December 22, 2018

Ms. Linda Bassi
Mr. Jeff Baessler
Colorado Water Conservation Board
1313 Sherman Street
Denver, CO 80203

Dear Ms. Bassi and Mr. Baessler,

High Country Conservation Advocates (HCCA) submits this instream flow recommendation for Gold 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 26 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 recent years, 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.

The headwaters of Gold Creek originate on United States Forest Service (USFS) lands in Gunnison County and in the Fossil Ridge Wilderness area. The Gold Creek riparian area is diverse, consisting of mixed pine forest near the headwaters, willows and alders in the middle segment, and irrigated hay meadows near the confluence with Quartz Creek. Gold Creek hosts a robust fishery. Stream sampling conducted by Colorado Parks and Wildlife in 2001 recorded a healthy population of brook trout. Alpine Environmental Consultants saw brook trout during sampling in October 2017.

Gold Creek has an existing instream flow protection of 7 cfs with a 3/17/1980 priority date. This segment stretches 9.84 miles from the headwaters of Gold Creek to the Tarkington Ditch headgate.

This proposal seeks to increase the summer instream flow right on Gold Creek. HCCA has coordinated with local consultants to arrive at a preliminary flow recommendation that would reasonably protect the health of the Gold Creek natural environment. In considering this application, the Colorado Water Conservation Board (CWCB) has an opportunity to protect an important stream ecosystem.

Enclosed you will find copies of data sheets from Colorado Parks and Wildlife reflecting the Gold Creek aquatic environment. We have attached 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 Colorado Parks and Wildlife and the CWCB for their support in developing this recommendation.

Sincerely,

Julie Nania
High Country Conservation Advocates
Water Director

Enclosure

ENCLOSURE - INSTREAM FLOW RECOMMENDATION FOR GOLD CREEK

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

Location

Gold Creek is located within the Gold Creek watershed (HUC 12# 140200030303) in Gunnison County, Water Division 4. The headwaters originate near Fairview Peak, the south end of Cross Mountain, and Gunsight Pass. The creek runs in a general south-southwest direction until it joins Quartz Creek. The Gold Creek watershed (headwaters to Tarkington Ditch) is 30.2 square miles. The Gold Creek watershed is on the following United States Geologic Survey quad maps: Pitkin and Fairview Peak. These maps are attached as Attachment E.

The existing instream flow right on Gold Creek begins at the headwaters and ends at Tarkington Ditch near Ohio City, with a total length of 9.84 miles. Table 1 summarizes the land.

Table 1. Land Status

Instream Flow Reach	Upper Terminus	Lower Terminus	Total Length (miles)	Land Ownership	
				Private (%)	Public (%)
Gold Creek (Appropriation Date 3/17/1980)	Headwaters	Headgate Tarkington Ditch	9.84	Riparian Corridor 15%	Riparian Corridor 85% USFS
				Watershed Composition 16%	Watershed Composition 84% USFS

The Gold Creek riparian corridor on the existing instream flow reach is primarily managed by the USFS. The Gold Creek watershed (headwaters to Quartz Creek) is approximately 16% private and 84% public lands.

Existing Instream Flow Right

The Colorado Water Conservation Board holds an existing instream flow right for 7 cfs year-round, from the headwaters of Gold Creek the Tarkington headgate. This instream flow right has an appropriation date of 3/17/1980. This proposal seeks to increase the existing summer instream flow right to 11 cfs. There is no change proposed for the winter instream flow right on upper Gold Creek.

Water Availability

Physical Availability

There is no gage on Gold Creek. To assess physical availability HCCA relied on R2Cross assessments and StreamStats. StreamStats is an online program developed by the USGS in collaboration with the CWCB. StreamStats uses a regionally specific regression equation

based on nearby active and historical stream gages to estimate stream flows at user-selected locations.

R2Cross results show sufficient water available to meet an increased summer instream flow of 11 cfs on upper Gold Creek. StreamStats modeling resulted in mean monthly flows for Gold Creek at the confluence with Quartz Creek that reached a high of 111 cfs in June. StreamStats modeling shows there is water available to satisfy the proposed summer increase of an additional 4 cfs to bring the total protection to 11 cfs.

R2Cross results collected by Alpine Consultants and by the CWCB for the original instream flow appropriation on Gold Creek corroborated that there is water physically available to meet a winter instream flow of 7 cfs on Gold Creek.

Legal Availability

Diversions on Gold Creek are shown on the attached map (Attachment A). Attachment (D) identifies major water rights on Gold Creek that may impact availability and CDSS records of all water rights on Gold Creek.

Biological Summary

Gold Creek is a coldwater, high gradient stream located in Gunnison County, Colorado. The stream substrate ranges from small gravels to medium boulders. There is a mixture of riffles and small pools that provide quality habitat for fish and other aquatic life.

The Gold Creek stream ecosystem supports a healthy aquatic ecosystem. Sampling conducted by Colorado Parks and Wildlife in 2001 identified a healthy book trout population. Results from the 2001 stream sampling even are included as Attachment C. An abundance of fish of differing sizes was observed by the proponent and Alpine Environmental Consultants during field reconnaissance and sampling in 2017.

In addition to supporting a healthy aquatic ecosystem, flows in Gold Creek support a robust riparian area. The riparian community is substantial. It is primarily pine/spruce forest near the headwaters of the creek. The riparian area along the middle section of the creek is primarily composed of willow and alder. A mixture of willows and irrigated pasture prevail towards the bottom of the creek, near Ohio City and the confluence with Quartz Creek. The riparian zone is in good condition and provides shade and cover for the extant fish community. There are both active and abandoned beaver ponds at several locations alongside the creek.

Preliminary R2CROSS Analysis

HCCA has relied on the expertise of Alpine Environmental Consultants to interpret output from the R2CROSS model and develop an instream flow recommendation that will protect Gold Creek's natural environment to a reasonable degree.

Alpine Environmental Consultants completed R2CROSS field survey on October 4 on Upper Gold Creek. R2CROSS analysis and interpretation were completed following fieldwork. These data were used to create summer instream flow recommendations for Gold Creek (Table 2). R2CROSS analysis outputs are attached for review (Attachment C).

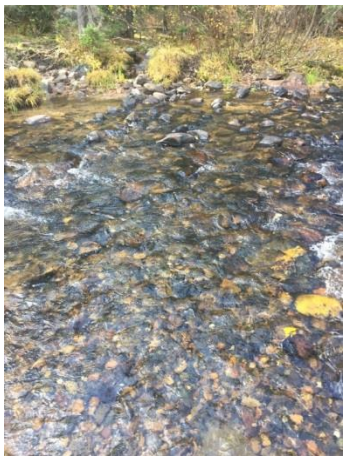
Based on analysis of R2CROSS results (Table 2; and Attachment C), 11 cfs is recommended to satisfy the protection of biotic resources during summer months on upper Gold Creek. This flow satisfies all three of the required hydrologic criteria. No change to the existing winter rate is proposed.

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

Cross Section (Date)	Measured Discharge (cfs)	Bankfull Top Width[1] (ft)	Average Depth Criterion (ft)	Winter Flow Recommendation (cfs)	Summer Flow Recommendation (cfs)
Upper Gold Creek (10/4/17)	7.37	36.0	0.36’	(no change to existing ISF right)	11.0 (April 15- July 13st)

Photographs

Photographs 1 and 2 show Gold Creek near the top of the reach.



