

CHANNEL BED MATERIAL SIZE RANGE: silt to 3" cobbles | PHOTOGRAPHS TAKEN: (YES)/NO | NUMBER OF PHOTOGRAPHS: 3

CHANNEL PROFILE DATA

STATION	DISTANCE FROM TAPE (ft)	ROD READING (ft)
⊗ Tape @ Stake LB	0.0	surveyed
⊗ Tape @ Stake RB	0.0	surveyed
① WS @ Tape LB/RB	0.0	4.95 / 4.95
② WS Upstream	3.51	4.93
③ WS Downstream	21.0	5.46
SLOPE	0.53/24.5' = .022	

SKETCH



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

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

caddisfly, mayfly, annelids

COMMENTS

Riparian: willow - cottonwood with some russian olive & tamarisk

DISCHARGE/CROSS SECTION NOTES

STREAM NAME: Vermillion Creek | CROSS-SECTION NO.: 2 | DATE: 6-14-18 | SHEET ___ OF ___

BEGINNING OF MEASUREMENT | EDGE OF WATER LOOKING DOWNSTREAM: (0.0 AT STAKE) LEFT / RIGHT | Gage Reading: _____ ft | TIME: 2:10 pm

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)
LS	0.0		2.73								
G	2.8		4.21								
	4.8		4.78								
LW	6.3		4.95	Ø							
	6.7		5.0	0.05				0.04			
	7.0		5.0	0.05				0.02			
	7.3		5.0	0.05				0.28			
	7.6		5.1	0.15				0.15			
	7.9		5.1	0.15				0.47			
	8.2		5.05	0.10				0.57			
	8.5		5.1	0.15				0.53			
	8.8		5.1	0.15				0.76			
	9.1		5.1	0.15				0.71			
	9.4		5.15	0.20				1.00			
	9.7		5.15	0.20				0.93			
	10.0		5.15	0.20				0.99			
	10.3		5.15	0.20				1.08			
	10.6		5.15	0.20				0.86			
	10.9		5.15	0.20				0.74			
	11.2		5.15	0.20				0.71			
	11.5		5.15	0.20				0.86			
	11.8		5.15	0.20				0.58			
	12.1		5.15	0.20				0.75			
	12.4		5.15	0.20				0.72			
	12.7		5.1	0.15				0.71			
	13.0		5.1	0.15				0.61			
	13.3		5.05	0.10				0.27			
	13.6		5.05	0.10				0.43			
	13.9		5.05	0.10				Ø			
	14.2		5.0	0.05				Ø			
RW	14.6		4.95	Ø							
	17.3		4.72								
G	18.0		4.25								
	18.9		3.46								
RS	22.0		2.68								
TOTALS:											

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

COLORADO WATER CONSERVATION BOARD

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

COLORADO DIVISION OF WILDLIFE

LOCATION INFORMATION

STREAM NAME: Vermillion Creek						CROSS-SECTION NO: 1
CROSS-SECTION LOCATION: 1500' downstream from Hwy. 318 crossing						
DATE: 4-1-21	OBSERVERS: R. Smith, E Schorff					
LEGAL DESCRIPTION	¼ SECTION: SW	SECTION: 21	TOWNSHIP: 9 (N)/S	RANGE: 101 E/(W)	PM: 6th	
COUNTY: Moffat	WATERSHED: Green River	WATER DIVISION: 6	DOW WATER CODE:			
MAP(S): USGS:	Zone 12, E 689594 N 4510253					
USFS:						

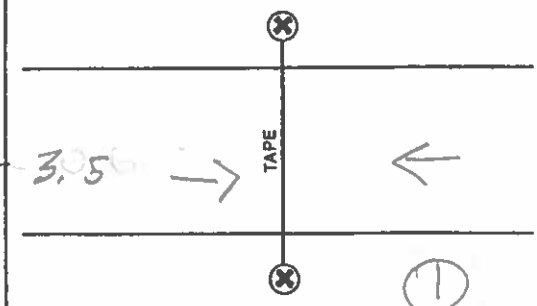
SUPPLEMENTAL DATA

SAG TAPE SECTION SAME AS DISCHARGE SECTION: (YES)/NO	METER TYPE: M-M			
METER NUMBER:	DATE RATED:	CALIB/SPIN: ____ sec	TAPE WEIGHT: Surveyed ____ lbs/foot	TAPE TENSION: Surveyed ____ lbs
CHANNEL BED MATERIAL SIZE RANGE: silt to 4-inch Cobbles	PHOTOGRAPHS TAKEN: (YES)/NO	NUMBER OF PHOTOGRAPHS: 3		

CHANNEL PROFILE DATA

STATION	DISTANCE FROM TAPE (ft)	ROD READING (ft)
⊗ Tape @ Stake LB	0.0	Surveyed
⊗ Tape @ Stake RB	0.0	Surveyed
① WS @ Tape LB/RB	0.0 10.6	10.25/10.25
② WS Upstream	19.8	10.06
③ WS Downstream	15.2	10.40
SLOPE	0.34 / 35.0 = .01	

SKETCH



LEGEND:
Stake ⊗
Station ①
Photo ①→
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

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

annelids - do early in year do inventory macros

COMMENTS

Riparian = willows Phragmites, tamarisk

DISCHARGE/CROSS SECTION NOTES

STREAM NAME: Vermillion Creek	CROSS-SECTION NO.: 1	DATE: 4-1-21	SHEET ___ OF ___
BEGINNING OF MEASUREMENT	EDGE OF WATER LOOKING DOWNSTREAM: (0.0 AT STAKE) LEFT / RIGHT	Gage Reading: ____ ft	TIME: 11:20 am.

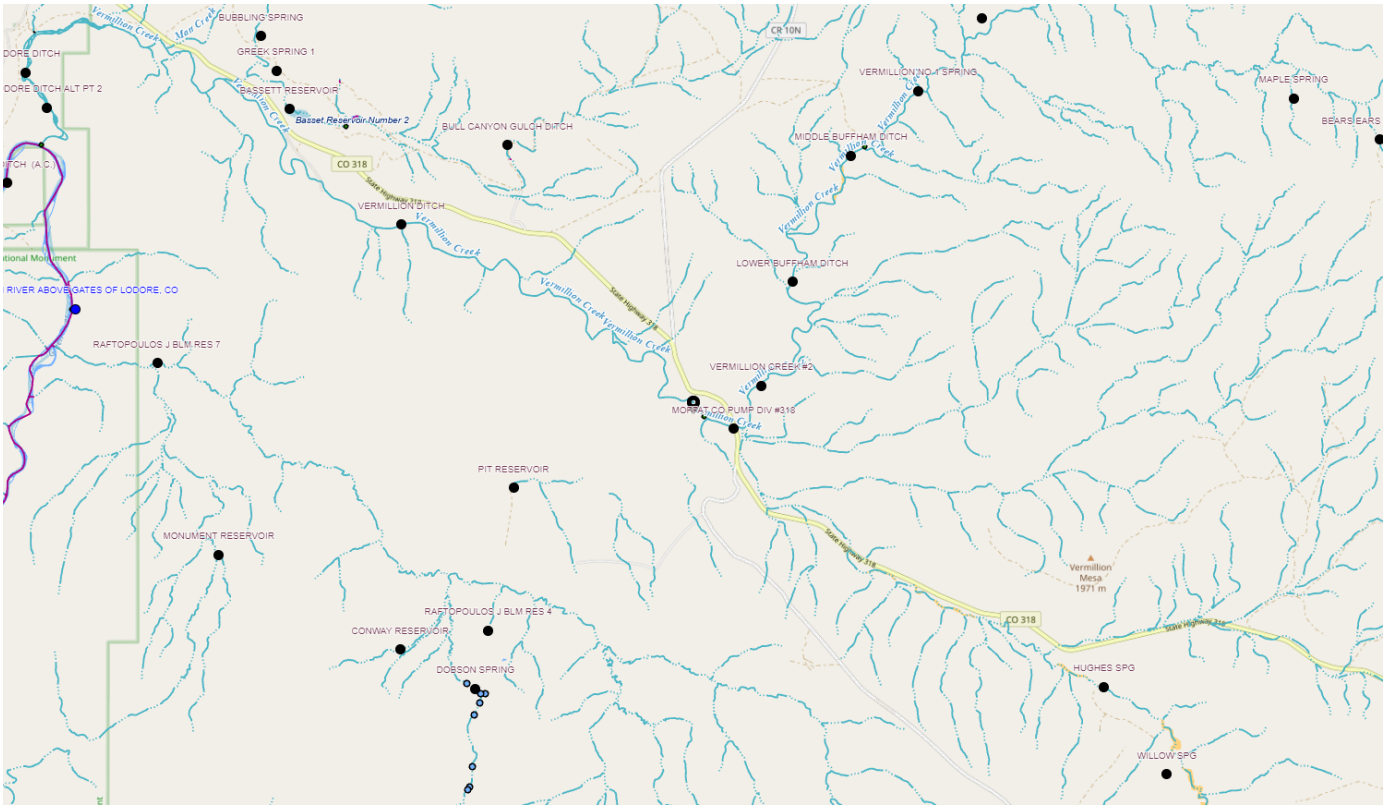
Features (Stake (S), Grassline (G), Waterline (W), Rock (R))	Distance From Initial Point (ft)	Width (ft)	Total Vertical Depth From Tape/Inst (ft)	Water Depth (ft)	Depth of Observation (ft)	Revolutions	Time (sec)	Velocity (ft/sec): At Point	Velocity (ft/sec): Mean in Vertical	Area (ft^2)	Discharge (cfs)
RS	0.0		8.10								
BF	2.0		9.42								
	2.7		9.82								
RW	3.5		10.25								
	4.0		10.6	0.35				0.45			
	4.3		10.65	0.40				0.94			
	4.6		10.70	0.45				0.78			
	4.9		10.70	0.45				1.39			
	5.2		10.80	0.55				1.26			
	5.5		10.85	0.60				2.22			
	5.8		10.70	0.45				1.69			
	6.1		10.70	0.45				1.65			
	6.4		10.70	0.45				0.63			
	6.7		10.70	0.45				1.44			
	7.0		10.65	0.40				0.78			
	7.3		10.50	0.25				0.58			
	7.6		10.45	0.20				1.28			
	7.9		10.40	0.15				0.90			
	8.2		10.50	0.25				1.83			
	8.5		10.45	0.20				1.14			
	8.8		10.45	0.20				1.13			
	9.1		10.55	0.30				1.16			
	9.4		10.55	0.30				0.65			
	9.7		10.55	0.30				1.41			
	10.0		10.65	0.40				0.75			
	10.3		10.70	0.45				0.35			
LW	10.6		10.25								
	10.0		9.60								
BF	11.4		9.34								
LS	13.1		8.90								
TOTALS:											

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

R2Cross RESULTS

Stream Name: Vermillion Creek
Stream Locations: 0.3 miles below Vermillion Falls
Fieldwork Date: 06/14/2018
Cross-section: 1
Observers: R. Smith
Coordinate System: UTM Zone 12
X (easting): 689157
Y (northing): 4510541
Date Processed: 07/11/2024
Slope: 0.01
Discharge: R2Cross data file: 0.96 (cfs)
Computation method: Ferguson VPE
R2Cross data filename: Vermillion Creek 6-14-18 #1 Ferguson.xlsx
R2Cross version: 2.0.2

LOCATION



ANALYSIS RESULTS

Habitat Criteria Results

Bankfull top width (ft) = 14.0

	Habitat Criteria	Discharge (cfs) Meeting Criteria
Mean Depth (ft)	0.2	1.52
Percent Wetted Perimeter (%)	50.0	1.24
Mean Velocity (ft/s)	1.0	2.67

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	3.22	14.0	1.31	1.63	18.28	15.4	100.0	1.19	0.03	5.42	99.05
	3.25	13.97	1.28	1.6	17.86	15.34	99.56	1.16	0.03	5.34	95.36
	3.3	13.93	1.23	1.55	17.16	15.22	98.84	1.13	0.03	5.2	89.32
	3.35	13.88	1.19	1.5	16.47	15.11	98.11	1.09	0.03	5.07	83.42
	3.4	13.83	1.14	1.45	15.77	15.0	97.39	1.05	0.03	4.92	77.67
	3.45	13.79	1.09	1.4	15.08	14.89	96.66	1.01	0.03	4.78	72.07
	3.5	13.74	1.05	1.35	14.4	14.78	95.94	0.97	0.03	4.63	66.62
	3.55	13.7	1.0	1.3	13.71	14.67	95.21	0.93	0.03	4.47	61.33
	3.6	13.65	0.95	1.25	13.03	14.55	94.49	0.89	0.03	4.31	56.2
	3.65	13.6	0.91	1.2	12.34	14.44	93.76	0.85	0.03	4.15	51.24
	3.7	13.56	0.86	1.15	11.67	14.33	93.04	0.81	0.03	3.98	46.44
	3.75	13.51	0.81	1.1	10.99	14.22	92.31	0.77	0.03	3.81	41.83
	3.8	13.46	0.77	1.05	10.31	14.11	91.59	0.73	0.03	3.63	37.39
	3.85	13.42	0.72	1.0	9.64	14.0	90.86	0.69	0.03	3.44	33.14
	3.9	13.37	0.67	0.95	8.97	13.88	90.14	0.65	0.03	3.24	29.09
	3.95	13.33	0.62	0.9	8.31	13.77	89.41	0.6	0.03	3.04	25.25
	4.0	13.28	0.58	0.85	7.64	13.66	88.69	0.56	0.04	2.83	21.61
	4.05	13.13	0.53	0.8	6.98	13.48	87.49	0.52	0.04	2.62	18.32
	4.1	12.98	0.49	0.75	6.33	13.29	86.29	0.48	0.04	2.41	15.25
	4.15	12.84	0.44	0.7	5.68	13.11	85.09	0.43	0.04	2.19	12.43
	4.2	12.69	0.4	0.65	5.04	12.92	83.89	0.39	0.04	1.96	9.86
	4.25	12.54	0.35	0.6	4.41	12.74	82.69	0.35	0.04	1.71	7.56
	4.3	12.39	0.31	0.55	3.79	12.55	81.49	0.3	0.05	1.46	5.54
	4.35	12.25	0.26	0.5	3.17	12.37	80.29	0.26	0.05	1.2	3.82
	4.4	11.81	0.22	0.45	2.57	11.9	77.28	0.22	0.06	0.97	2.49