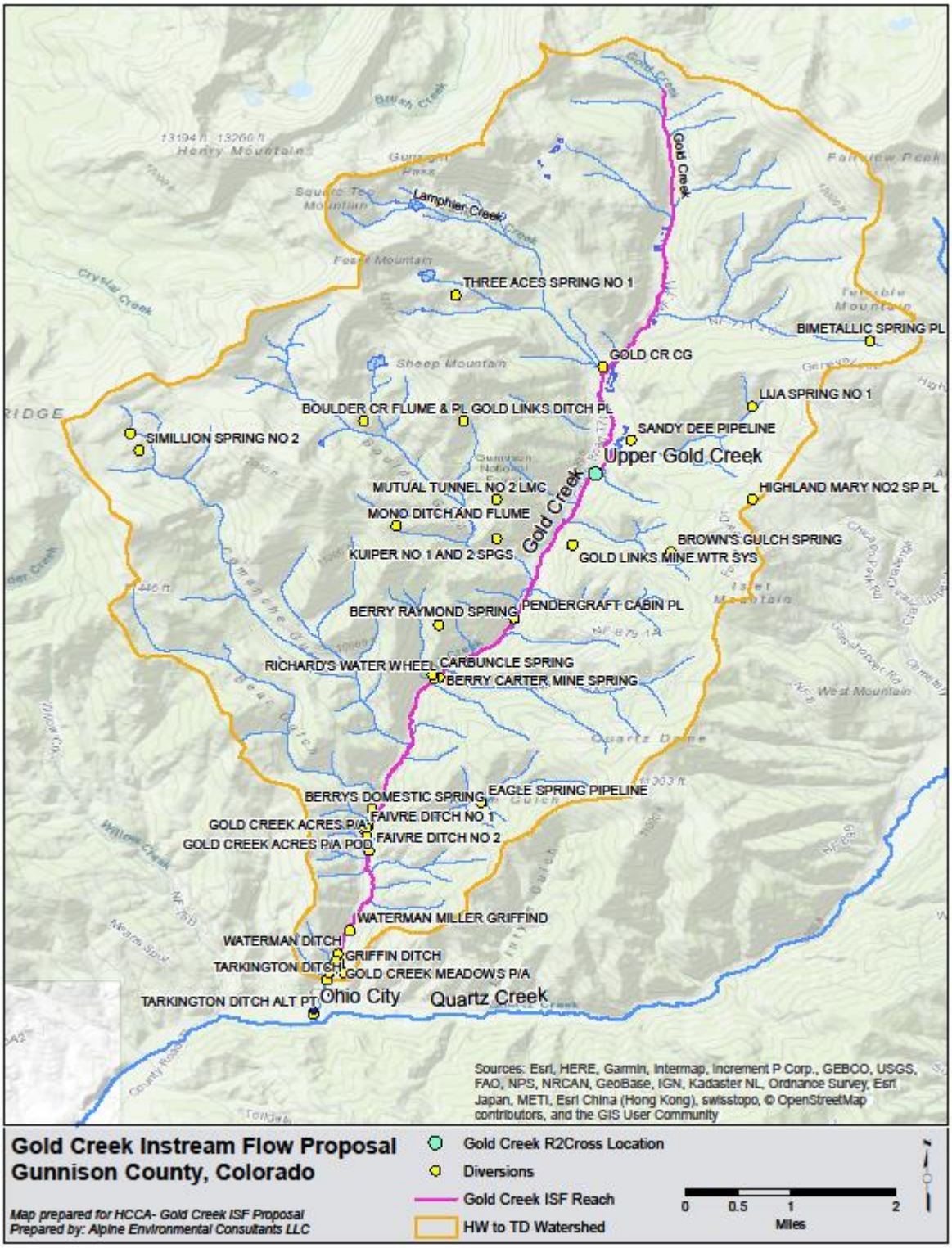
The photograph below shows fish in the pool above the location where R2Cross was conducted.

Relationship to Existing State Policy

HCCA and WRA are 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 – Gold Creek Watershed Map
B – Biological Data
C – R2CROSS Analysis
D – Water Availability Analysis
E – USGS Topographic Quadrangle Maps

Attachment A- Gold Creek Watershed Map



Attachment B- Biological Data

CalYear	SurveyID	Region	Drainage	WaterType	WaterId	WaterName	StationID	Station
2001	8656	Southwest	Gunnison River	Stream	40369	Gold Creek	4079	GU1366
2001	8140	Southwest	Gunnison River	Stream	40369	Gold Creek	4078	GU1365

Attachment C- R2CROSS Analysis

Photograph 1 shows Gold Creek looking downstream from the R2Cross location.

Photograph 2 shows Gold Creek looking upstream from the R2Cross location.

Figure B. Field data input sheet (Front Page)

COLORADO WATER CONSERVATION BOARD

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

LOCATION INFORMATION

STREAM NAME: Upper Gold Creek					CROSS-SECTION NO.: #1
CROSS-SECTION LOCATION: Upper Gold Creek approx. 1 mile downstream of confluence w/ Lamphier Creek					
DATE: 10/4/17	OBSERVERS: Ashley Bembenek, Julie Nania				
LEGAL DESCRIPTION	¼ SECTION:	SECTION:	TOWNSHIP: N/S	RANGE: E/W	PM:
COUNTY:	WATERSHED: Quartz Creek		WATER DIVISION: 4		DOW WATER CODE:
MAP(S): USGS:					
MAP(S): USFS:					

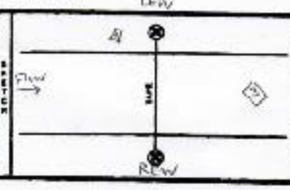
SUPPLEMENTAL DATA

SAG TAPE SECTION SAME AS DISCHARGE SECTION: YES / NO	METER TYPE: Hach FH 950			
METER NUMBER:	DATE RATED:	CALIB/SPIN: ____ sec	TAPE WEIGHT: ____ lbs/foot	TAPE TENSION: ____ lbs
CHANNEL BED MATERIAL SIZE RANGE: gravel, cobble, boulder		PHOTOGRAPHS TAKEN: YES/NO	NUMBER OF PHOTOGRAPHS:	

CHANNEL PROFILE DATA ①

STATION	DISTANCE FROM TAPE (ft)	ROD READING (ft)
⊗ Tape @ Stake LB	0.0	
⊗ Tape @ Stake RB	0.0	
① WS @ Tape LB/RB	0.0	1.6 / 1.6
② WS Upstream	5.5	1.6
③ WS Downstream	11.0	2.0
SLOPE	0.4/16.5 = 0.0242	

SKETCH



LEGEND: Stake ⊗; Station ①; Photo ◇; Direction of Flow

AQUATIC SAMPLING SUMMARY

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

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

SPECIES (FILL IN)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	>15	TOTAL

AQUATIC INSECTS IN STREAM SECTION BY COMMON OR SCIENTIFIC ORDER NAME

COMMENTS

① Photos from left bank hillslope - landscape view.
② Photo from left bank about 40-50' US↑ of stake.
③ US↑ view from grassy gravel bar.
* We saw several fish during sampling; up to 8"-10" in size.
Hawk flowmeter file name UPGold

FORM #ISF FD 1-85

WQ measurements

(Oakton PC450 calibrated on 10/3/17)

Spc: 113.6 μs/cm

Temp: 4.9 °C

pH: 7.89

Attachment D – Water Availability Analysis

Physical Availability

StreamStats report for Gold Creek 12/15/17.

Region ID: CO

Workspace ID: CO20171215145847945000

Clicked Point (Latitude, Longitude): 38.56565, -106.61214

Time: 2017-12-15 07:59:04 -0700

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	30.3	square miles
PRECIP	Mean Annual Precipitation	24.78	inches
ELEV	Mean Basin Elevation	10802	feet
BSLDEM10M	Mean basin slope computed from 10 m DEM	39.6	percent

Flow-Duration Statistics Parameters [Mountain Region Flow Duration]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	30.3	square miles	1	1060
PRECIP	Mean Annual Precipitation	24.78	inches	18	47

Flow-Duration Statistics Flow Report [Mountain Region Flow Duration]

PII: Prediction Interval-Lower, Plu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	SEp

Statistic	Value	Unit	SEp
10 Percent Duration	59.3	ft^3/s	45
25 Percent Duration	17.3	ft^3/s	55
50 Percent Duration	6.9	ft^3/s	55
75 Percent Duration	3.96	ft^3/s	64
90 Percent Duration	2.43	ft^3/s	85

Flow-Duration Statistics Citations

Capesius, J.P., and Stephens, V. C.,2009, Regional Regression Equations for Estimation of Natural Streamflow Statistics in Colorado: U. S. Geological Survey Scientific Investigations Report 2009-5136, 32 p.

Flood-Volume Statistics Parameters [Mountain Region Max Flow]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	30.3	square miles	1	1060
PRECIP	Mean Annual Precipitation	24.78	inches	18	47

Flood-Volume Statistics Flow Report [Mountain Region Max Flow]

PII: Prediction Interval-Lower, Plu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	SEp
7 Day 2 Year Maximum	133	ft^3/s	46
7 Day 10 Year Maximum	229	ft^3/s	35
7 Day 50 Year Maximum	322	ft^3/s	31

Flood-Volume Statistics Citations

Capesius, J.P., and Stephens, V. C.,2009, Regional Regression Equations for Estimation of Natural Streamflow Statistics in Colorado: U. S. Geological Survey Scientific Investigations Report 2009-5136, 32 p.

Monthly Flow Statistics Parameters [Mountain Region Mean Flow]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	30.3	square miles	1	1060
PRECIP	Mean Annual Precipitation	24.78	inches	18	47

Monthly Flow Statistics Flow Report [Mountain Region Mean Flow]

PII: Prediction Interval-Lower, Plu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	SEp
January Mean Flow	4.51	ft^3/s	50
February Mean Flow	4.23	ft^3/s	51
March Mean Flow	4.79	ft^3/s	49
April Mean Flow	10.6	ft^3/s	44
May Mean Flow	63.1	ft^3/s	46
June Mean Flow	111	ft^3/s	46
July Mean Flow	35.7	ft^3/s	76
August Mean Flow	15.6	ft^3/s	80
September Mean Flow	9.96	ft^3/s	59
October Mean Flow	8.08	ft^3/s	45
November Mean Flow	6.21	ft^3/s	46
December Mean Flow	5.02	ft^3/s	47

Monthly Flow Statistics Citations

Capesius, J.P., and Stephens, V. C.,2009, Regional Regression Equations for Estimation of Natural Streamflow Statistics in Colorado: U. S. Geological Survey Scientific Investigations Report 2009-5136, 32 p.

Annual Flow Statistics Parameters [Mountain Region Mean Flow]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	30.3	square miles	1	1060
PRECIP	Mean Annual Precipitation	24.78	inches	18	47

Annual Flow Statistics Flow Report [Mountain Region Mean Flow]

PII: Prediction Interval-Lower, PIu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	SEp
Mean Annual Flow	23.9	ft^3/s	33

Annual Flow Statistics Citations

Capesius, J.P., and Stephens, V. C.,2009, Regional Regression Equations for Estimation of Natural Streamflow Statistics in Colorado: U. S. Geological Survey Scientific Investigations Report 2009-5136, 32 p.

Low-Flow Statistics Parameters [Mountain Region Min Flow]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	30.3	square miles	1	1060
PRECIP	Mean Annual Precipitation	24.78	inches	18	47
ELEV	Mean Basin Elevation	10802	feet	8600	12000

Low-Flow Statistics Flow Report [Mountain Region Min Flow]

PII: Prediction Interval-Lower, PIu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	SEp

Statistic	Value	Unit	SEp
7 Day 2 Year Low Flow	2.93	ft^3/s	89
7 Day 10 Year Low Flow	1.57	ft^3/s	153
7 Day 50 Year Low Flow	1.34	ft^3/s	126

Low-Flow Statistics Citations

Capesius, J.P., and Stephens, V. C.,2009, Regional Regression Equations for Estimation of Natural Streamflow Statistics in Colorado: U. S. Geological Survey Scientific Investigations Report 2009-5136, 32 p.

Peak-Flow Statistics Parameters [Mountain Region Peak Flow]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	30.3	square miles	1	1060
BSLDEM10M	Mean Basin Slope from 10m DEM	39.6	Percent	7.6	60.2
PRECIP	Mean Annual Precipitation	24.78	Inches	18	47

Peak-Flow Statistics Flow Report [Mountain Region Peak Flow]

PII: Prediction Interval-Lower, PIu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	SEp
2 Year Peak Flood	202	ft^3/s	49
5 Year Peak Flood	292	ft^3/s	44
10 Year Peak Flood	353	ft^3/s	41
25 Year Peak Flood	424	ft^3/s	40
50 Year Peak Flood	511	ft^3/s	39

Statistic	Value	Unit	SEp
100 Year Peak Flood	571	ft^3/s	36
200 Year Peak Flood	624	ft^3/s	36
500 Year Peak Flood	733	ft^3/s	33

Peak-Flow Statistics Citations

Capesius, J.P., and Stephens, V. C.,2009, Regional Regression Equations for Estimation of Natural Streamflow Statistics in Colorado: U. S. Geological Survey Scientific Investigations Report 2009-5136, 32 p.

Legal Availability

A copy of the water rights search on Gold Creek is included below.

There are a number of decreed spring rights along Upper Gold Creek. The majority of these are appropriations for very small amounts. One, the Berry Carter Mine Spring right, is more substantial. Other spring rights are included in the water rights search. There are several ditches on Upper Gold Creek, included below. There are more significant diversions on Lower Gold Creek.

Significant rights include:

- Berry Carter Mine Spring 2 cfs appropriation date of 1887-07-01 with an adjudication date of 1981-12-31 (81CW0287)
- O'Banion Feeder Ditch (feeds O'Banion pond)- .5 cfs
- Faivre Ditch No. 2- 2 cfs appropriation date of 1978-09-28 and adjudication date of 1979-12-31.
- Tarkington Ditch Alt Pt-diverts 2.5 cfs appropriation date of 1891-05-10 adjudication date of 1943-04-19 (potentially transferred to Tarkington Ditch)
- Tarkington Ditch- 18 cfs appropriation date of 1891-05-10 adjudication date of 1943-04-19
- Gold Links Ditch PL- .9 cfs appropriation date of 1904-09029 with adjudication date of 1976-12-31
- Gold Links Mine System
    - 2.23 cfs appropriation date of 1934-06-01 adjudication date 1979-12-31
    - 1 cfs appropriation date of 1934-06-01 adjudication date 1979-12-31

There are also abandoned rights. Significant abandoned rights include:

- Faivre Ditch No. 1 was for 2 cfs but cancelled in 12/15/1981 (81CW0158)
- Mono Ditch & Flume- 2.5 cfs, abandoned 2000

HCCA has included the diversion records for the Tarkington Ditch, the largest diversion on Gold Creek. Tarkington water use will likely determine whether water is available on lower Gold Creek for an instream flow appropriation. HCCA intends to work with the Natural Streams and Lakes Protection Unit and Division of Water Resources to determine whether water is available below this diversion.

Annual Water Diversion Report

Irrigation Year: 1970
(1969-11-01 To 1970-10-31)

Division: 4 Water District: 28

Structure Name: TARKINGTON DITCH (704)
Source Stream: GOLD CREEK (4333)

Source: NATURAL STREAMFLOW (1)
From:
Use: IRRIGATION (1)
Type:
Group:

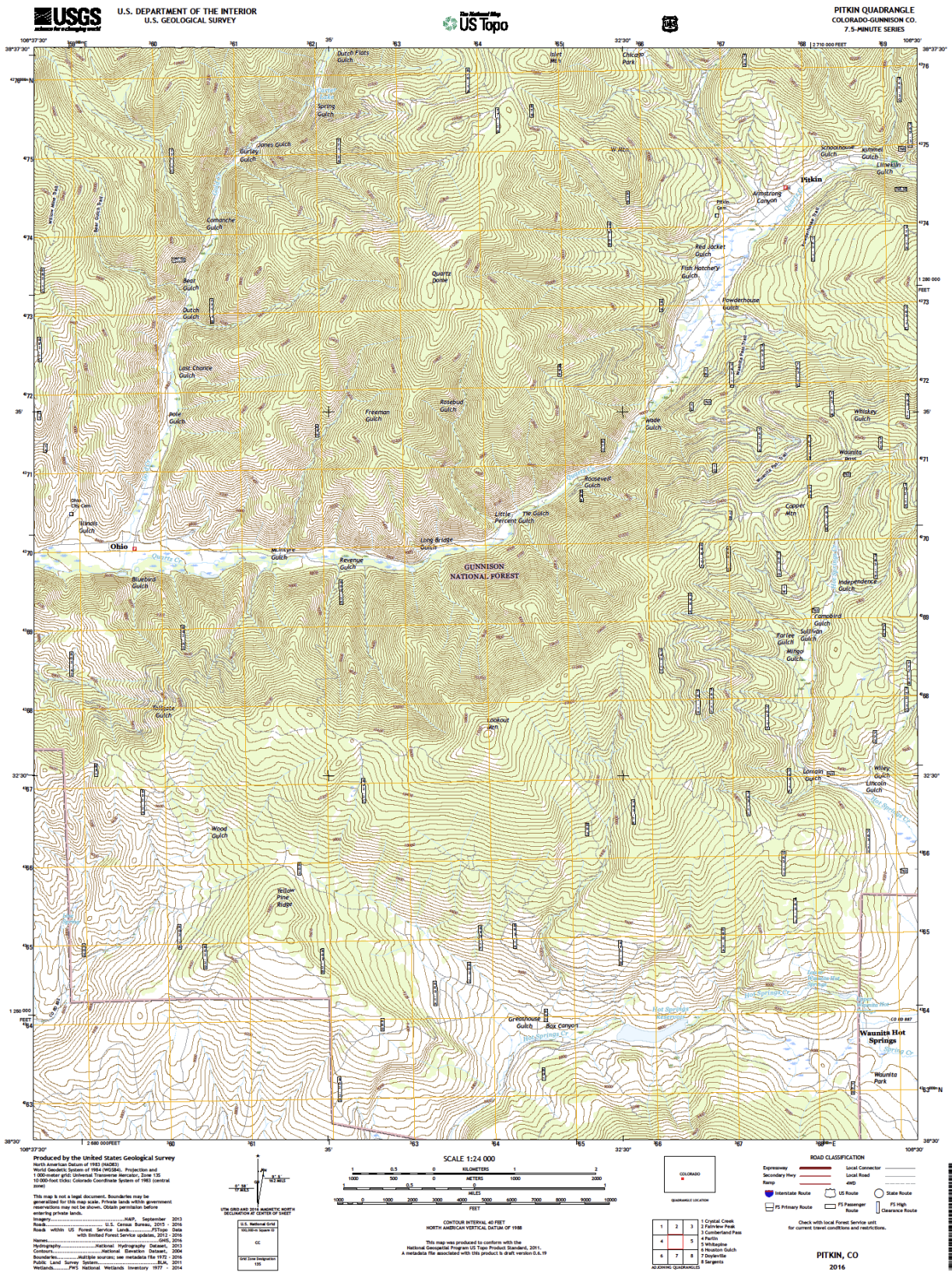
Day	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Day
1							18.000 *	18.000 *	18.000 *	0 *	0 *		1
2							18.000	18.000	18.000				2
3							18.000	18.000	18.000				3
4							18.000	18.000	18.000				4
5							18.000	18.000	18.000				5
6							18.000	18.000	18.000				6
7							18.000	18.000	18.000				7
8							18.000	18.000	18.000				8
9							18.000	18.000	18.000				9
10							18.000	18.000	18.000				10
11							18.000	18.000	18.000				11
12							18.000	18.000	18.000				12
13							18.000	18.000	18.000				13
14							18.000	18.000	18.000				14
15							18.000	18.000	18.000				15
16							18.000	18.000	0 *				16
17							18.000	18.000					17
18							18.000	18.000					18
19							18.000	18.000					19
20							18.000	18.000					20
21							18.000	18.000					21
22							18.000	18.000					22
23							18.000	18.000					23
24							18.000	18.000					24
25							18.000	18.000					25
26							18.000	18.000					26
27							18.000	18.000					27
28							18.000	18.000					28
29							18.000	18.000					29
30							18.000	18.000 *			0 *		30
31							18.000 *		0 *	0 *			31
Total SFD:	0.000	0.000	0.000	0.000	0.000	0.000	558.000	540.000	270.000	0.000	0.000	0.000	
Days Used:	0	0	0	0	0	0	31	30	15	0	0	0	
Avg SFD:	0.000	0.000	0.000	0.000	0.000	0.000	18.000	18.000	18.000	0.000	0.000	0.000	
Total AF:	0.000	0.000	0.000	0.000	0.000	0.000	1106.790	1071.090	535.550	0.000	0.000	0.000	

Annual Total SFD: 1368.000 SFD
Total Days Used: 76 DAYS
Annual Total Acre Feet: 2713.428 AF

* Indicates Observed data. U Indicates User supplied data.
All other data is interpreted from previous observed value.