	4.45	9.82	0.21	0.4	2.01	9.9	64.27	0.2	0.06	0.9	1.81
	4.5	8.01	0.2	0.35	1.58	8.08	52.47	0.19	0.06	0.85	1.34
Waterline	4.55	6.5	0.19	0.3	1.21	6.57	42.64	0.18	0.06	0.79	0.96
	4.6	5.7	0.16	0.25	0.9	5.76	37.38	0.16	0.07	0.63	0.57
	4.65	5.1	0.12	0.2	0.63	5.15	33.43	0.12	0.08	0.45	0.28
	4.7	4.35	0.09	0.15	0.39	4.39	28.48	0.09	0.1	0.28	0.11
	4.75	3.0	0.06	0.1	0.18	3.02	19.64	0.06	0.14	0.16	0.03
	4.8	1.5	0.03	0.05	0.04	1.52	9.84	0.03	0.25	0.06	0.0
	4.83	0.66	0.01	0.01	0.01	0.66	4.32	0.01	0.57	0.01	0.0

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

MODEL SUMMARY

Measured Flow (Qm) =	0.96	(cfs)
Calculated Flow (Qc) =	0.96	(cfs)
(Qm-Qc)/Qm * 100 =	0.02%	
Measured Waterline (WLm) =	4.55	(ft)
Calculated Waterline (WLc) =	4.55	(ft)
(WLm-WLc)/WLm * 100 =	-0.00%	
Max Measured Depth (Dm) =	0.3	(ft)
Max Calculated Depth (Dc) =	0.3	(ft)
(Dm-Dc)/Dm * 100 =	0.01%	
Mean Velocity =	0.79	(ft/s)
Manning's n =	0.061	
0.4 * Qm =	0.38	(cfs)
2.5 * Qm =	2.4	(cfs)

FIELD DATA

Feature	Station (ft)	Rod Height (ft)	Water depth (ft)	Velocity (ft/s)
	0	1.77		
	0.8	2.5		
Bankfull	0.9	3.22		
	1.7	4.42		
	3.8	4.46		
Waterline	5.8	4.55	0	0
	6	4.6	0.05	0.13
	6.3	4.6	0.05	0.14
	6.6	4.65	0.1	0.34
	6.9	4.7	0.15	0.52
	7.2	4.7	0.15	0.52
	7.5	4.75	0.2	0.68
	7.8	4.75	0.2	0.81
	8.1	4.75	0.2	0.81
	8.4	4.75	0.2	0.8
	8.7	4.8	0.25	0.84
	9	4.8	0.25	0.79
	9.3	4.85	0.3	0.79
	9.6	4.85	0.3	0.76
	9.9	4.8	0.25	0.98
	10.2	4.8	0.25	0.99
	10.5	4.8	0.25	1.02
	10.8	4.85	0.3	1.16
	11.1	4.8	0.25	0.98
	11.4	4.75	0.2	0.65
	11.7	4.65	0.1	0.2
Waterline	12.3	4.55	0	0
	13.9	4.35		
	14.7	4		
Bankfull	14.9	3.22		

	15.9	2.3					

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
0.21	0.05	0.01	0	0.17
0.3	0.05	0.01	0	0.22
0.3	0.1	0.03	0.01	1.06
0.3	0.15	0.04	0.02	2.44
0.3	0.15	0.04	0.02	2.44
0.3	0.2	0.06	0.04	4.26
0.3	0.2	0.06	0.05	5.07
0.3	0.2	0.06	0.05	5.07
0.3	0.2	0.06	0.05	5.01
0.3	0.25	0.07	0.06	6.57
0.3	0.25	0.08	0.06	6.18
0.3	0.3	0.09	0.07	7.42
0.3	0.3	0.09	0.07	7.13
0.3	0.25	0.07	0.07	7.67
0.3	0.25	0.07	0.07	7.75
0.3	0.25	0.08	0.08	7.98
0.3	0.3	0.09	0.1	10.89
0.3	0.25	0.07	0.07	7.67
0.3	0.2	0.06	0.04	4.07
0.32	0.1	0.04	0.01	0.94
0.61	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0

0	0	0	0	0

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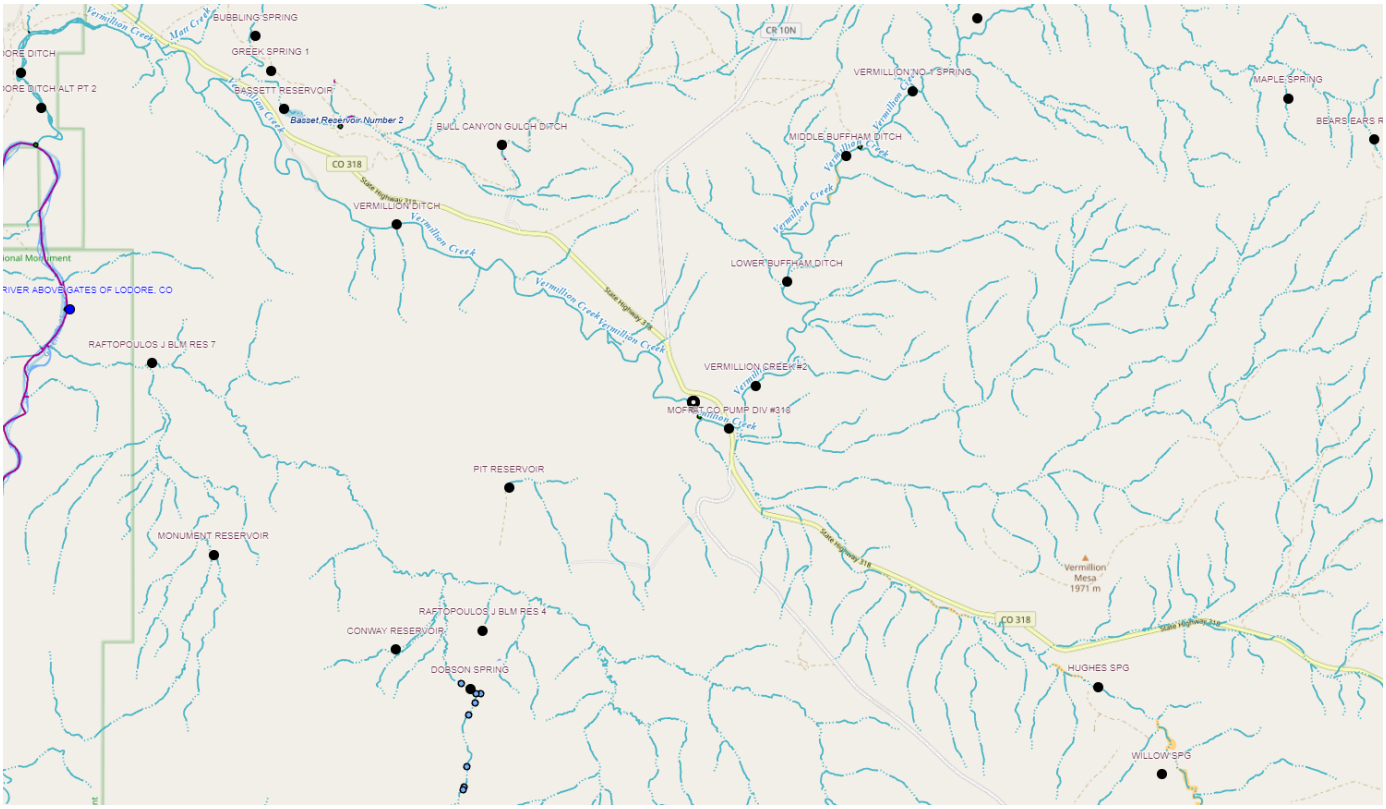
R2Cross RESULTS

Stream Name: Vermillion Creek
Stream Locations: 0.25 miles downstream from Vermillion Falls
Fieldwork Date: 06/14/2018
Cross-section: 2
Observers: R. Smith, E. Scherff
Coordinate System: UTM Zone 12
X (easting): 689247
Y (northing): 4510504
Date Processed: 07/11/2024
Slope: 0.022
Discharge: R2Cross data file: 0.82 (cfs)
Computation method: Ferguson VPE
R2Cross data filename: Vermillion Creek 6-14-18 #2 Ferguson.xlsx
R2Cross version: 2.0.2

LOCATION



ANALYSIS RESULTS

Habitat Criteria Results

Bankfull top width (ft) = 15.06

	Habitat Criteria	Discharge (cfs) Meeting Criteria
Mean Depth (ft)	0.2	2.3
Percent Wetted Perimeter (%)	50.0	0.38
Mean Velocity (ft/s)	1.0	1.81

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	4.25	15.06	0.67	0.9	10.12	15.34	100.0	0.66	0.04	4.52	45.74
	4.27	14.95	0.65	0.88	9.78	15.22	99.2	0.64	0.04	4.41	43.11
	4.29	14.83	0.64	0.85	9.45	15.1	98.4	0.63	0.04	4.29	40.55
	4.32	14.72	0.62	0.83	9.12	14.97	97.61	0.61	0.04	4.17	38.06
	4.34	14.61	0.6	0.81	8.79	14.85	96.81	0.59	0.04	4.06	35.64
	4.36	14.5	0.58	0.79	8.46	14.73	96.01	0.57	0.04	3.94	33.3
	4.38	14.38	0.57	0.77	8.13	14.61	95.21	0.56	0.04	3.81	31.02
	4.41	14.27	0.55	0.74	7.81	14.48	94.41	0.54	0.04	3.69	28.82
	4.43	14.16	0.53	0.72	7.49	14.36	93.61	0.52	0.04	3.56	26.7
	4.45	14.05	0.51	0.7	7.17	14.24	92.82	0.5	0.04	3.44	24.65
	4.47	13.94	0.49	0.68	6.86	14.12	92.02	0.49	0.04	3.3	22.67
	4.5	13.82	0.47	0.65	6.55	13.99	91.22	0.47	0.04	3.17	20.77
	4.52	13.71	0.45	0.63	6.24	13.87	90.42	0.45	0.04	3.04	18.94
	4.54	13.6	0.44	0.61	5.93	13.75	89.62	0.43	0.04	2.9	17.2
	4.57	13.49	0.42	0.58	5.63	13.63	88.83	0.41	0.04	2.76	15.53
	4.59	13.37	0.4	0.56	5.32	13.5	88.03	0.39	0.05	2.62	13.94
	4.61	13.26	0.38	0.54	5.02	13.38	87.23	0.38	0.05	2.48	12.44
	4.63	13.15	0.36	0.52	4.73	13.26	86.43	0.36	0.05	2.33	11.01
	4.66	13.04	0.34	0.49	4.43	13.14	85.63	0.34	0.05	2.18	9.67
	4.68	12.92	0.32	0.47	4.14	13.01	84.83	0.32	0.05	2.03	8.41
	4.7	12.81	0.3	0.45	3.85	12.89	84.04	0.3	0.05	1.88	7.24
	4.72	12.67	0.28	0.43	3.56	12.74	83.08	0.28	0.05	1.73	6.17
	4.75	12.33	0.27	0.41	3.28	12.4	80.81	0.26	0.06	1.62	5.31
	4.77	11.99	0.25	0.38	3.01	12.05	78.55	0.25	0.06	1.5	4.51
	4.79	11.59	0.24	0.36	2.74	11.65	75.95	0.24	0.06	1.39	3.81

	4.81	11.13	0.22	0.34	2.49	11.19	72.91	0.22	0.06	1.29	3.21
	4.83	10.66	0.21	0.32	2.24	10.72	69.88	0.21	0.07	1.19	2.67
	4.86	10.2	0.2	0.29	2.01	10.26	66.85	0.2	0.07	1.09	2.19
	4.88	9.74	0.18	0.27	1.78	9.79	63.82	0.18	0.07	0.99	1.76
	4.9	9.28	0.17	0.25	1.57	9.33	60.79	0.17	0.08	0.89	1.39
	4.92	8.81	0.16	0.23	1.37	8.86	57.76	0.15	0.08	0.79	1.07
Waterline	4.95	8.36	0.14	0.2	1.18	8.41	54.8	0.14	0.09	0.69	0.81
	4.95	8.35	0.14	0.2	1.17	8.4	54.73	0.14	0.09	0.68	0.8
	4.97	7.98	0.12	0.18	0.99	8.02	52.29	0.12	0.1	0.57	0.57
	4.99	7.62	0.11	0.16	0.81	7.66	49.93	0.11	0.11	0.46	0.38
	5.01	6.67	0.1	0.14	0.66	6.71	43.74	0.1	0.11	0.41	0.27
	5.04	6.34	0.08	0.11	0.51	6.37	41.51	0.08	0.13	0.31	0.16
	5.06	5.64	0.07	0.09	0.37	5.66	36.92	0.07	0.16	0.23	0.09
	5.08	5.17	0.05	0.07	0.25	5.18	33.78	0.05	0.2	0.15	0.04
	5.11	3.54	0.04	0.04	0.15	3.55	23.12	0.04	0.23	0.12	0.02
	5.13	3.27	0.02	0.02	0.07	3.27	21.34	0.02	0.39	0.04	0.0