Water Commissioner
District WC

Attachment E- USGS Topographic Quadrangle Maps

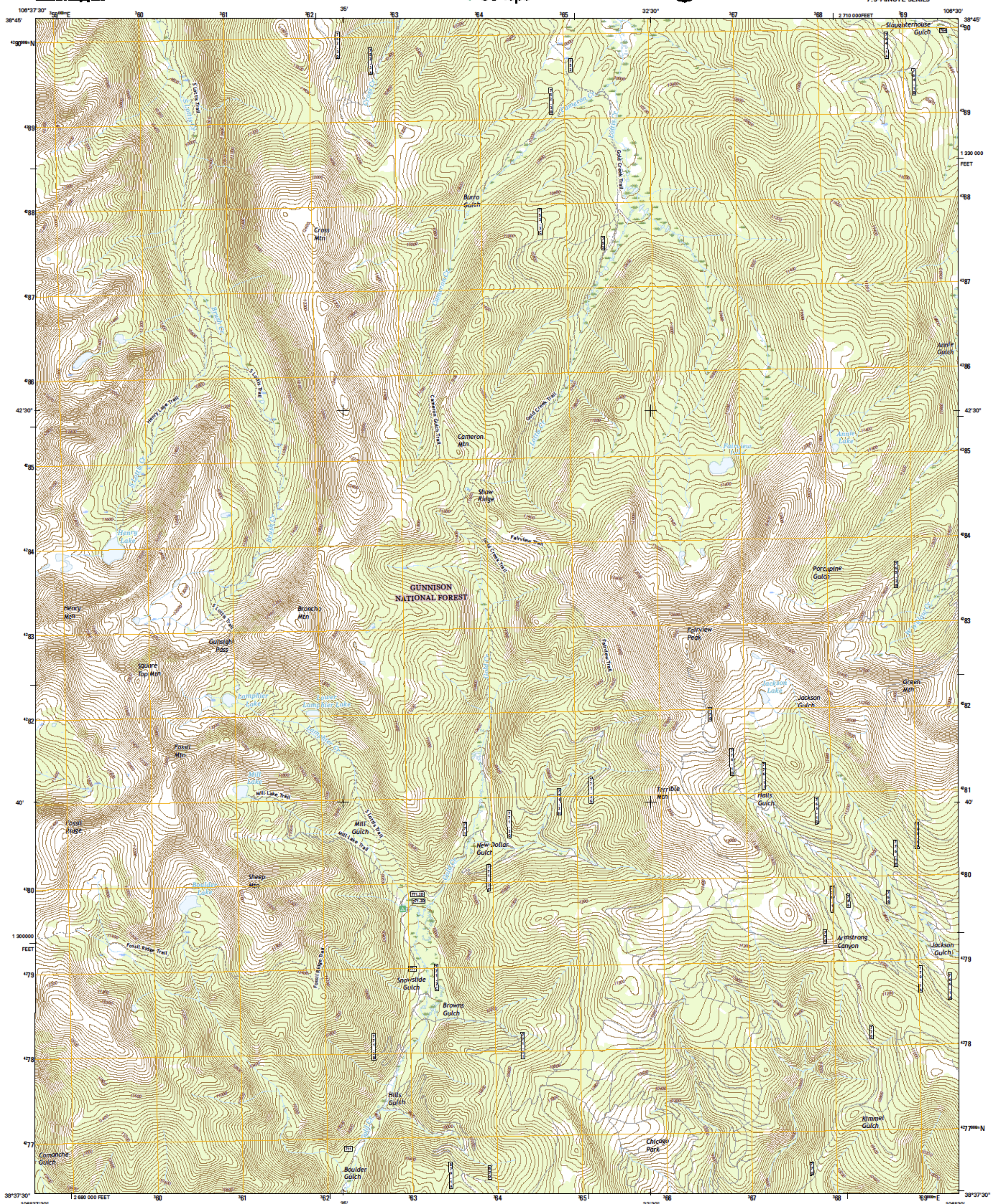


USGS
science for a changing world

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

The National Map
US Topo

FAIRVIEW PEAK 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 1 000-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..........GNIS, 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

UTM GRID AND 2016 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET
0° 59′ 17 MILS
9° 6′ 162 MILS

U.S. National Grid
100,000-m Square ID
CC
Grid Zone Designation
13S

SCALE 1:24 000

KILOMETERS 1 0.5 0 1 2
METERS 1000 500 0 1000 2000
MILES 1 0.5 0 1
FEET 1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000

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

COLORADO
QUADRANGLE LOCATION

1	2	3
4		5
6	7	8

ADJOINING QUADRANGLES

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

ROAD CLASSIFICATION

Expressway
Secondary Hwy
Ramp
Local Connector
Local Road
4WD
Interstate Route
US Route
State Route
FS Primary Route
FS Passenger Route
FS High Clearance Route

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

FAIRVIEW PEAK, CO
2016

NSN. 7643016358837
NGA REF NO. USGSX24K148888

Colorado Parks and Wildlife
Gold Creek fishery survey data

CalYear	SurveyID	Region	Drainage	WaterType	WaterId	WaterName	StationID	Station	SiteName
2016	52212	Southwest	Gunnison River	Stream	38166	Elk Creek	33675	GU4080	
2016	52216	Southwest	Gunnison River	Stream	38166	Elk Creek	8035	GU2223	0.1 MI ABV CO RD 12
2009	24082	Southwest	Gunnison River	Stream	38166	Elk Creek	8035	GU2223	0.1 MI ABV CO RD 12
2009	24214	Southwest	Gunnison River	Stream	38166	Elk Creek	33675	GU4080	
2008	53554	Southwest	Gunnison River	Stream	38166	Elk Creek	33675	GU4080	
2008	9332	Southwest	Gunnison River	Stream	38166	Elk Creek	8035	GU2223	0.1 MI ABV CO RD 12
2007	7073	Southwest	Gunnison River	Stream	38166	Elk Creek	8035	GU2223	0.1 MI ABV CO RD 12
2007	8922	Southwest	Gunnison River	Stream	38166	Elk Creek	33675	GU4080	
2006	8921	Southwest	Gunnison River	Stream	38166	Elk Creek	5367	GU2201	
2006	10328	Southwest	Gunnison River	Stream	38166	Elk Creek	33675	GU4080	
2006	9331	Southwest	Gunnison River	Stream	38166	Elk Creek	8035	GU2223	0.1 MI ABV CO RD 12
1977	10327	Southwest	Gunnison River	Stream	38166	Elk Creek	8035	GU2223	0.1 MI ABV CO RD 12
1977	7074	Southwest	Gunnison River	Stream	38166	Elk Creek	5813	GU1429	HEADWATERS
2001	8656	Southwest	Gunnison River	Stream	40369	Gold Creek	4079	GU1366	1 MI N OF GOLD CREEK CG
2001	8140	Southwest	Gunnison River	Stream	40369	Gold Creek	4078	GU1365	GOLD CREEK TRAILHEAD

Colorado Parks and Wildlife
Gold Creek fishery survey data

Location	Elevation	Lat	Lon	UTMX	UTMY	HUC12	County	AreaBio	SampleDate
At CO RD 12	9598	38.8569	-107.0598	321268	4302914	140200010204	GUNNISO	Dan Brauch	15-Sep-2016
150 M ABV CO RD 12	9664	38.8576	-107.0611	321158	4302992	140200010204	GUNNISO	Dan Brauch	15-Sep-2016
150 M ABV CO RD 12	9664	38.8576	-107.0611	321158	4302992	140200010204	GUNNISO	Dan Brauch	17-Sep-2009
At CO RD 12	9598	38.8569	-107.0598	321268	4302914	140200010204	GUNNISO	Dan Brauch	17-Sep-2009
At CO RD 12	9598	38.8569	-107.0598	321268	4302914	140200010204	GUNNISO	Dan Brauch	11-Sep-2008
150 M ABV CO RD 12	9664	38.8576	-107.0611	321158	4302992	140200010204	GUNNISO	Dan Brauch	11-Sep-2008
150 M ABV CO RD 12	9664	38.8576	-107.0611	321158	4302992	140200010204	GUNNISO	Dan Brauch	19-Sep-2007
At CO RD 12	9598	38.8569	-107.0598	321268	4302914	140200010204	GUNNISO	Dan Brauch	19-Sep-2007
1975 ABV Coal Creek	10383	38.8671	-107.0760	319893	4304077	140200010204	GUNNISO	Dan Brauch	19-Jul-2006
At CO RD 12	9598	38.8569	-107.0598	321268	4302914	140200010204	GUNNISO	Dan Brauch	18-Jul-2006
150 M ABV CO RD 12	9664	38.8576	-107.0611	321158	4302992	140200010204	GUNNISO	Dan Brauch	18-Jul-2006
150 M ABV CO RD 12	9664	38.8576	-107.0611	321158	4302992	140200010204	GUNNISO	Dan Brauch	21-Jun-1977
ABV Hdwtrs	10963	38.8793	-107.0746	320040	4305422	140200010204	GUNNISO	Dan Brauch	21-Jun-1977
175 M BLW New Dollar Gulch	10156	38.6609	-106.5668	363681	4280313	140200030302	GUNNISO	Dan Brauch	27-Aug-2001
825 M ABV New Dollar Gulch	10266	38.6691	-106.5645	363896	4281219	140200030302	GUNNISO	Dan Brauch	27-Aug-2001

Colorado Parks and Wildlife
Gold Creek fishery survey data

Survey_Purpose	Protocol	Gear	NumNets	NumPasses	NumAnglers	StationLength	StationAsMiles	StationAsKilometers	AvgWidth
Standard Survey or Population Estimate	TWO-PASS REMOVAL	Backpack EF	---	2	---	150	0.028409	0.04572	6.5
---	TWO-PASS REMOVAL	BPEF	---	2	---	300	0.056818	0.09144	---
---	PRESENCE/ABSENCE	BPEF	---	---	---	400	0.075758	0.12192	7.25
---	TWO-PASS REMOVAL	NOT LISTED	---	2	---	150	0.028409	0.04572	6.5
---	TWO-PASS REMOVAL	BPEF	---	2	---	328	0.062121	0.099974	4.9
---	PRESENCE/ABSENCE	BPEF	---	---	---	300	0.056818	0.09144	7.25
---	PRESENCE/ABSENCE	NOT LISTED	---	---	---	900	0.170455	0.27432	0
---	TWO-PASS REMOVAL	NOT LISTED	---	2	---	150	0.028409	0.04572	6.5
---	PRESENCE/ABSENCE	BPEF	---	---	---	300	0.056818	0.09144	8.8
---	PRESENCE/ABSENCE	BPEF	---	---	---	150	0.028409	0.04572	6.5
---	PRESENCE/ABSENCE	BPEF	---	---	---	300	0.056818	0.09144	7.25
Standard Survey or Population Estimate	PRESENCE/ABSENCE	BPEF	---	---	---	100	0.018939	0.03048	4
Standard Survey or Population Estimate	PRESENCE/ABSENCE	VISUAL	---	---	---	---	---	---	1
---	TWO-PASS REMOVAL	NOT LISTED	---	2	---	500	0.094697	0.1524	6
---	TWO-PASS REMOVAL	NOT LISTED	---	2	---	300	0.056818	0.09144	8

Colorado Parks and Wildlife
Gold Creek fishery survey data

StationAsAcres	StationAsHectares	TotalCatch	TotalWeight	ElecEffort	GillEffort	TrapEffort	SeinEffort	TotalEffort	EffortMetric	SpeciesID	SpeciesCode	CommonName	SpeciesMethod
0.022383	0.009058	13	757	---	---	---	---	2	PASS	24	BRK	BROOK TROUT	Seber Lecren
---	---	0	---	---	---	---	---	2	PASS	---	XXX	No Fish Caught	Counts
0.066575	0.026942	0	---	1	---	---	---	1	PASS	---	XXX	No Fish Caught	Counts
0.022383	0.009058	17	1055	---	---	---	---	2	PASS	24	BRK	BROOK TROUT	Seber Lecren
0.036896	0.014931	18	790	---	---	---	---	2	PASS	24	BRK	BROOK TROUT	Seber Lecren
0.049931	0.020206	0	---	1	---	---	---	1	PASS	---	XXX	No Fish Caught	Counts
---	---	0	---	0	0	0	0	1	PASS	---	XXX	No Fish Caught	Counts
0.022383	0.009058	32	1100	0	0	0	0	2	PASS	24	BRK	BROOK TROUT	Seber Lecren
0.060606	0.024526	0	---	0	0	0	---	1	PASS	---	XXX	No Fish Caught	Counts
0.022383	0.009058	4	116	0	0	0	---	1	PASS	24	BRK	BROOK TROUT	Counts
0.049931	0.020206	0	---	0	0	0	---	1	PASS	---	XXX	No Fish Caught	Counts
0.009183	0.003716	7	450	1	---	---	---	1	PASS	24	BRK	BROOK TROUT	Counts
---	---	0	---	---	---	---	---	1	PASS	---	XXX	No Fish Caught	Counts
0.068871	0.027871	140	4742	---	---	---	---	2	PASS	24	BRK	BROOK TROUT	Seber Lecren
0.055096	0.022297	65	2702	---	---	---	---	2	PASS	24	BRK	BROOK TROUT	Seber Lecren

Colorado Parks and Wildlife
Gold Creek fishery survey data

SpeciesCatch	Threshold	NumBlwThreshold	PercentCatch	FirstCatch	SecondCatch	ThirdCatch	AdditionalCatch	Marked	Recaptured	Captured	SpeciesWeight	Weighed	WeightCalcd
13	130	0	100	9	4	---	---	---	---	---	757	13	0
0	---	0	---	---	---	---	---	---	---	---	---	0	0
0	---	0	---	---	---	---	---	---	---	---	---	0	0
17	130	0	100	16	1	---	---	---	---	---	1055	17	0
18	130	3	100	12	6	---	---	---	---	---	863	15	0
0	---	0	---	---	---	---	---	---	---	---	---	0	0
0	---	0	---	---	---	---	---	---	---	---	---	0	0
32	130	6	100	22	10	---	---	---	---	---	1186	26	0
0	---	0	---	---	---	---	---	---	---	---	---	0	0
4	130	0	100	4	---	---	---	---	---	---	116	4	0
0	---	0	---	---	---	---	---	---	---	---	---	0	0
7	130	0	100	7	---	---	---	---	---	---	450	0	7
0	---	0	---	---	---	---	---	---	---	---	---	0	0
140	130	58	100	117	23	---	---	---	---	---	5455	82	0
65	130	22	100	51	14	---	---	---	---	---	3075	43	0

Colorado Parks and Wildlife
Gold Creek fishery survey data

FirstWeight	SecondWeight	ThirdWeight	MarkedWeight	RecapturedWeight	CapturedWeight	MeanWeight	WeightRange	AvgWr	Measured	MeanLength	LengthRange
505	252	---	---	---	---	58.23	36 - 84	115.76	13	165.23	139 - 188
---	---	---	---	---	---	---	---	---	---	---	---
---	---	---	---	---	---	---	---	---	---	---	---
1000	55	---	---	---	---	62.06	32 - 115	95.65	17	178.35	142 - 215
621	242	---	---	---	---	52.67	23 - 97	106.47	18	157.5	127 - 200
---	---	---	---	---	---	---	---	---	---	---	---
---	---	---	---	---	---	---	---	---	---	---	---
893	293	---	---	---	---	42.31	23 - 89	93.62	32	150.03	103 - 215
---	---	---	---	---	---	---	---	---	---	---	---
116	---	---	---	---	---	29	24 - 34	97.76	4	140.75	133 - 151
---	---	---	---	---	---	---	---	---	---	---	---
---	---	---	---	---	---	64.29	38 - 94	---	7	177.71	152 - 203
---	---	---	---	---	---	---	---	---	---	---	---
4522	933	---	---	---	---	57.83	20 - 125	95.56	140	139.09	20 - 233
2497	578	---	---	---	---	62.84	11 - 150	105.46	65	142.17	50 - 226

Colorado Parks and Wildlife
Gold Creek fishery survey data

ProbabilityOfCapture	PopulationEstimate	POP_Variance	LOWER_POP_CI	UPPER_POP_CI	EstimatedSpeciesWeight	NumberPerAcre	PoundsPerAcre	NumberPerMile	PoundsPerMile
0.5556	16.2	26.9568	6.0237	26.3763	876	723.7636	86.282	570.2418	67.9802
0	0	---	---	---	---	---	---	---	---
---	0	---	---	---	---	---	---	---	---
0.9375	17.0667	0.085965432	16.492	17.6414	1009	762.4849	99.3819	600.7498	78.3014
0.5	24	72	7.3688	40.6312	1009	650.477	60.2901	386.3428	35.8086
---	0	---	---	---	---	---	---	---	---
---	0	---	---	---	---	---	---	---	---
0.5455	40.3333	74.69135802	23.3942	57.2724	1268	1801.9613	124.8922	1419.7367	98.4006
---	0	---	---	---	---	---	---	---	---
---	4	---	---	---	113	178.7071	11.13	140.8005	8.7691
---	0	---	---	---	---	---	---	---	---
---	7	---	---	---	---	762.2781	---	369.6077	---
---	0	---	---	---	---	---	---	---	---
0.8034	145.6277	12.98506168	138.5649	152.6905	7737	2114.4996	247.6683	1537.828	180.1236
0.7255	70.2973	17.68083959	62.0558	78.5388	4308	1275.9057	172.3812	1237.2364	167.1568