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

MODEL SUMMARY

Measured Flow (Qm) =	0.82	(cfs)
Calculated Flow (Qc) =	0.81	(cfs)
(Qm-Qc)/Qm * 100 =	0.51%	
Measured Waterline (WLm) =	4.95	(ft)
Calculated Waterline (WLc) =	4.95	(ft)
(WLm-WLc)/WLm * 100 =	0.06%	
Max Measured Depth (Dm) =	0.2	(ft)
Max Calculated Depth (Dc) =	0.2	(ft)
(Dm-Dc)/Dm * 100 =	-1.49%	
Mean Velocity =	0.69	(ft/s)
Manning's n =	0.086	
0.4 * Qm =	0.33	(cfs)
2.5 * Qm =	2.04	(cfs)

FIELD DATA

Feature	Station (ft)	Rod Height (ft)	Water depth (ft)	Velocity (ft/s)
	0	2.73		
Bankfull	2.8	4.21		
	4.8	4.78		
Waterline	6.3	4.95	0	0
	6.7	5	0.05	0.04
	7	5	0.05	0.02
	7.3	5	0.05	0.28
	7.6	5.1	0.15	0.15
	7.9	5.1	0.15	0.47
	8.2	5.05	0.1	0.57
	8.5	5.1	0.15	0.53
	8.8	5.1	0.15	0.76
	9.1	5.1	0.15	0.71
	9.4	5.15	0.2	1
	9.7	5.15	0.2	0.93
	10	5.15	0.2	0.99
	10.3	5.15	0.2	1.08
	10.6	5.15	0.2	0.86
	10.9	5.15	0.2	0.79
	11.2	5.15	0.2	0.79
	11.5	5.15	0.2	0.71
	11.8	5.15	0.2	0.86
	12.1	5.15	0.2	0.58
	12.4	5.15	0.2	0.75
	12.7	5.1	0.15	0.72
	13	5.1	0.15	0.71
	13.3	5.05	0.1	0.61
	13.6	5.05	0.1	0.27
	14.2	5	0.1	0.43
Waterline	14.6	4.95	0.05	0

	17.3	4.72	0	0
Bankfull	18	4.25		
	18.9	3.46		
	22	2.68		

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
0.4	0.05	0.02	0	0.09
0.3	0.05	0.01	0	0.04
0.3	0.05	0.01	0	0.51
0.32	0.15	0.04	0.01	0.83
0.3	0.15	0.04	0.02	2.59
0.3	0.1	0.03	0.02	2.09
0.3	0.15	0.05	0.02	2.92
0.3	0.15	0.04	0.03	4.19
0.3	0.15	0.04	0.03	3.91
0.3	0.2	0.06	0.06	7.34
0.3	0.2	0.06	0.06	6.83
0.3	0.2	0.06	0.06	7.27
0.3	0.2	0.06	0.06	7.93
0.3	0.2	0.06	0.05	6.32
0.3	0.2	0.06	0.05	5.8
0.3	0.2	0.06	0.05	5.8
0.3	0.2	0.06	0.04	5.21
0.3	0.2	0.06	0.05	6.32
0.3	0.2	0.06	0.03	4.26
0.3	0.2	0.06	0.04	5.51
0.3	0.15	0.04	0.03	3.97
0.3	0.15	0.05	0.03	3.91
0.3	0.1	0.03	0.02	2.24
0.3	0.1	0.04	0.01	1.49
0.6	0.1	0.05	0.02	2.63
0.4	0	0	0	0

0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0

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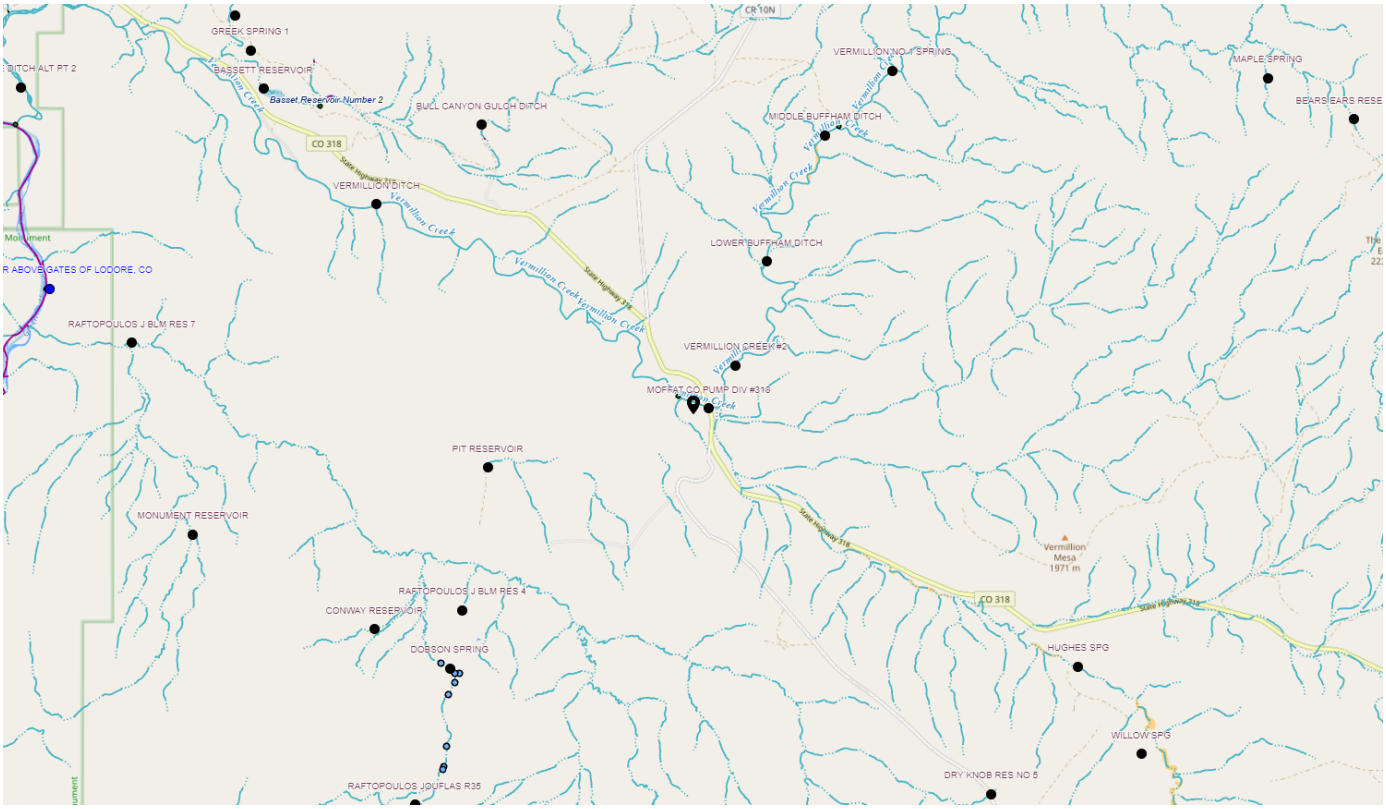
R2Cross RESULTS

Stream Name: Vermillion Creek
Stream Locations: 1500 ft downstream from Highway 318 crossing
Fieldwork Date: 04/01/2021
Cross-section: 1
Observers: R Smith, E Scherff
Coordinate System: UTM Zone 12
X (easting): 689594
Y (northing): 4510253
Date Processed: 07/11/2024
Slope: 0.01
Discharge: R2Cross data file: 2.76 (cfs)
Computation method: Ferguson VPE
R2Cross data filename: Vermillion Creek 4-1-21 #1 Ferguson.xlsx
R2Cross version: 2.0.2

LOCATION



ANALYSIS RESULTS

Habitat Criteria Results

Bankfull top width (ft) = 9.28

	Habitat Criteria	Discharge (cfs) Meeting Criteria
Mean Depth (ft)	0.2	0.75
Percent Wetted Perimeter (%)	50.0	0.33
Mean Velocity (ft/s)	1.0	2.19

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	9.42	9.28	0.99	1.43	9.19	10.43	100.0	0.88	0.04	3.57	32.82
	9.45	9.18	0.97	1.4	8.91	10.31	98.89	0.86	0.04	3.51	31.24
	9.5	9.01	0.94	1.35	8.46	10.12	97.05	0.84	0.04	3.39	28.69
	9.55	8.85	0.91	1.3	8.01	9.93	95.2	0.81	0.04	3.28	26.26
	9.6	8.69	0.87	1.25	7.57	9.73	93.35	0.78	0.04	3.16	23.93
	9.65	8.57	0.83	1.2	7.14	9.58	91.82	0.75	0.04	3.03	21.62
	9.7	8.45	0.79	1.15	6.71	9.42	90.3	0.71	0.04	2.89	19.43
	9.75	8.33	0.76	1.1	6.29	9.26	88.77	0.68	0.04	2.75	17.34
	9.8	8.21	0.72	1.05	5.88	9.1	87.24	0.65	0.04	2.61	15.35
	9.85	8.09	0.68	1.0	5.47	8.93	85.68	0.61	0.04	2.46	13.49
	9.9	7.97	0.64	0.95	5.07	8.77	84.1	0.58	0.04	2.31	11.73
	9.95	7.84	0.6	0.9	4.68	8.61	82.53	0.54	0.05	2.16	10.09
	10.0	7.72	0.56	0.85	4.29	8.44	80.95	0.51	0.05	2.0	8.57
	10.05	7.6	0.51	0.8	3.9	8.28	79.38	0.47	0.05	1.83	7.16
	10.1	7.47	0.47	0.75	3.53	8.11	77.8	0.43	0.05	1.67	5.88
	10.15	7.35	0.43	0.7	3.16	7.95	76.22	0.4	0.05	1.49	4.71
	10.2	7.22	0.39	0.65	2.79	7.78	74.65	0.36	0.06	1.31	3.67
Waterline	10.25	7.1	0.34	0.6	2.44	7.62	73.07	0.32	0.06	1.13	2.76
	10.3	7.0	0.3	0.55	2.08	7.47	71.66	0.28	0.07	0.95	1.98
	10.35	6.89	0.25	0.5	1.74	7.33	70.25	0.24	0.07	0.76	1.32
	10.4	6.79	0.21	0.45	1.39	7.18	68.84	0.19	0.09	0.58	0.81
	10.45	5.93	0.18	0.4	1.07	6.27	60.12	0.17	0.09	0.48	0.52
	10.5	4.93	0.16	0.35	0.8	5.2	49.84	0.15	0.1	0.42	0.33
	10.55	3.97	0.14	0.3	0.56	4.18	40.08	0.13	0.11	0.34	0.19
	10.6	3.62	0.1	0.25	0.37	3.76	36.08	0.1	0.14	0.22	0.08

	10.65	3.03	0.07	0.2	0.2	3.13	30.0	0.07	0.2	0.12	0.02
	10.7	0.9	0.08	0.15	0.08	0.96	9.17	0.08	0.17	0.16	0.01
	10.75	0.65	0.06	0.1	0.04	0.69	6.58	0.05	0.24	0.09	0.0
	10.8	0.4	0.03	0.05	0.01	0.42	3.99	0.02	0.46	0.03	0.0
	10.84	0.12	0.01	0.02	0.0	0.12	1.2	0.01	1.25	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) =	2.76	(cfs)
Calculated Flow (Qc) =	2.76	(cfs)
(Qm-Qc)/Qm * 100 =	-0.01%	
Measured Waterline (WLm) =	10.25	(ft)
Calculated Waterline (WLc) =	10.25	(ft)
(WLm-WLc)/WLm * 100 =	0.00%	
Max Measured Depth (Dm) =	0.6	(ft)
Max Calculated Depth (Dc) =	0.6	(ft)
(Dm-Dc)/Dm * 100 =	-0.00%	
Mean Velocity =	1.13	(ft/s)
Manning's n =	0.061	
0.4 * Qm =	1.1	(cfs)
2.5 * Qm =	6.9	(cfs)

FIELD DATA

Feature	Station (ft)	Rod Height (ft)	Water depth (ft)	Velocity (ft/s)
	0	8.1		
Bankfull	2	9.42		
	2.7	9.82		
Waterline	3.5	10.25	0	0
	4	10.6	0.35	0.45
	4.3	10.65	0.4	0.94
	4.6	10.7	0.45	0.78
	4.9	10.7	0.45	1.39
	5.2	10.8	0.55	1.26
	5.5	10.85	0.6	2.22
	5.8	10.7	0.45	1.69
	6.1	10.7	0.45	1.65
	6.4	10.7	0.45	0.63
	6.7	10.7	0.45	1.44
	7	10.65	0.4	0.78
	7.3	10.5	0.25	0.58
	7.6	10.45	0.2	1.28
	7.9	10.4	0.15	0.9
	8.2	10.5	0.25	1.83
	8.5	10.45	0.2	1.14
	8.8	10.45	0.2	1.13
	9.1	10.55	0.3	1.16
	9.4	10.55	0.3	0.65
	9.7	10.55	0.3	1.41
	10	10.65	0.4	0.75
	10.3	10.7	0.45	0.35
Waterline	10.6	10.25	0	0
	11	9.6		
Bankfull	11.4	9.34		
	13.1	8.9		