Colorado Parks and Wildlife
Gold Creek fishery survey data

NumberPerHectare	kilogramsPerHectare	NumberPerkilometer	kilogramsPerkilometer	CPUE	WPUE	PSD	SRSD	QRSD	PRSD	MRSD	TRSD	DataSource
1788.4743	96.7101	354.3307	19.1601	---	---	---	---	---	---	---	---	Southwest Region Fisheries Management
---	---	---	---	---	---	---	---	---	---	---	---	Southwest Region Fisheries Management
---	---	---	---	---	---	---	---	---	---	---	---	Species Conservation
1884.1577	111.3932	373.2874	22.0691	---	---	00:00.0	100	---	---	---	---	Species Conservation
1607.394	67.5775	240.0624	10.0926	---	---	00:00.0	100	---	---	---	---	Species Conservation
---	---	---	---	---	---	---	---	---	---	---	---	Species Conservation
---	---	---	---	---	---	---	---	---	---	---	---	Species Conservation
4452.7821	139.9868	882.1807	27.734	---	---	00:00.0	100	---	---	---	---	Species Conservation
---	---	---	---	---	---	---	---	---	---	---	---	Species Conservation
441.5986	12.4752	87.4891	2.4716	---	---	---	---	---	---	---	---	Species Conservation
---	---	---	---	---	---	---	---	---	---	---	---	Species Conservation
1883.746	---	229.6588	---	---	---	00:00.0	100	---	---	---	---	Species Conservation
---	---	---	---	---	---	---	---	---	---	---	---	Species Conservation
5225.0619	277.6004	955.5623	50.7677	---	---	00:00.0	100	---	---	---	---	Species Conservation
3152.7694	193.2098	768.7806	47.1129	---	---	00:00.0	100	---	---	---	---	Species Conservation

Colorado Parks and Wildlife
Gold Creek fishery survey data

SciColl	Surveyors	Comments
	Brauch. Samuelse	Sampled at CR 12
	Brauch, Samuelse	No fish seen or netted.
---	Jones, Oulton	Backpack Electrofishing, no fish seen or taken.
	Jones, Oulton	Just above CO RD 12
	Golder	From culvert on CR12 upstream. Original lengths were fork lengths and were adjusted to estimate total length of fish to report here.
---	CAPPS, MALICK, (	Backpack Electrofishing, no fish seen or taken.
---		UTM"S in NAD83; No fish sampled or seen

---	BRAUCH ET.AL.	BP EFISH, no fish seen or taken
	BRAUCH, VIERA E	BP EFISH, For contaminants of potential concern by U.S. EPA as part of Standard Mine cleanup assessment.
---	BRAUCH, VIERA E	BP EFISH, no fish seen or taken additional half mile surveyed visually and no fish seen
---	WEILER	BRK 421 g TTL
---	WEILER	NO FISH SAMPLING, WATER QUALITY ONLY.
---	HEDEAN, ERICKSC	Section 1; Elevation 10,200ft
---	HEDEAN, ERICKSC	---

Figure B. Field data input sheet (Front Page)

COLORADO WATER CONSERVATION BOARD

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

LOCATION INFORMATION

STREAM NAME: Upper Gold Creek | CROSS-SECTION NO.: #1

CROSS-SECTION LOCATION: Upper Gold Creek approx. 1 mile downstream of confluence w/ Lampheir Creek

DATE: 10/4/17 | OBSERVERS: Ashley Bembenek, Julie Nania

LEGAL DESCRIPTION: ¼ SECTION | SECTION | TOWNSHIP N/S | RANGE: E/W | PM

COUNTY: | WATERSHED: Quartz Creek | WATER DIVISION: 4 | DOW WATER CODE:

MAP(S): USGS: | USFS:

SUPPLEMENTAL DATA

SAG TAPE SECTION SAME AS DISCHARGE SECTION: YES / NO | METER TYPE: Hach FH 950

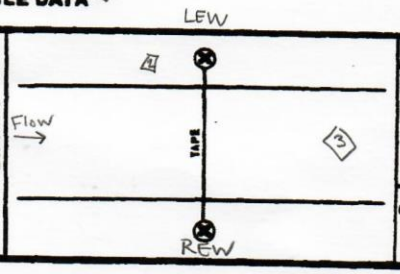
METER NUMBER: | DATE RATED: | CALIB/SPIN ____ sec | TAPE WEIGHT ____ lbs/foot | TAPE TENSION ____ lbs

CHANNEL BED MATERIAL SIZE RANGE: gravel, cobble, boulder | PHOTOGRAPHS TAKEN: YES/NO | NUMBER OF PHOTOGRAPHS:

CHANNEL PROFILE DATA ①

STATION	DISTANCE FROM TAPE ft	ROD READING ft
⊗ Tape @ Stake LB	0.0	
⊗ Tape @ Stake RB	0.0	
① WS @ Tape LB/RB	0.0	1.6/1.6
② WS Upstream	5.5	1.6
③ WS Downstream	11.0	2.0
SLOPE	0.4/16.5 = 0.0242	

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

COMMENTS

① Photos from left bank hillslope - landscape view. ⑤ US↑ view from grassy gravel bar.
② Photo from left bank about 40-50' US↑ of stake
* We saw several fish during sampling; up to 8"-10" in size.
Hawk flowmeter file name UPGold

FORM #ISF FD 1-85

WQ measurements
Oakton PC450 calibrated on 10/3/17
Spc: 113.6 µs/cm
Temp: 4.9°C
pH: 7.89

Figure C. Field data input sheet (Back Page)

DISCHARGE/CROSS SECTION NOTES

STREAM NAME: UPPER GOLD CREEK	CROSS-SECTION NO: 1	DATE: 10/4/17	SHEET 1 OF 2
BEGINNING OF MEASUREMENT — EDGE OF WATER LOOKING DOWNSTREAM (0.0 AT STAKE): LEFT / RIGHT	Gage Reading: NA ft	TIME: 12:00	

Features	Stake (S) Grassline (G) Waterline (W) Rock (R)	Distance From Initial Point (ft)	Width (ft)	Total Vertical Depth From Tape/Inst (ft) V	Water Depth (ft) D	Depth of Observation (ft)	Revolutions	Time (sec)	Velocity (ft/sec) At Point	Velocity (ft/sec) Mean in Vertical Ft/s	Area (ft²)	Discharge (cfs)
LEW	S	2.0		.5	N/A					N/A		
		2.5		.55	N/A					N/A		
		3		.5	—					—		
		3.5		.6	—					—		
	G	4		.6	—					—		
		4.5		.65	—					—		
		5		.7	—					—		
		5.5		1.2	—					—		
		6		1.3	—					—		
	Rock	6.5		1.35	—					—		
	Rock	7		1.25	—					—		
	W	7.4		1.75	0					0		
		7.5		1.8	0.15					-0.02		
	Rock	8		1.6	0					0		
		8.5		1.95	.25					-0.07		
		9		1.9	.25					0.09		
		9.5		1.8	.2					0.42		
		10		1.85	.2					0.12		
		10.5		1.95	0.3					0.41		
		11		1.9	0.35					0.41		
		11.5		1.9	0.3					0.18		
		12		1.95	0.35					0.12		
	Rock	12.5		2	.35					0.01		
		13		1.95	.35					0.47		
		13.5		2.1	.5					0.65		
	Rock	14		1.7	.15					.93		
	lp ↑	15.6		1.95	.35					1.52		> flow between rock
		15.7		1.9	.3					0.79		
	eddy	17		1.85	.25					0.01		
		17.7		2	0.4					0.44		
		18		1.95	0.4					1.05		
		18.5		1.85	0.4					1		
		19		2	.5					1.32		
		19.6		2.1	.55					1.36		
		20		2.1	.5					1.05		
		20.5		1.95	0.4					1.11		
		21		2	.45					1.84		
	eddy	21.5		2.15	.6					0.47		
		22		2.15	.7					1.85		
	..	22.5		2.1	.65					1.68		
		23		2.15	.6					1.40		
		23.5		2.15	.55					0.53		
TOTALS												

End of Measurement	Time: 14:45	Gage Reading: NA ft	CALCULATIONS PERFORMED BY: AJB/JN	CALCULATIONS CHECKED BY:

↳ After pebble count.