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
0.61	0.35	0.14	0.06	2.28
0.3	0.4	0.12	0.11	4.08
0.3	0.45	0.14	0.11	3.81
0.3	0.45	0.14	0.19	6.79
0.32	0.55	0.17	0.21	7.53
0.3	0.6	0.18	0.4	14.47
0.34	0.45	0.14	0.23	8.26
0.3	0.45	0.14	0.22	8.07
0.3	0.45	0.14	0.09	3.08
0.3	0.45	0.14	0.19	7.04
0.3	0.4	0.12	0.09	3.39
0.34	0.25	0.07	0.04	1.57
0.3	0.2	0.06	0.08	2.78
0.3	0.15	0.04	0.04	1.47
0.32	0.25	0.07	0.14	4.97
0.3	0.2	0.06	0.07	2.48
0.3	0.2	0.06	0.07	2.46
0.32	0.3	0.09	0.1	3.78
0.3	0.3	0.09	0.06	2.12
0.3	0.3	0.09	0.13	4.59
0.32	0.4	0.12	0.09	3.26
0.3	0.45	0.14	0.05	1.71
0.54	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 Measurment Field Visit Data Report *(Filters: Name begins with Vermillion; Division = 6;)*

Div	Name	CWCB Case Number	Segment ID	Meas. Date	UTM	Location	Flow Amount (cfs)	Meas #	Rating	Station ID
6	Vermillion Creek		23/6/A-004	11/09/2023	UTMx: 689778 UTMy: 4510215	above Vermillion Falls	4.18	1		
6	Vermillion Creek		23/6/A-004	03/26/2024	UTMx: 689778 UTMy: 4510215	above Vermillion Falls	22.44	2		
6	Vermillion Creek		23/6/A-004	05/15/2024	UTMx: 689778 UTMy: 4510215	above Vermillion Falls	4.95	3		
6	Vermillion Creek		23/6/A-004	06/27/2024	UTMx: 689778 UTMy: 4510215	above Vermillion Falls	0.32	4		

Discharge Measurement Summary

Site name	VermillionMiddle
Site number	03262024
Operator(s)	SC
File name	VermillionMiddle_20240326-155842.ft
Comment	

Start time	3/26/2024 2:36 PM
End time	3/26/2024 3:57 PM
Start location latitude	40.720
Start location longitude	-108.753
Calculations engine	FlowTracker2

Sensor type	Top Setting
Handheld serial number	FT2H2322005
Probe serial number	FT2P2317010
Probe firmware	1.30
Handheld software	1.7

# Stations	Avg interval (s)	Total discharge (ft³/s)
43	40	22.4384

Total width (ft)	Total area (ft²)	Wetted Perimeter (ft)
22.200	21.5530	23.344

Mean SNR (dB)	Mean depth (ft)	Mean velocity (ft/s)
49	0.971	1.0411

Mean temp (°F)	Max depth (ft)	Max velocity (ft/s)
45.081	1.670	1.3862

Discharge Uncertainty		
Category	**ISO**	**IVE**
Accuracy	1.0%	1.0%
Depth	0.1%	1.6%
Velocity	0.9%	3.2%
Width	0.1%	0.1%
Method	1.3%	
# Stations	1.2%	
Overall	**2.2%**	**3.7%**

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

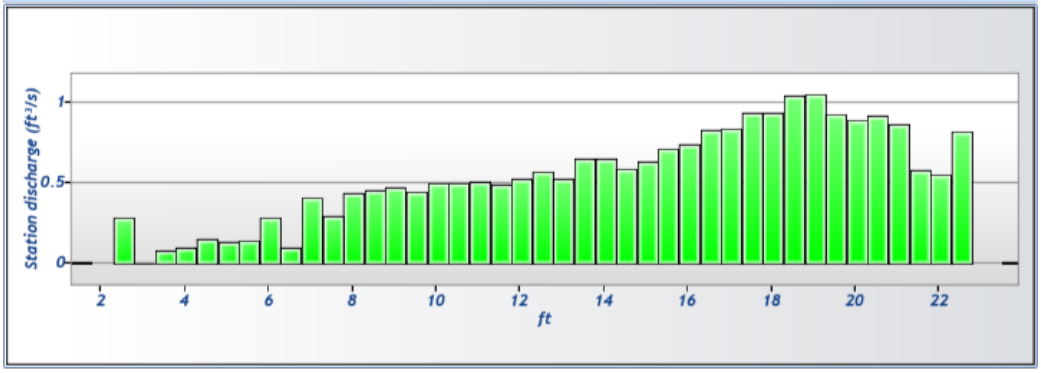
No changes were made to this file
Quality control warnings

Discharge Measurement Summary

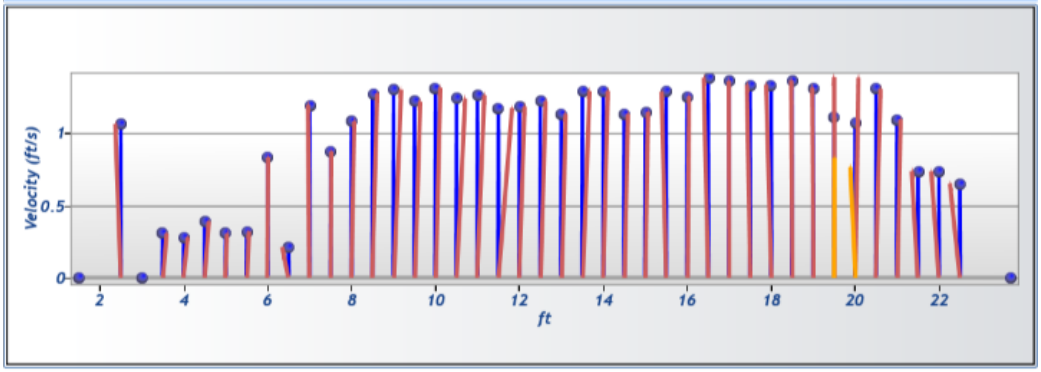
Site name	VermillionMiddle
Site number	02262024
Operator(s)	SC
File name	VermillionMiddle_20240326-155842.ft
Comment	

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%	

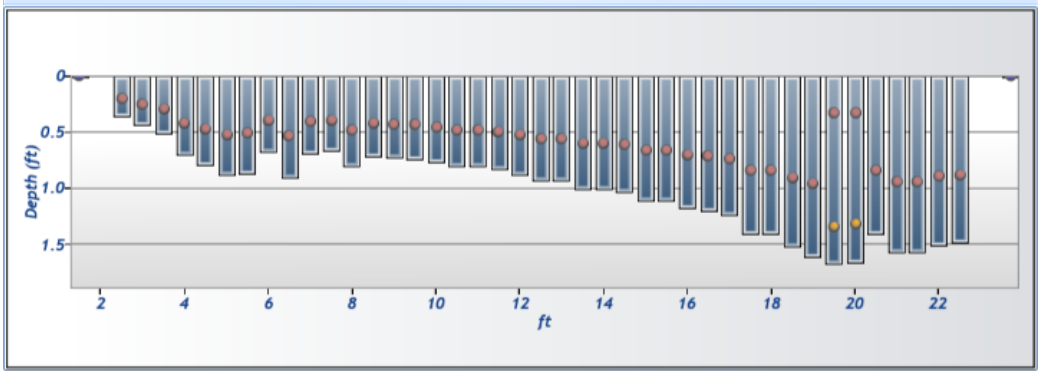
Discharge chart



Velocity chart



Depth chart



Discharge Measurement Summary

Site name	VermillionMiddle
Site number	02262024
Operator(s)	SC
File name	VermillionMiddle_20240326-155842.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	2:36 PM	1.500	None	0.010	0.0000	0.000	0	0.0000	1.0000	1.0629	0.0050	0.0053	0.02	✓
1	2:37 PM	2.500	0.6	0.350	0.6000	0.210	63	1.0629	1.0000	1.0629	0.2625	0.2790	1.24	✓
2	2:39 PM	3.000	0.6	0.430	0.6000	0.258	65	-0.0002	1.0000	-0.0002	0.2150	0.0000	0.00	✓
3	2:40 PM	3.500	0.6	0.500	0.6000	0.300	62	0.3071	1.0000	0.3071	0.2500	0.0768	0.34	✓
4	2:42 PM	4.000	0.6	0.700	0.6000	0.420	62	0.2804	1.0000	0.2804	0.3500	0.0981	0.44	✓
5	2:43 PM	4.500	0.6	0.780	0.6000	0.468	62	0.3909	1.0000	0.3909	0.3900	0.1524	0.68	✓
6	2:45 PM	5.000	0.6	0.880	0.6000	0.528	66	0.3046	1.0000	0.3046	0.4400	0.1340	0.60	✓
7	2:47 PM	5.500	0.6	0.860	0.6000	0.516	63	0.3217	1.0000	0.3217	0.4300	0.1383	0.62	✓
8	2:49 PM	6.000	0.6	0.670	0.6000	0.402	66	0.8320	1.0000	0.8320	0.3350	0.2787	1.24	✓
9	2:50 PM	6.500	0.6	0.900	0.6000	0.540	62	0.2122	1.0000	0.2122	0.4500	0.0955	0.43	✓
10	2:53 PM	7.000	0.6	0.680	0.6000	0.408	63	1.1939	1.0000	1.1939	0.3400	0.4059	1.81	✓
11	2:56 PM	7.500	0.6	0.660	0.6000	0.396	63	0.8740	1.0000	0.8740	0.3300	0.2884	1.29	✓
12	2:58 PM	8.000	0.6	0.800	0.6000	0.480	62	1.0824	1.0000	1.0824	0.4000	0.4330	1.93	✓
13	2:59 PM	8.500	0.6	0.710	0.6000	0.426	68	1.2731	1.0000	1.2731	0.3550	0.4520	2.01	✓
14	3:02 PM	9.000	0.6	0.720	0.6000	0.432	63	1.2999	1.0000	1.2999	0.3600	0.4680	2.09	✓
15	3:05 PM	9.500	0.6	0.730	0.6000	0.438	62	1.2163	1.0000	1.2163	0.3650	0.4440	1.98	✓
16	3:07 PM	10.000	0.6	0.760	0.6000	0.456	63	1.3130	1.0000	1.3130	0.3800	0.4990	2.22	✓
17	3:08 PM	10.500	0.6	0.800	0.6000	0.480	63	1.2379	1.0000	1.2379	0.4000	0.4952	2.21	✓
18	3:10 PM	11.000	0.6	0.800	0.6000	0.480	62	1.2611	1.0000	1.2611	0.4000	0.5044	2.25	✓
19	3:13 PM	11.500	0.6	0.830	0.6000	0.498	63	1.1723	1.0000	1.1723	0.4150	0.4865	2.17	✓
20	3:14 PM	12.000	0.6	0.880	0.6000	0.528	64	1.1832	1.0000	1.1832	0.4400	0.5206	2.32	✓
21	3:16 PM	12.500	0.6	0.930	0.6000	0.558	63	1.2197	1.0000	1.2197	0.4650	0.5672	2.53	✓
22	3:18 PM	13.000	0.6	0.930	0.6000	0.558	63	1.1324	1.0000	1.1324	0.4650	0.5266	2.35	✓
23	3:20 PM	13.500	0.6	1.000	0.6000	0.600	66	1.2891	1.0000	1.2891	0.5000	0.6446	2.87	✓
24	3:22 PM	14.000	0.6	1.000	0.6000	0.600	67	1.2905	1.0000	1.2905	0.5000	0.6453	2.88	✓
25	3:23 PM	14.500	0.6	1.030	0.6000	0.618	63	1.1308	1.0000	1.1308	0.5150	0.5823	2.60	✓
26	3:25 PM	15.000	0.6	1.100	0.6000	0.660	63	1.1457	1.0000	1.1457	0.5500	0.6301	2.81	✓
27	3:27 PM	15.500	0.6	1.100	0.6000	0.660	63	1.2856	1.0000	1.2856	0.5500	0.7071	3.15	✓
28	3:28 PM	16.000	0.6	1.170	0.6000	0.702	63	1.2540	1.0000	1.2540	0.5850	0.7336	3.27	✓
29	3:30 PM	16.500	0.6	1.200	0.6000	0.720	63	1.3819	1.0000	1.3819	0.6000	0.8291	3.70	✓
30	3:32 PM	17.000	0.6	1.230	0.6000	0.738	67	1.3599	1.0000	1.3599	0.6150	0.8363	3.73	✓
31	3:34 PM	17.500	0.6	1.400	0.6000	0.840	63	1.3328	1.0000	1.3328	0.7000	0.9330	4.16	✓
32	3:35 PM	18.000	0.6	1.400	0.6000	0.840	80	1.3321	1.0000	1.3321	0.7000	0.9324	4.16	✓
33	3:37 PM	18.500	0.6	1.520	0.6000	0.912	62	1.3639	1.0000	1.3639	0.7600	1.0366	4.62	✓
34	3:39 PM	19.000	0.6	1.600	0.6000	0.960	65	1.3124	1.0000	1.3124	0.8000	1.0500	4.68	✓
35	3:41 PM	19.500	0.2/0.8	1.670	0.2000	0.334	63	1.3862	1.0000	1.1071	0.8350	0.9244	4.12	✓
35	3:41 PM	19.500	0.2/0.8	1.670	0.8000	1.336	63	0.8280	1.0000	1.1071	0.8350	0.9244	4.12	✓
36	3:45 PM	20.000	0.2/0.8	1.650	0.2000	0.330	62	1.3823	1.0000	1.0734	0.8250	0.8856	3.95	✓
36	3:45 PM	20.000	0.2/0.8	1.650	0.8000	1.320	63	0.7645	1.0000	1.0734	0.8250	0.8856	3.95	✓
37	3:48 PM	20.500	0.6	1.400	0.6000	0.840	63	1.3055	1.0000	1.3055	0.7000	0.9139	4.07	✓
38	3:50 PM	21.000	0.6	1.570	0.6000	0.942	66	1.0947	1.0000	1.0947	0.7850	0.8593	3.83	✓
39	3:52 PM	21.500	0.6	1.570	0.6000	0.942	66	0.7360	1.0000	0.7360	0.7850	0.5778	2.57	✓
40	3:54 PM	22.000	0.6	1.500	0.6000	0.900	64	0.7354	1.0000	0.7354	0.7500	0.5516	2.46	✓
41	3:55 PM	22.500	0.6	1.470	0.6000	0.882	62	0.6504	1.0000	0.6504	1.2495	0.8127	3.62	✓
42	3:57 PM	23.700	None	0.010	0.0000	0.000	0	0.0000	1.0000	0.6504	0.0060	0.0039	0.02	✓