 See additional sheet

UPPER Gold Continued

Figure C. Field data input sheet (Back Page)

DISCHARGE/CROSS SECTION NOTES

STREAM NAME: | CROSS-SECTION NO: | DATE: | SHEET 2 OF 2

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

Features	Stone (D) Gravel (G) Vegetation (V) Rock (R)	Distance From Initial Point (ft)	Width (ft)	Total Vertical Depth From Tape/rod (ft)	Water Depth (ft)	Depth of Observation (ft)	Revolutions	Time (sec)	Velocity (ft/sec): At Point	Velocity (ft/sec): Mean in Vertical	Area (ft²)	Discharge (cfs)
		24		2.1	.55					0.65		
		24.5		2	.45					0.89		
		25		2	.45					0.77		
		25.5		2.05	.5					1.18		
		26		2.05	.5					0.78		
		26.5		2	.4					0.89		
		27		2	.4					0.78		
		27.5		2	.35					0.67		
		28		2	.35					0.91		
		28.5		2	.35					0.56		
		29		1.95	.3					1.07		
		29.4		1.9	.25					1.32		
too shallow to measure	W	30.5		1.6	0					—		
		31		1	—					—		
		31.16		.9	—					—		
		32		.9	—					—		
		32.5		.9	—					—		
		33		.9						—		
		33.5		.85	—					—		
		34		.95	—					—		
		34.5		1.05	—					—		
		35		1.1	—					—		
		35.5		1.1	—					—		
Hummocks & side channel	G	36		1.2	—					—		
		36.5		1.25	—					—		
		37		1.2	—					—		
		37.5		13.5 IN	—					—		
		38		7 IN	—					—		
switched to ruler convert from inches to tenths of a foot.		38.5		5 IN	—					—		
		39		8 IN	—					—		
		39.5		7 IN	—					—		
		40		5 IN	—					—		
		40.5		5 IN	—					—		
REV	S	40.9		2.5 IN								
TOTALS												

End of Measurement | Time: 11:45 | Gage Reading ____ ft | CALCULATIONS PERFORMED BY: | CALCULATIONS CHECKED BY:

↳ After pebble count

7.36 cfs

QA/QC looks good. No Verticals >10%

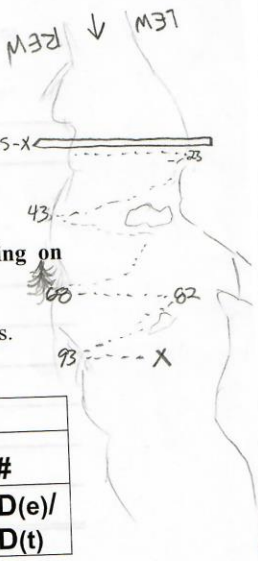
recording in cms

Riffle Pebble Count Actual Measurements (mm)

Upper Gold Creek 10/4/17 13:45 AJB (Picker) JN (Scribe).

L = Loose
E = Embedded.
F = Fines less o1 cm

1	F	26	20 (L)	51	9.6 (E) Bugs	76	16.5 (E)	101	
2	5.4 (L)	27	19.6 (E)	52	2.2 (L)	77	20 (E)	102	
3	6 (L)	28	3.4 (L)	53	2.8 (L)	78	5.5 (L)	103	
4	4.2 (L)	29	16.4 (L)	54	2 (L)	79	7.5 (L)	104	
5	2.4 (L)	30	8 (E)	55	2 (L)	80	3 (L)	105	
6	3.6 (L)	31	17.2 (L)	56	6 (E)	81	2 (L)	106	
7	2.4 (L)	32	25 (L)	57	6.6 (L)	82	13.5 (L) T5	107	
8	6 (L)	33	14 (L)	58	9 (L) Bugs	83	12 (E)	108	
9	6.8 (L)	34	6 (L)	59	19 (L)	84	7.5 (L)	109	
10	4.6 (L)	35	4.2 (L)	60	7 (E)	85	14 (E)	110	
11	4.8 (L)	36	2.4 (L)	61	19 (E)	86	21 (E)	111	
12	17.4 (E)	37	14.6 (E)	62	6.5 (E) Bugs	87	11 (E)	112	
13	13 (L)	38	6 (L)	63	7.8 (E)	88	10 (L)	113	
14	3 (L)	39	2.2 (L)	64	14 (L)	89	16.5 (E)	114	
15	7 (L)	40	6.6 (L)	65	2.6 (L)	90	7 (E)	115	
16	31.8 (E)	41	1.6 (L)	66	2.4 (E)	91	3.5 (L)		
17	F	42	2 (L)	67	F	92	3.4 (L)		
18	1.4 (L)	43	10.8 (E) T3	68	11 (E) T4	93	3 (L) T6		
19	26 (E)	44	5 (L)	69	6.6 (E)	94	4.8 (L)		
20	2 (L)	45	17 (E)	70	6 (L)	95	7.8 (E)		
21	28 (E)	46	2 (L)	71	10.4 (L)	96	3.8 (L)		
22	F	47	22 (E)	72	18 (E)	97	4.8 (L)		
23	3 (L)	48	12.5 (L) Bugs	73	11 (L)	98	21 (F)		
24	3.4 (L)	49	12.8 (E) Bugs	74	15 (E)	99	6.6 (L)		
25	3.5 (E)	50	24.4 (E)	75	3.6 (E)	100	11 (L)		



****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

Data Input & Proofing

STREAM NAME:	Upper Gold Creek
XS LOCATION:	Upper Gold Creek approx. 1 mile DS of confluence with Lampheir C
XS NUMBER:	ONE
DATE:	10/4/2017
OBSERVERS:	Ashley Bemenek, Julie Nania
1/4 SEC:	
SECTION:	
TWP:	
RANGE:	
PM:	
COUNTY:	Gunnison
WATERSHED:	Quartz and Tomichi Creeks
DIVISION:	4
DOW CODE:	
USGS MAP:	
USFS MAP:	
	Sag Tape
TAPE WT:	0.0106 lbs / ft
TENSION:	99999 lbs
SLOPE:	0.0242 ft / ft

CHECKED BY:.....DATE.....

ASSIGNED TO: .....DATE.....

GL=1	FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL	A	Q	Tape to Water
		Total Data Points = 76						
	S	2.00	0.50	0.00	0.00	0.00	0.00	0.00
		2.50	0.55	0.00	0.00	0.00	0.00	0.00
		3.00	0.50	0.00	0.00	0.00	0.00	0.00
		3.50	0.60	0.00	0.00	0.00	0.00	0.00
1	G	4.00	0.60	0.00	0.00	0.00	0.00	0.00
		4.50	0.65	0.00	0.00	0.00	0.00	0.00
		5.00	0.70	0.00	0.00	0.00	0.00	0.00
		5.50	1.20	0.00	0.00	0.00	0.00	0.00
		6.00	1.30	0.00	0.00	0.00	0.00	0.00
		6.50	1.35	0.00	0.00	0.00	0.00	0.00
		7.00	1.50	0.00	0.00	0.00	0.00	0.00
	W	7.40	1.75	0.00	0.00	0.00	0.00	0.00
		7.50	1.80	0.15	-0.02	0.05	0.00	1.65
		8.00	1.60	0.00	0.00	0.00	0.00	0.00
		8.50	1.95	0.25	-0.07	0.13	-0.01	1.70
		9.00	1.90	0.25	0.09	0.13	0.01	1.65
		9.50	1.80	0.20	0.42	0.10	0.04	1.60
		10.00	1.85	0.20	0.12	0.10	0.01	1.65
		10.50	1.95	0.30	0.41	0.15	0.06	1.65
		11.00	1.90	0.35	0.41	0.18	0.07	1.55
		11.50	1.90	0.30	0.18	0.15	0.03	1.60
		12.00	1.95	0.35	0.12	0.18	0.02	1.60
		12.50	2.00	0.35	0.01	0.18	0.00	1.65
		13.00	1.95	0.35	0.47	0.18	0.08	1.60
		13.50	2.10	0.50	0.65	0.25	0.16	1.60
		14.00	1.70	0.15	0.83	0.12	0.10	1.55
		15.10	1.95	0.35	1.52	0.30	0.45	1.60
		15.70	1.90	0.30	0.79	0.29	0.23	1.60
		17.00	1.85	0.25	0.01	0.25	0.00	1.60
		17.70	2.00	0.40	0.44	0.20	0.09	1.60
		18.00	1.95	0.40	1.05	0.16	0.17	1.55
		18.50	1.85	0.40	1.00	0.20	0.20	1.45
		19.00	2.00	0.50	1.32	0.28	0.36	1.50
		19.60	2.10	0.55	1.36	0.28	0.37	1.55
		20.00	2.00	0.50	1.05	0.23	0.24	1.50
		20.50	1.95	0.40	1.11	0.20	0.22	1.55
		21.00	2.00	0.45	1.84	0.23	0.41	1.55
		21.50	2.15	0.60	0.47	0.30	0.14	1.55
		22.00	2.15	0.70	1.85	0.35	0.65	1.45
		22.50	2.10	0.65	1.68	0.33	0.55	1.45
		23.00	2.15	0.60	1.40	0.30	0.42	1.55
		23.50	2.15	0.55	0.53	0.28	0.15	1.60
		24.00	2.10	0.55	0.65	0.28	0.18	1.55
		24.50	2.00	0.45	0.89	0.23	0.20	1.55
		25.00	2.00	0.45	0.77	0.23	0.17	1.55
		25.50	2.05	0.50	1.18	0.25	0.30	1.55
		26.00	2.05	0.50	0.78	0.25	0.20	1.55
		26.50	2.00	0.40	0.89	0.20	0.18	1.60
		27.00	2.00	0.40	0.78	0.20	0.16	1.60
		27.50	2.00	0.35	0.67	0.18	0.12	1.65
		28.00	2.00	0.35	0.91	0.18	0.16	1.65
		28.50	2.00	0.35	0.56	0.18	0.10	1.65
		29.00	1.95	0.30	1.07	0.14	0.14	1.65
		29.40	1.90	0.25	1.32	0.19	0.25	1.65
	W	30.50	1.60	0.00	0.00	0.00	0.00	0.00
		31.00	1.00	0.00	0.00	0.00	0.00	0.00
		31.60	0.90	0.00	0.00	0.00	0.00	0.00
		32.00	0.90	0.00	0.00	0.00	0.00	0.00
		32.50	0.90	0.00	0.00	0.00	0.00	0.00
		33.00	0.90	0.00	0.00	0.00	0.00	0.00
		33.50	0.85	0.00	0.00	0.00	0.00	0.00
		34.00	0.95	0.00	0.00	0.00	0.00	0.00
		34.50	1.05	0.00	0.00	0.00	0.00	0.00
		35.00	1.10	0.00	0.00	0.00	0.00	0.00
		35.50	1.10	0.00	0.00	0.00	0.00	0.00
1	G	36.00	1.20	0.00	0.00	0.00	0.00	0.00
		36.50	1.25	0.00	0.00	0.00	0.00	0.00
		37.00	1.20	0.00	0.00	0.00	0.00	0.00
		37.50	1.13	0.00	0.00	0.00	0.00	0.00
		38.00	0.58	0.00	0.00	0.00	0.00	0.00
		38.50	0.42	0.00	0.00	0.00	0.00	0.00
		39.00	0.66	0.00	0.00	0.00	0.00	0.00
		39.50	0.58	0.00	0.00	0.00	0.00	0.00
		40.00	0.42	0.00	0.00	0.00	0.00	0.00
		40.50	0.42	0.00	0.00	0.00	0.00	0.00
	S	40.90	0.21	0.00	0.00	0.00	0.00	0.00