Discharge Measurement Summary

Site name	VermillionMiddle
Site number	02262024
Operator(s)	SC
File name	VermillionMiddle_20240326-155842.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
1	2:37 PM	2.500	0.6	0.350	0.6000	0.210	Low SNR,SNR Threshold Variation,Standard Error > QC
2	2:39 PM	3.000	0.6	0.430	0.6000	0.258	Large SNR Variation,High % Spikes
4	2:42 PM	4.000	0.6	0.700	0.6000	0.420	Velocity Angle > QC
8	2:49 PM	6.000	0.6	0.670	0.6000	0.402	Standard Error > QC
9	2:50 PM	6.500	0.6	0.900	0.6000	0.540	Velocity Angle > QC
10	2:53 PM	7.000	0.6	0.680	0.6000	0.408	Beam SNRs Not Similar,SNR Threshold Variation
35	3:41 PM	19.500	0.2/0.8	1.670	0.2000	0.334	Standard Error > QC
35	3:41 PM	19.500	0.2/0.8	1.670	0.8000	1.336	Standard Error > QC
36	3:45 PM	20.000	0.2/0.8	1.650	0.2000	0.330	Standard Error > QC
36	3:45 PM	20.000	0.2/0.8	1.650	0.8000	1.320	Standard Error > QC
41	3:55 PM	22.500	0.6	1.470	0.6000	0.882	Velocity Angle > QC
42	3:57 PM	23.700	None	0.010	0.0000	0.000	Stn Spacing > QC,Water Depth > QC

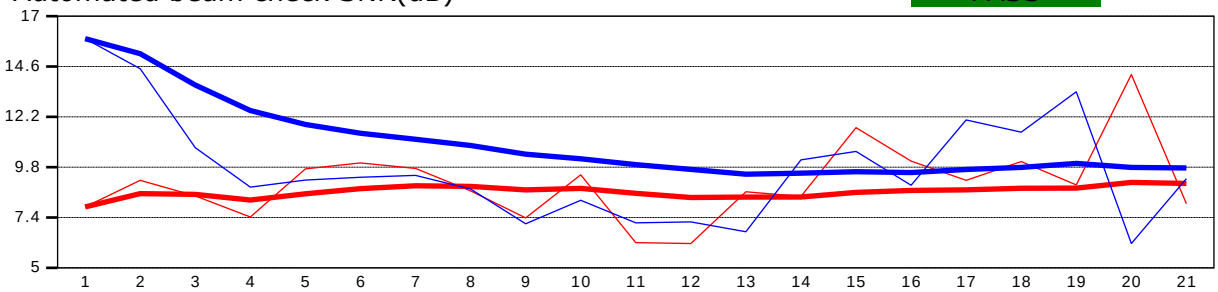
Discharge Measurement Summary

Site name	VermillionMiddle
Site number	02262024
Operator(s)	SC
File name	VermillionMiddle_20240326-155842.ft
Comment	

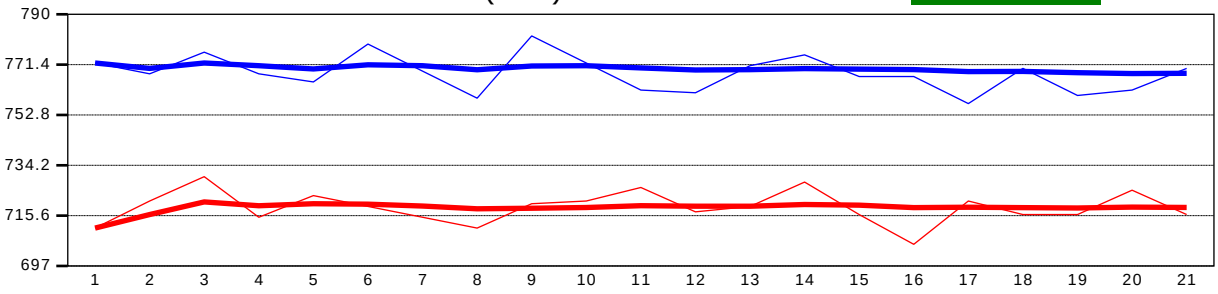
Beam 1	
Beam 2	

Automated beam check Start time 3/26/2024 2:36:04 PM

Automated beam check SNR(dB) PASS



Automated beam check Noise level(cnts) PASS



Automated beam check Quality control warnings

No quality control warnings

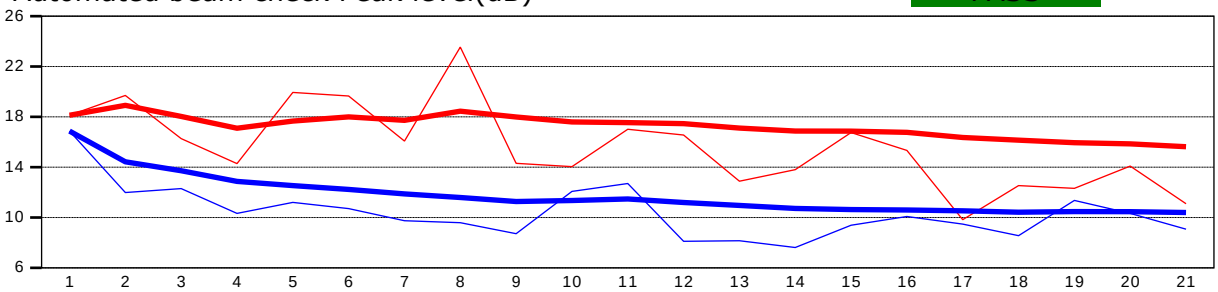
Discharge Measurement Summary

Site name	VermillionMiddle
Site number	02262024
Operator(s)	SC
File name	VermillionMiddle_20240326-155842.ft
Comment	

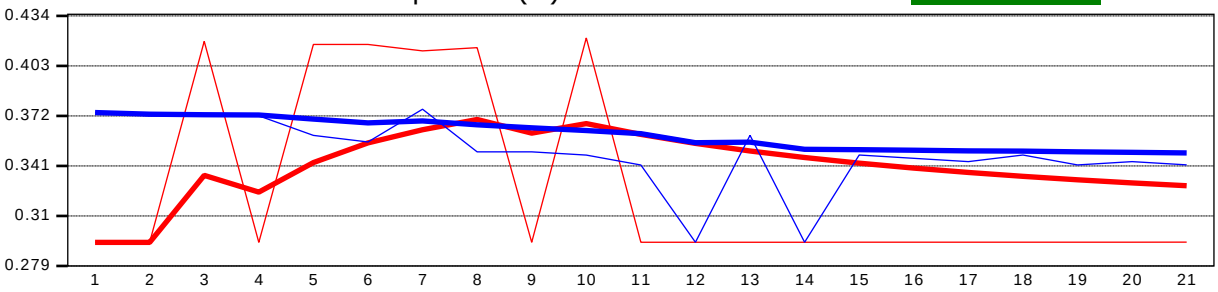
Beam 1	
Beam 2	

Automated beam check Start time 3/26/2024 2:36:04 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

Discharge Measurement Summary

Site name	VermillionAbvFalls
Site number	05152024
Operator(s)	SC
File name	VermillionAbvFalls_20240515-141704.ft
Comment	

Start time	5/15/2024 1:46 PM
End time	5/15/2024 2:14 PM
Start location latitude	40.721
Start location longitude	-108.753
Calculations engine	FlowTracker2

Sensor type	Top Setting
Handheld serial number	FT2H2322005
Probe serial number	FT2P2317010
Probe firmware	1.30
Handheld software	1.7

# Stations	Avg interval (s)	Total discharge (ft³/s)
19	40	4.9508

Total width (ft)	Total area (ft²)	Wetted Perimeter (ft)
7.900	5.2873	8.385

Mean SNR (dB)	Mean depth (ft)	Mean velocity (ft/s)
42	0.669	0.9364

Mean temp (°F)	Max depth (ft)	Max velocity (ft/s)
59.111	1.040	1.6556

Discharge Uncertainty		
Category	**ISO**	**IVE**
Accuracy	1.0%	1.0%
Depth	0.3%	3.3%
Velocity	0.7%	3.7%
Width	0.1%	0.1%
Method	1.9%	
# Stations	2.6%	
Overall	**3.5%**	**5.0%**

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 %

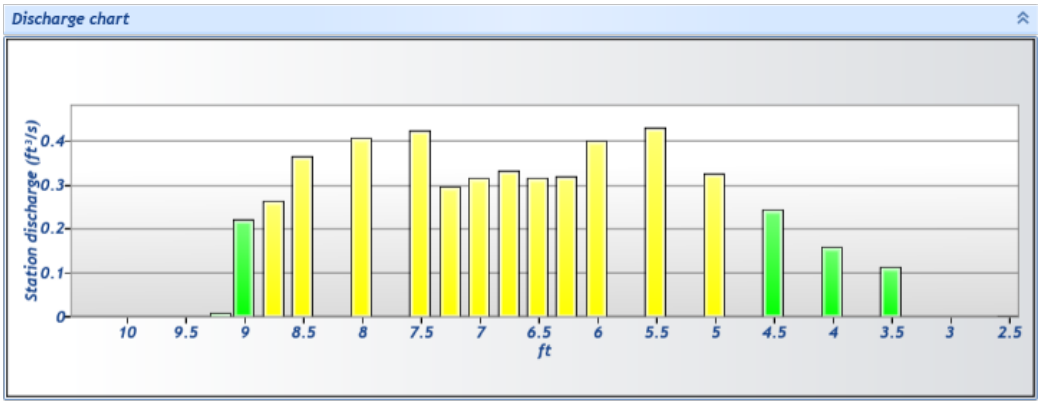
Summary overview

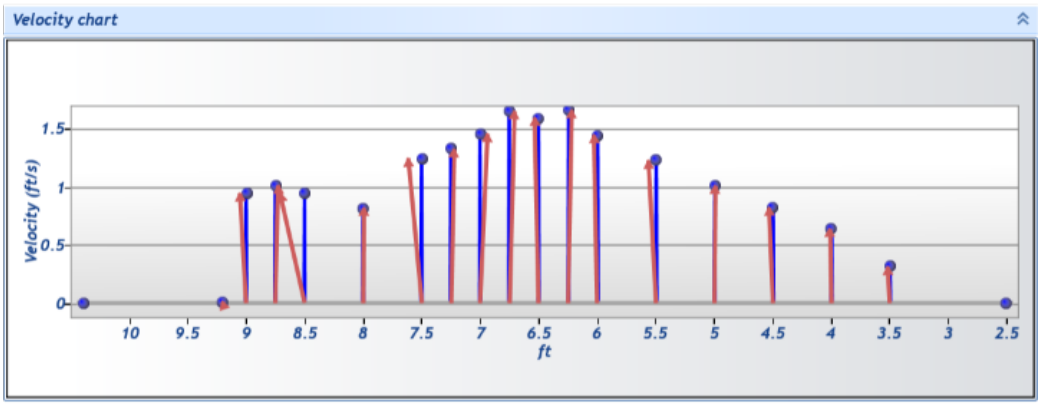
No changes were made to this file
Quality control warnings

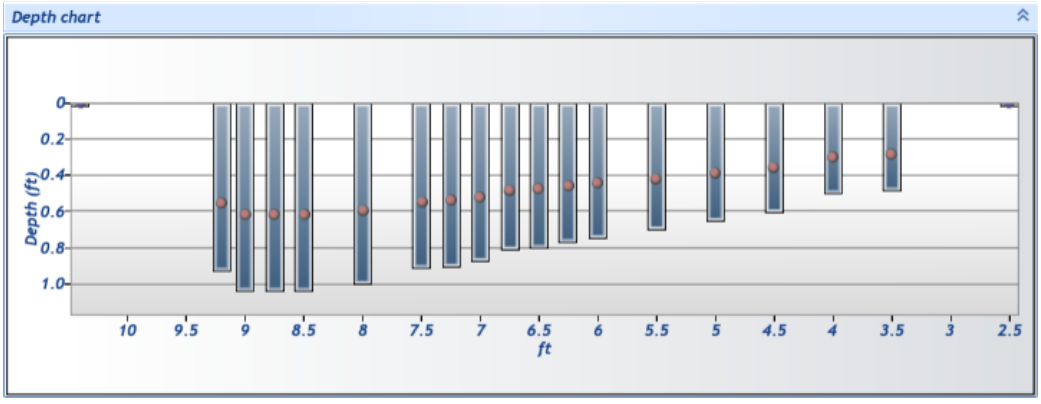
Discharge Measurement Summary

Site name	VermillionAbvFalls
Site number	05152024
Operator(s)	SC
File name	VermillionAbvFalls_20240515-141704.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	VermillionAbvFalls
Site number	05152024
Operator(s)	SC
File name	VermillionAbvFalls_20240515-141704.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	
18	2:05 PM	2.500	None	0.010	0.0000	0.000	0	0.0000	1.0000	0.3126	0.0050	0.0016	0.03	✓
17	2:03 PM	3.500	0.6	0.480	0.6000	0.288	54	0.3126	1.0000	0.3126	0.3600	0.1126	2.27	✓
16	2:02 PM	4.000	0.6	0.500	0.6000	0.300	55	0.6371	1.0000	0.6371	0.2500	0.1593	3.22	✓
15	2:00 PM	4.500	0.6	0.600	0.6000	0.360	62	0.8178	1.0000	0.8178	0.3000	0.2453	4.96	✓
14	1:59 PM	5.000	0.6	0.650	0.6000	0.390	58	1.0070	1.0000	1.0070	0.3250	0.3273	6.61	✓
13	1:58 PM	5.500	0.6	0.700	0.6000	0.420	62	1.2265	1.0000	1.2265	0.3500	0.4293	8.67	✓
12	1:56 PM	6.000	0.6	0.740	0.6000	0.444	56	1.4405	1.0000	1.4405	0.2775	0.3997	8.07	✓
11	2:07 PM	6.250	0.6	0.770	0.6000	0.462	53	1.6556	1.0000	1.6556	0.1925	0.3187	6.44	✓
10	1:55 PM	6.500	0.6	0.800	0.6000	0.480	55	1.5889	1.0000	1.5889	0.2000	0.3178	6.42	✓
9	2:09 PM	6.750	0.6	0.810	0.6000	0.486	52	1.6476	1.0000	1.6476	0.2025	0.3336	6.74	✓
8	1:53 PM	7.000	0.6	0.870	0.6000	0.522	54	1.4528	1.0000	1.4528	0.2175	0.3160	6.38	✓
7	2:11 PM	7.250	0.6	0.900	0.6000	0.540	62	1.3216	1.0000	1.3216	0.2250	0.2974	6.01	✓
6	1:52 PM	7.500	0.6	0.910	0.6000	0.546	53	1.2428	1.0000	1.2428	0.3413	0.4241	8.57	✓
5	1:51 PM	8.000	0.6	1.000	0.6000	0.600	59	0.8163	1.0000	0.8163	0.5000	0.4082	8.24	✓
4	1:50 PM	8.500	0.6	1.040	0.6000	0.624	58	0.9398	1.0000	0.9398	0.3900	0.3665	7.40	✓
3	2:13 PM	8.750	0.6	1.040	0.6000	0.624	62	1.0110	1.0000	1.0110	0.2600	0.2629	5.31	✓
2	1:48 PM	9.000	0.6	1.040	0.6000	0.624	60	0.9433	1.0000	0.9433	0.2340	0.2207	4.46	✓
1	2:14 PM	9.200	0.6	0.930	0.6000	0.558	58	0.0152	1.0000	0.0152	0.6510	0.0099	0.20	✓
0	1:46 PM	10.400	None	0.010	0.0000	0.000	0	0.0000	1.0000	0.0152	0.0060	0.0001	0.00	✓

Discharge Measurement Summary

Site name	VermillionAbvFalls
Site number	05152024
Operator(s)	SC
File name	VermillionAbvFalls_20240515-141704.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
10	1:55 PM	6.500	0.6	0.800	0.6000	0.480	Standard Error > QC
9	2:09 PM	6.750	0.6	0.810	0.6000	0.486	Standard Error > QC
8	1:53 PM	7.000	0.6	0.870	0.6000	0.522	Standard Error > QC
7	2:11 PM	7.250	0.6	0.900	0.6000	0.540	Standard Error > QC
6	1:52 PM	7.500	0.6	0.910	0.6000	0.546	Standard Error > QC
4	1:50 PM	8.500	0.6	1.040	0.6000	0.624	Standard Error > QC
0	1:46 PM	10.400	None	0.010	0.0000	0.000	Stn Spacing > QC,Water Depth > QC

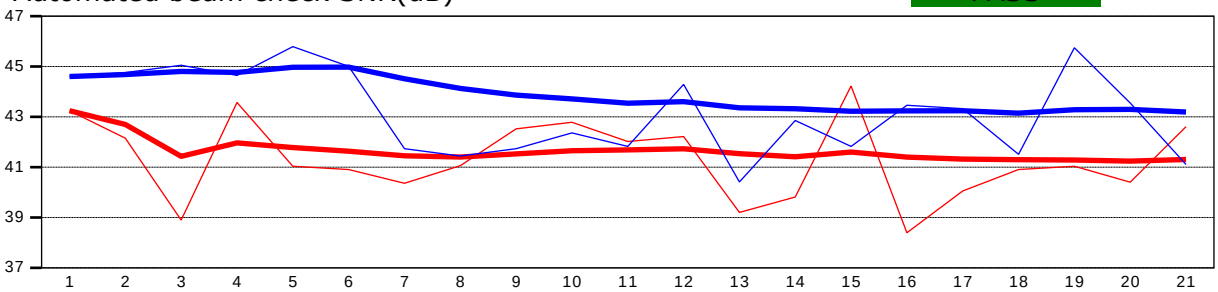
Discharge Measurement Summary

Site name	VermillionAbvFalls
Site number	05152024
Operator(s)	SC
File name	VermillionAbvFalls_20240515-141704.ft
Comment	

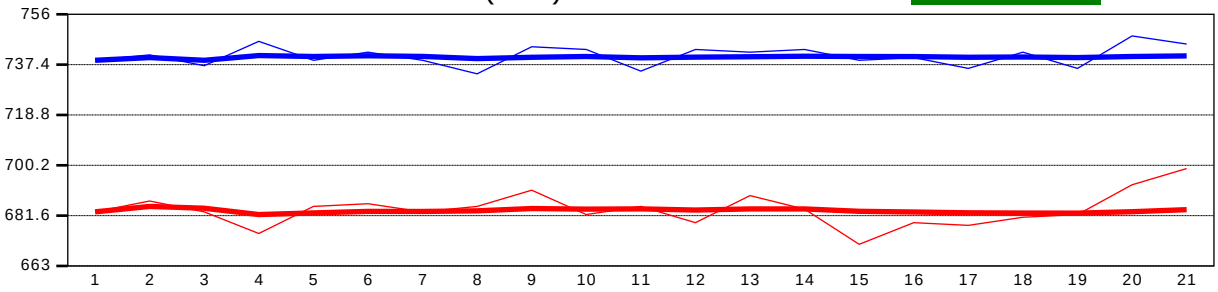
Beam 1	
Beam 2	

Automated beam check Start time 5/15/2024 1:46:32 PM

Automated beam check SNR(dB) PASS



Automated beam check Noise level(cnts) PASS



Automated beam check Quality control warnings

No quality control warnings

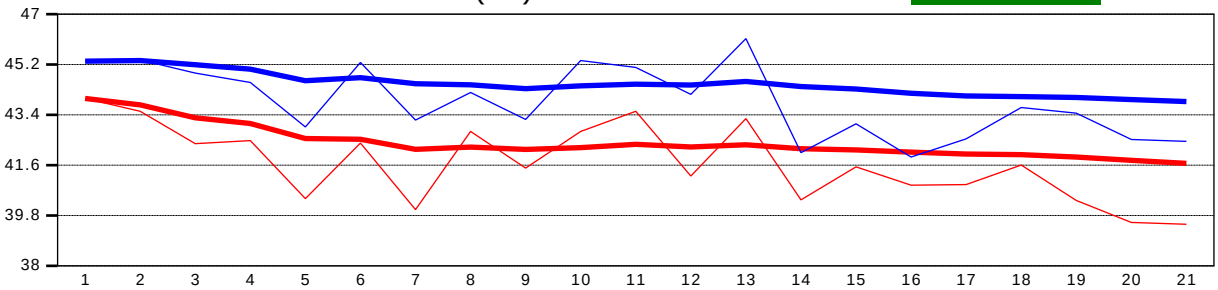
Discharge Measurement Summary

Site name	VermillionAbvFalls
Site number	05152024
Operator(s)	SC
File name	VermillionAbvFalls_20240515-141704.ft
Comment	

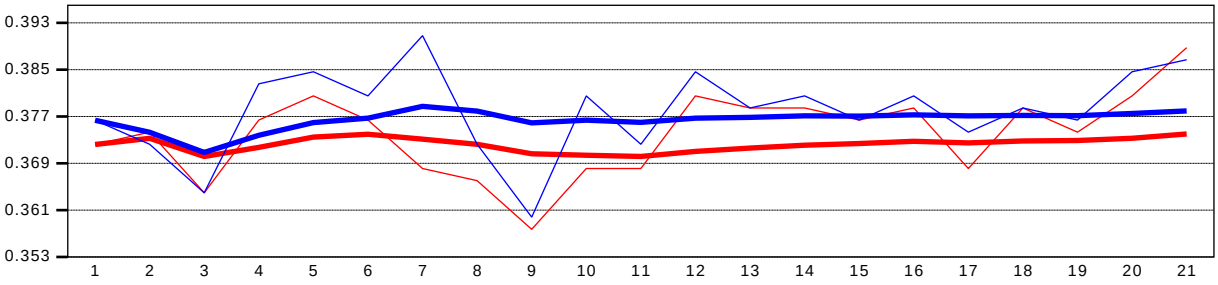
Beam 1	
Beam 2	

Automated beam check Start time 5/15/2024 1:46:32 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

Discharge Measurement Summary

Site name	Vermillion middle
Site number	06272024
Operator(s)	Lfsc
File name	20240627-113147_Vermillion middle.ft
Comment	

Start time	6/27/2024 11:04 AM
End time	6/27/2024 11:24 AM
Start location latitude	40.721
Start location longitude	-108.753
Calculations engine	FlowTracker2

Sensor type	Top Setting
Handheld serial number	FT2H2322006
Probe serial number	FT2P2319001
Probe firmware	1.30
Handheld software	1.7

# Stations	Avg interval (s)	Total discharge (ft³/s)
29	40	0.7478

Total width (ft)	Total area (ft²)	Wetted Perimeter (ft)
5.800	2.3035	6.172

Mean SNR (dB)	Mean depth (ft)	Mean velocity (ft/s)
42	0.397	0.3246

Mean temp (°F)	Max depth (ft)	Max velocity (ft/s)
67.183	0.520	0.8367

Discharge Uncertainty		
Category	**ISO**	**IVE**
Accuracy	1.0%	1.0%
Depth	0.4%	6.0%
Velocity	2.1%	10.7%
Width	0.1%	0.1%
Method	2.0%	
# Stations	1.8%	
Overall	**3.5%**	**12.3%**

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 %

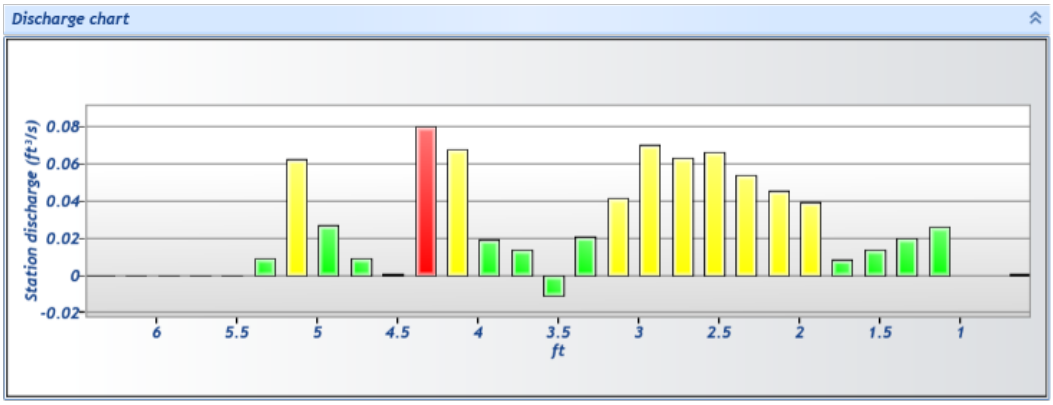
Summary overview

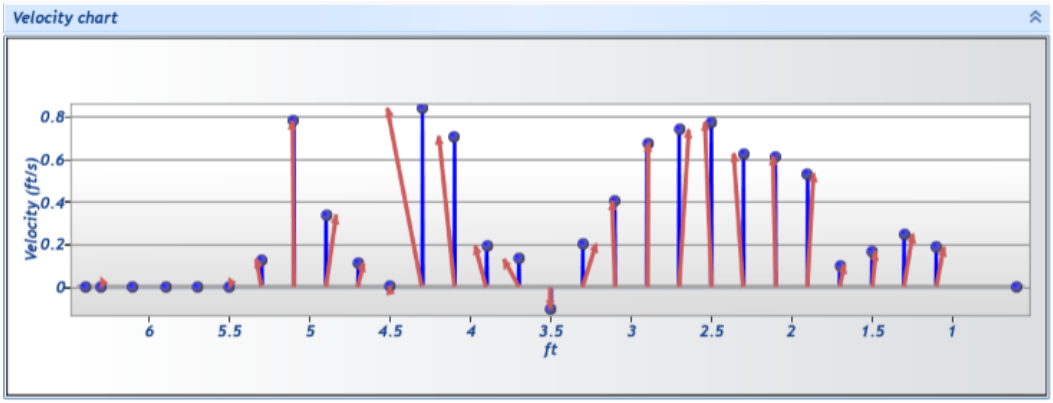
No changes were made to this file
Quality control warnings

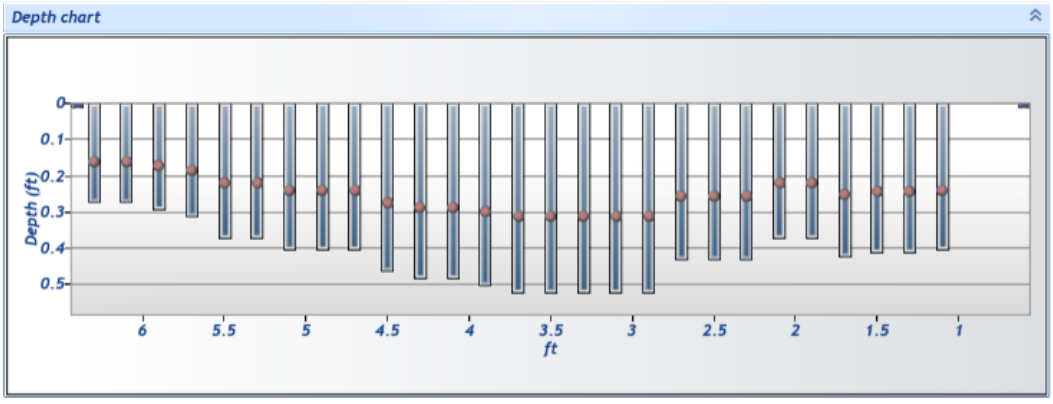
Discharge Measurement Summary

Site name	Vermillion middle
Site number	06272024
Operator(s)	Lfsc
File name	20240627-113147_Vermillion middle.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	Vermillion middle
Site number	06272024
Operator(s)	Lfsc
File name	20240627-113147_Vermillion middle.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	
28	11:24 AM	0.600	None	0.010	0.0000	0.000	0	0.0000	1.0000	0.1866	0.0025	0.0005	0.06	✓
27	11:23 AM	1.100	0.6	0.400	0.6000	0.240	30	0.1866	1.0000	0.1866	0.1400	0.0261	3.49	✓
26	11:23 AM	1.300	0.6	0.410	0.6000	0.246	21	0.2472	1.0000	0.2472	0.0820	0.0203	2.71	✓
25	11:22 AM	1.500	0.6	0.410	0.6000	0.246	18	0.1669	1.0000	0.1669	0.0820	0.0137	1.83	✓
24	11:22 AM	1.700	0.6	0.420	0.6000	0.252	26	0.1032	1.0000	0.1032	0.0840	0.0087	1.16	✓
23	11:21 AM	1.900	0.6	0.370	0.6000	0.222	21	0.5311	1.0000	0.5311	0.0740	0.0393	5.26	✓
22	11:20 AM	2.100	0.6	0.370	0.6000	0.222	18	0.6097	1.0000	0.6097	0.0740	0.0451	6.03	✓
21	11:20 AM	2.300	0.6	0.430	0.6000	0.258	25	0.6239	1.0000	0.6239	0.0860	0.0537	7.17	✓
20	11:19 AM	2.500	0.6	0.430	0.6000	0.258	12	0.7699	1.0000	0.7699	0.0860	0.0662	8.85	✓
19	11:18 AM	2.700	0.6	0.430	0.6000	0.258	21	0.7352	1.0000	0.7352	0.0860	0.0632	8.46	✓
18	11:18 AM	2.900	0.6	0.520	0.6000	0.312	14	0.6729	1.0000	0.6729	0.1040	0.0700	9.36	✓
17	11:17 AM	3.100	0.6	0.520	0.6000	0.312	23	0.4027	1.0000	0.4027	0.1040	0.0419	5.60	✓
16	11:16 AM	3.300	0.6	0.520	0.6000	0.312	19	0.2016	1.0000	0.2016	0.1040	0.0210	2.80	✓
15	11:16 AM	3.500	0.6	0.520	0.6000	0.312	28	-0.1019	1.0000	-0.1019	0.1040	-0.0106	-1.42	✓
14	11:15 AM	3.700	0.6	0.520	0.6000	0.312	15	0.1313	1.0000	0.1313	0.1040	0.0137	1.83	✓
13	11:15 AM	3.900	0.6	0.500	0.6000	0.300	16	0.1926	1.0000	0.1926	0.1000	0.0193	2.58	✓
12	11:14 AM	4.100	0.6	0.480	0.6000	0.288	23	0.7057	1.0000	0.7057	0.0960	0.0678	9.06	✓
11	11:13 AM	4.300	0.6	0.480	0.6000	0.288	19	0.8367	1.0000	0.8367	0.0960	0.0803	10.74	✓
10	11:13 AM	4.500	0.6	0.460	0.6000	0.276	24	0.0056	1.0000	0.0056	0.0920	0.0005	0.07	✓
9	11:12 AM	4.700	0.6	0.400	0.6000	0.240	43	0.1119	1.0000	0.1119	0.0800	0.0090	1.20	✓
8	11:11 AM	4.900	0.6	0.400	0.6000	0.240	17	0.3373	1.0000	0.3373	0.0800	0.0270	3.61	✓
7	11:10 AM	5.100	0.6	0.400	0.6000	0.240	18	0.7759	1.0000	0.7759	0.0800	0.0621	8.30	✓
6	11:10 AM	5.300	0.6	0.370	0.6000	0.222	14	0.1295	1.0000	0.1295	0.0740	0.0096	1.28	✓
5	11:09 AM	5.500	0.6	0.370	0.6000	0.222	29	-0.0018	1.0000	-0.0018	0.0740	-0.0001	-0.02	✓
4	11:08 AM	5.700	0.6	0.310	0.6000	0.186	44	-0.0002	1.0000	-0.0002	0.0620	0.0000	0.00	✓
3	11:07 AM	5.900	0.6	0.290	0.6000	0.174	19	-0.0008	1.0000	-0.0008	0.0580	0.0000	-0.01	✓
2	11:05 AM	6.100	0.6	0.270	0.6000	0.162	19	0.0007	1.0000	0.0007	0.0540	0.0000	0.01	✓
1	11:04 AM	6.300	0.6	0.270	0.6000	0.162	25	-0.0029	1.0000	-0.0029	0.0405	-0.0001	-0.02	✓
0	11:04 AM	6.400	None	0.010	0.0000	0.000	0	0.0000	1.0000	-0.0029	0.0005	0.0000	0.00	✓

Discharge Measurement Summary

Site name	Vermillion middle
Site number	06272024
Operator(s)	Lfsc
File name	20240627-113147_Vermillion middle.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
26	11:23 AM	1.300	0.6	0.410	0.6000	0.246	Boundary Interference
25	11:22 AM	1.500	0.6	0.410	0.6000	0.246	Stn Spacing > QC
23	11:21 AM	1.900	0.6	0.370	0.6000	0.222	Standard Error > QC
22	11:20 AM	2.100	0.6	0.370	0.6000	0.222	Standard Error > QC
21	11:20 AM	2.300	0.6	0.430	0.6000	0.258	Standard Error > QC
20	11:19 AM	2.500	0.6	0.430	0.6000	0.258	High % Spikes
18	11:18 AM	2.900	0.6	0.520	0.6000	0.312	Standard Error > QC
16	11:16 AM	3.300	0.6	0.520	0.6000	0.312	Velocity Angle > QC
15	11:16 AM	3.500	0.6	0.520	0.6000	0.312	Velocity Angle > QC
14	11:15 AM	3.700	0.6	0.520	0.6000	0.312	Velocity Angle > QC
13	11:15 AM	3.900	0.6	0.500	0.6000	0.300	Standard Error > QC
11	11:13 AM	4.300	0.6	0.480	0.6000	0.288	Standard Error > QC,High Stn % Discharge
10	11:13 AM	4.500	0.6	0.460	0.6000	0.276	Large SNR Variation,SNR Threshold Variation
9	11:12 AM	4.700	0.6	0.400	0.6000	0.240	Large SNR Variation
8	11:11 AM	4.900	0.6	0.400	0.6000	0.240	Standard Error > QC
7	11:10 AM	5.100	0.6	0.400	0.6000	0.240	Standard Error > QC
6	11:10 AM	5.300	0.6	0.370	0.6000	0.222	Large SNR Variation,Standard Error > QC
5	11:09 AM	5.500	0.6	0.370	0.6000	0.222	Boundary Interference,Large SNR Variation,SNR Threshold Variation
4	11:08 AM	5.700	0.6	0.310	0.6000	0.186	Large SNR Variation,SNR Threshold Variation
3	11:07 AM	5.900	0.6	0.290	0.6000	0.174	Boundary Interference,Large SNR Variation
2	11:05 AM	6.100	0.6	0.270	0.6000	0.162	SNR Threshold Variation

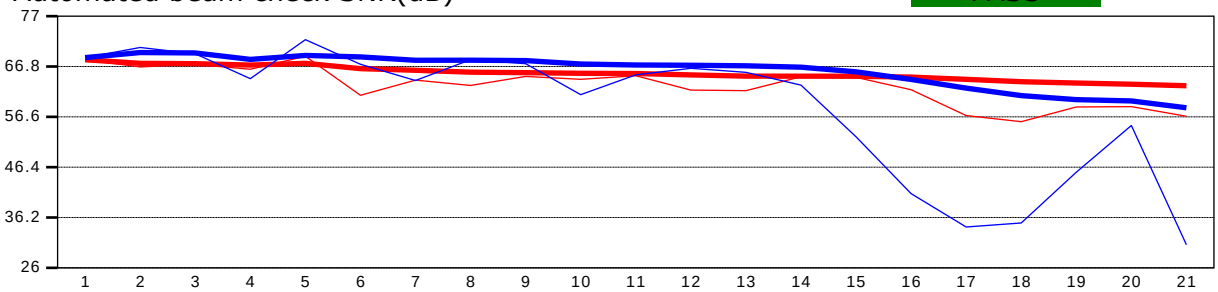
Discharge Measurement Summary

Site name	Vermillion middle
Site number	06272024
Operator(s)	Lfsc
File name	20240627-113147_Vermillion middle.ft
Comment	

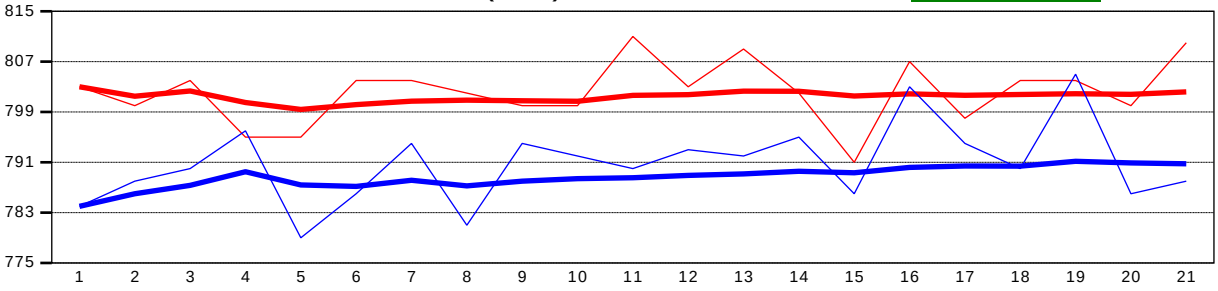
Beam 1	
Beam 2	

Automated beam check Start time 6/27/2024 11:03:29 AM

Automated beam check SNR(dB) PASS



Automated beam check Noise level(cnts) PASS



Automated beam check Quality control warnings

No quality control warnings

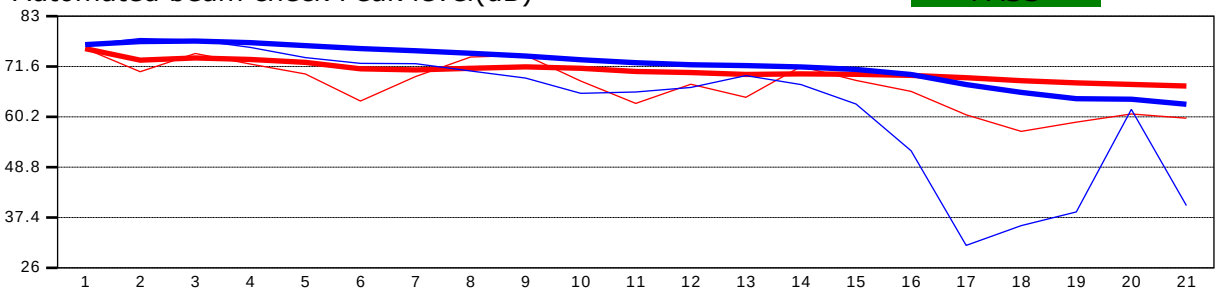
Discharge Measurement Summary

Site name	Vermillion middle
Site number	06272024
Operator(s)	Lfsc
File name	20240627-113147_Vermillion middle.ft
Comment	

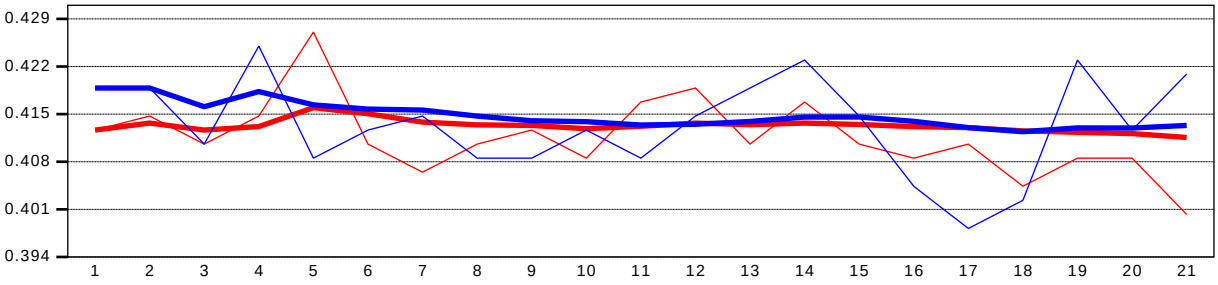
Beam 1	
Beam 2	

Automated beam check Start time 6/27/2024 11:03:29 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

Discharge Measurement Summary

Site name	VermillionCreekFalls
Site number	11092023
Operator(s)	SC
File name	VermillionCreekFalls_20231109-150829.ft
Comment	

Start time	11/9/2023 2:39 PM
End time	11/9/2023 3:06 PM
Start location latitude	40.721
Start location longitude	-108.753
Calculations engine	FlowTracker2

Sensor type	Top Setting
Handheld serial number	FT2H2322005
Probe serial number	FT2P2317010
Probe firmware	1.30
Handheld software	1.7

# Stations	Avg interval (s)	Total discharge (ft³/s)
18	40	4.1768

Total width (ft)	Total area (ft²)	Wetted Perimeter (ft)
7.900	6.0145	8.720

Mean SNR (dB)	Mean depth (ft)	Mean velocity (ft/s)
33	0.761	0.6945

Mean temp (°F)	Max depth (ft)	Max velocity (ft/s)
37.703	1.040	1.2303

Discharge Uncertainty		
Category	**ISO**	**IVE**
Accuracy	1.0%	1.0%
Depth	0.4%	3.4%
Velocity	0.9%	2.5%
Width	0.1%	0.1%
Method	2.1%	
# Stations	2.8%	
Overall	**3.7%**	**4.4%**

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

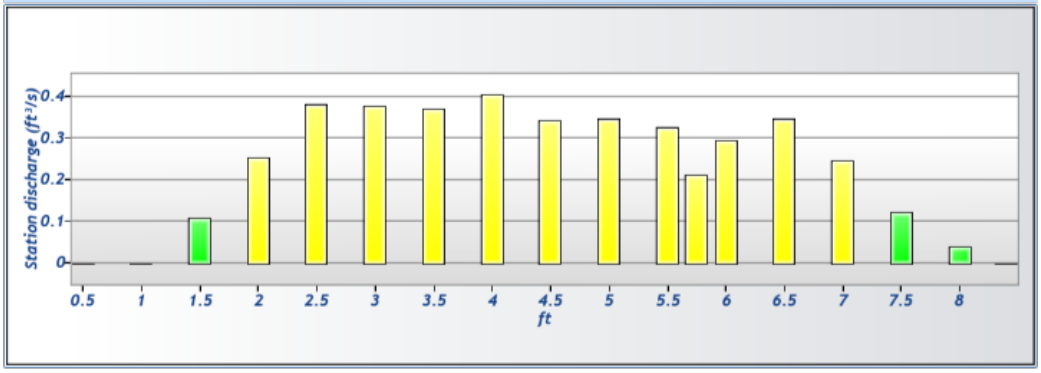
No changes were made to this file
Quality control warnings

Discharge Measurement Summary

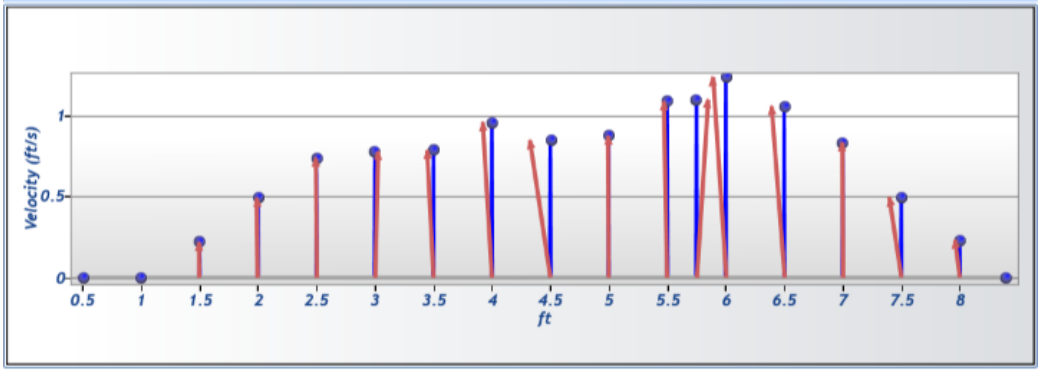
Site name	VermillionCreekFalls
Site number	11092023
Operator(s)	SC
File name	VermillionCreekFalls_20231109-150829.ft
Comment	

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%

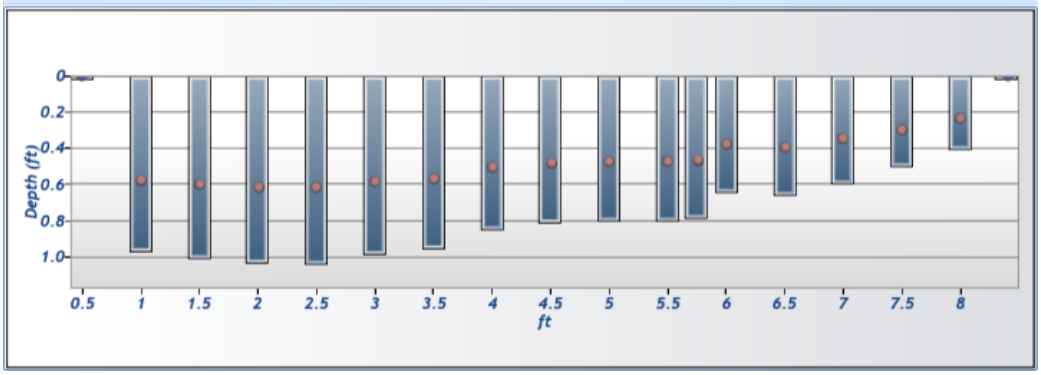
Discharge chart



Velocity chart



Depth chart



Discharge Measurement Summary

Site name	VermillionCreekFalls
Site number	11092023
Operator(s)	SC
File name	VermillionCreekFalls_20231109-150829.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	
17	3:04 PM	0.500	None	0.010	0.0000	0.000	0	0.0000	1.0000	-0.0004	0.0025	0.0000	0.00	✓
16	3:03 PM	1.000	0.6	0.970	0.6000	0.582	48	-0.0004	1.0000	-0.0004	0.4850	-0.0002	0.00	✓
15	3:01 PM	1.500	0.6	1.010	0.6000	0.606	56	0.2186	1.0000	0.2186	0.5050	0.1104	2.64	✓
14	3:00 PM	2.000	0.6	1.030	0.6000	0.618	80	0.4901	1.0000	0.4901	0.5150	0.2524	6.04	✓
13	2:58 PM	2.500	0.6	1.040	0.6000	0.624	52	0.7333	1.0000	0.7333	0.5200	0.3813	9.13	✓
12	2:57 PM	3.000	0.6	0.980	0.6000	0.588	48	0.7727	1.0000	0.7727	0.4900	0.3786	9.06	✓
11	2:56 PM	3.500	0.6	0.950	0.6000	0.570	53	0.7805	1.0000	0.7805	0.4750	0.3707	8.88	✓
10	2:54 PM	4.000	0.6	0.850	0.6000	0.510	51	0.9548	1.0000	0.9548	0.4250	0.4058	9.71	✓
9	2:53 PM	4.500	0.6	0.810	0.6000	0.486	48	0.8429	1.0000	0.8429	0.4050	0.3414	8.17	✓
8	2:52 PM	5.000	0.6	0.800	0.6000	0.480	48	0.8680	1.0000	0.8680	0.4000	0.3472	8.31	✓
7	2:50 PM	5.500	0.6	0.800	0.6000	0.480	47	1.0802	1.0000	1.0802	0.3000	0.3241	7.76	✓
6	3:06 PM	5.750	0.6	0.780	0.6000	0.468	49	1.0914	1.0000	1.0914	0.1950	0.2128	5.10	✓
5	2:49 PM	6.000	0.6	0.640	0.6000	0.384	45	1.2303	1.0000	1.2303	0.2400	0.2953	7.07	✓
4	2:48 PM	6.500	0.6	0.660	0.6000	0.396	53	1.0506	1.0000	1.0506	0.3300	0.3467	8.30	✓
3	2:45 PM	7.000	0.6	0.590	0.6000	0.354	50	0.8304	1.0000	0.8304	0.2950	0.2450	5.86	✓
2	2:42 PM	7.500	0.6	0.500	0.6000	0.300	56	0.4936	1.0000	0.4936	0.2500	0.1234	2.95	✓
1	2:40 PM	8.000	0.6	0.400	0.6000	0.240	54	0.2309	1.0000	0.2309	0.1800	0.0416	1.00	✓
0	2:39 PM	8.400	None	0.010	0.0000	0.000	0	0.0000	1.0000	0.2309	0.0020	0.0005	0.01	✓

Discharge Measurement Summary

Site name	VermillionCreekFalls
Site number	11092023
Operator(s)	SC
File name	VermillionCreekFalls_20231109-150829.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
16	3:03 PM	1.000	0.6	0.970	0.6000	0.582	High % Spikes
9	2:53 PM	4.500	0.6	0.810	0.6000	0.486	High % Spikes

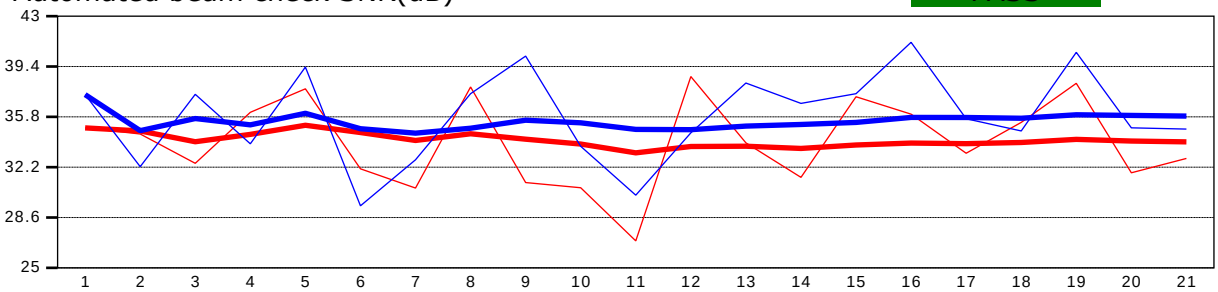
Discharge Measurement Summary

Site name	VermillionCreekFalls
Site number	11092023
Operator(s)	SC
File name	VermillionCreekFalls_20231109-150829.ft
Comment	

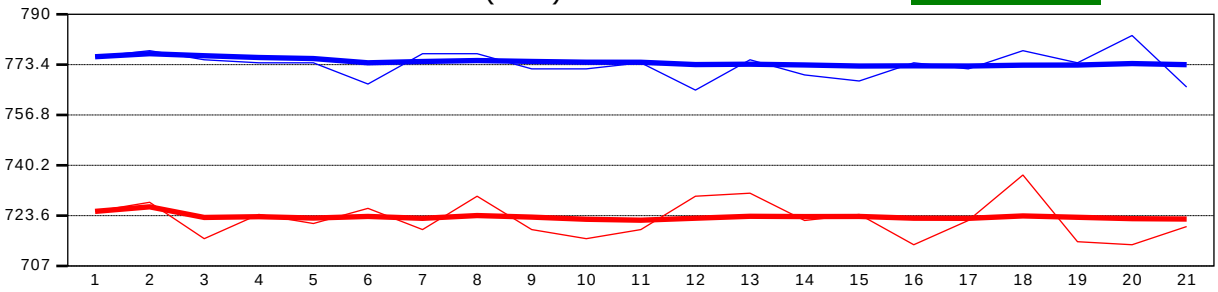
Beam 1	
Beam 2	

Automated beam check Start time 11/9/2023 2:39:23 PM

Automated beam check SNR(dB) PASS



Automated beam check Noise level(cnts) PASS



Automated beam check Quality control warnings

No quality control warnings

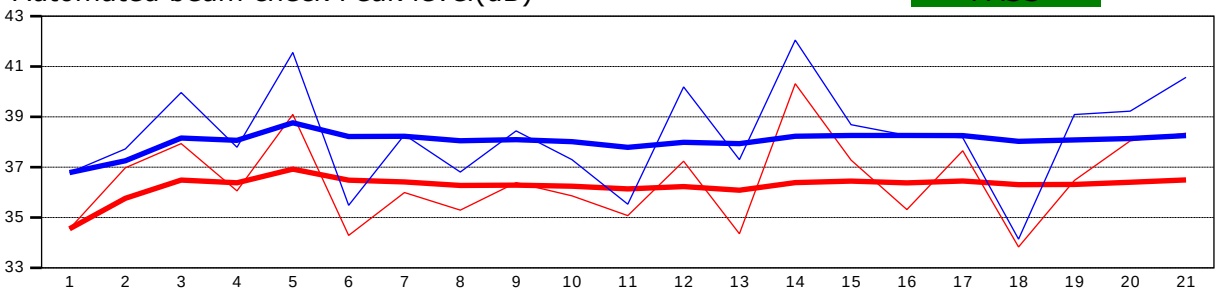
Discharge Measurement Summary

Site name	VermillionCreekFalls
Site number	11092023
Operator(s)	SC
File name	VermillionCreekFalls_20231109-150829.ft
Comment	

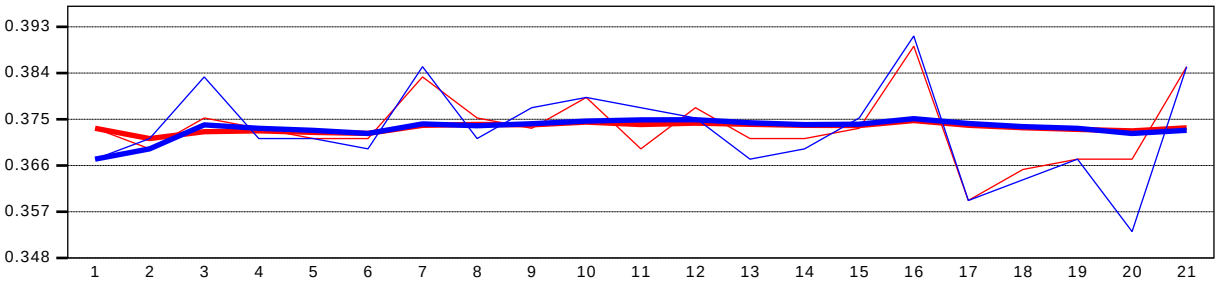
Beam 1	
Beam 2	

Automated beam check Start time 11/9/2023 2:39:23 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