Data Input & Proofing

GL=1	FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL	A	Q	Tape to Water
					Totals	8.48	7.37	

COLORADO WATER CONSERVATION BOARD
INSTREAM FLOW / NATURAL LAKE LEVEL PROGRAM
STREAM CROSS-SECTION AND FLOW ANALYSIS

LOCATION INFORMATION

STREAM NAME:	Upper Gold Creek
XS LOCATION:	Upper Gold Creek approx. 1 mile DS of confluence with Lampheir Creek
XS NUMBER:	ONE
DATE:	4-Oct-17
OBSERVERS:	Ashley Bemenek, Julie Nania
1/4 SEC:	0
SECTION:	0
TWP:	0
RANGE:	0
PM:	0
COUNTY:	Gunnison
WATERSHED:	Quartz and Tomichi Creeks
DIVISION:	4
DOW CODE:	0
USGS MAP:	0
USFS MAP:	0

SUPPLEMENTAL DATA

*** NOTE ***
Leave TAPE WT and TENSION
at defaults for data collected
with a survey level and rod

TAPE WT:	0.0106
TENSION:	99999

CHANNEL PROFILE DATA

SLOPE:	0.0242

INPUT DATA CHECKED BY: .....DATE.....

ASSIGNED TO: ….....…….....DATE.....

STREAM NAME: Upper Gold Creek
XS LOCATION: Upper Gold Creek approx. 1 mile DS of confluence with Lampheir Creek
XS NUMBER: ONE

DATA POINTS= 76

VALUES COMPUTED FROM RAW FIELD DATA

FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL	WETTED PERIM.	WATER DEPTH	AREA (Am)	Q (Qm)	% Q CELL
S	2.00	0.50	0.00	0.00	0.00		0.00	0.00	0.0%
	2.50	0.55	0.00	0.00	0.00		0.00	0.00	0.0%
	3.00	0.50	0.00	0.00	0.00		0.00	0.00	0.0%
	3.50	0.60	0.00	0.00	0.00		0.00	0.00	0.0%
1 G	4.00	0.60	0.00	0.00	0.00		0.00	0.00	0.0%
	4.50	0.65	0.00	0.00	0.00		0.00	0.00	0.0%
	5.00	0.70	0.00	0.00	0.00		0.00	0.00	0.0%
	5.50	1.20	0.00	0.00	0.00		0.00	0.00	0.0%
	6.00	1.30	0.00	0.00	0.00		0.00	0.00	0.0%
	6.50	1.35	0.00	0.00	0.00		0.00	0.00	0.0%
	7.00	1.50	0.00	0.00	0.00		0.00	0.00	0.0%
W	7.40	1.75	0.00	0.00	0.00		0.00	0.00	0.0%
	7.50	1.80	0.15	-0.02	0.11	0.15	0.05	0.00	0.0%
	8.00	1.60	0.00	0.00	0.54		0.00	0.00	0.0%
	8.50	1.95	0.25	-0.07	0.61	0.25	0.13	-0.01	-0.1%
	9.00	1.90	0.25	0.09	0.50	0.25	0.13	0.01	0.2%
	9.50	1.80	0.20	0.42	0.51	0.20	0.10	0.04	0.6%
	10.00	1.85	0.20	0.12	0.50	0.20	0.10	0.01	0.2%
	10.50	1.95	0.30	0.41	0.51	0.30	0.15	0.06	0.8%
	11.00	1.90	0.35	0.41	0.50	0.35	0.18	0.07	1.0%
	11.50	1.90	0.30	0.18	0.50	0.30	0.15	0.03	0.4%
	12.00	1.95	0.35	0.12	0.50	0.35	0.18	0.02	0.3%
	12.50	2.00	0.35	0.01	0.50	0.35	0.18	0.00	0.0%
	13.00	1.95	0.35	0.47	0.50	0.35	0.18	0.08	1.1%
	13.50	2.10	0.50	0.65	0.52	0.50	0.25	0.16	2.2%
	14.00	1.70	0.15	0.83	0.64	0.15	0.12	0.10	1.4%
	15.10	1.95	0.35	1.52	1.13	0.35	0.30	0.45	6.1%
	15.70	1.90	0.30	0.79	0.60	0.30	0.29	0.23	3.1%
	17.00	1.85	0.25	0.01	1.30	0.25	0.25	0.00	0.0%
	17.70	2.00	0.40	0.44	0.72	0.40	0.20	0.09	1.2%
	18.00	1.95	0.40	1.05	0.30	0.40	0.16	0.17	2.3%
	18.50	1.85	0.40	1.00	0.51	0.40	0.20	0.20	2.7%
	19.00	2.00	0.50	1.32	0.52	0.50	0.28	0.36	4.9%
	19.60	2.10	0.55	1.36	0.61	0.55	0.28	0.37	5.1%
	20.00	2.00	0.50	1.05	0.41	0.50	0.23	0.24	3.2%
	20.50	1.95	0.40	1.11	0.50	0.40	0.20	0.22	3.0%
	21.00	2.00	0.45	1.84	0.50	0.45	0.23	0.41	5.6%
	21.50	2.15	0.60	0.47	0.52	0.60	0.30	0.14	1.9%
	22.00	2.15	0.70	1.85	0.50	0.70	0.35	0.65	8.8%
	22.50	2.10	0.65	1.68	0.50	0.65	0.33	0.55	7.4%
	23.00	2.15	0.60	1.40	0.50	0.60	0.30	0.42	5.7%
	23.50	2.15	0.55	0.53	0.50	0.55	0.28	0.15	2.0%
	24.00	2.10	0.55	0.65	0.50	0.55	0.28	0.18	2.4%
	24.50	2.00	0.45	0.89	0.51	0.45	0.23	0.20	2.7%
	25.00	2.00	0.45	0.77	0.50	0.45	0.23	0.17	2.4%
	25.50	2.05	0.50	1.18	0.50	0.50	0.25	0.30	4.0%
	26.00	2.05	0.50	0.78	0.50	0.50	0.25	0.20	2.6%
	26.50	2.00	0.40	0.89	0.50	0.40	0.20	0.18	2.4%
	27.00	2.00	0.40	0.78	0.50	0.40	0.20	0.16	2.1%
	27.50	2.00	0.35	0.67	0.50	0.35	0.18	0.12	1.6%
	28.00	2.00	0.35	0.91	0.50	0.35	0.18	0.16	2.2%
	28.50	2.00	0.35	0.56	0.50	0.35	0.18	0.10	1.3%
	29.00	1.95	0.30	1.07	0.50	0.30	0.14	0.14	2.0%
	29.40	1.90	0.25	1.32	0.40	0.25	0.19	0.25	3.4%
W	30.50	1.60	0.00	0.00	1.14		0.00	0.00	0.0%
	31.00	1.00	0.00	0.00	0.00		0.00	0.00	0.0%
	31.60	0.90	0.00	0.00	0.00		0.00	0.00	0.0%
	32.00	0.90	0.00	0.00	0.00		0.00	0.00	0.0%
	32.50	0.90	0.00	0.00	0.00		0.00	0.00	0.0%
	33.00	0.90	0.00	0.00	0.00		0.00	0.00	0.0%
	33.50	0.85	0.00	0.00	0.00		0.00	0.00	0.0%
	34.00	0.95	0.00	0.00	0.00		0.00	0.00	0.0%
	34.50	1.05	0.00	0.00	0.00		0.00	0.00	0.0%
	35.00	1.10	0.00	0.00	0.00		0.00	0.00	0.0%
	35.50	1.10	0.00	0.00	0.00		0.00	0.00	0.0%
1 G	36.00	1.20	0.00	0.00	0.00		0.00	0.00	0.0%
	36.50	1.25	0.00	0.00	0.00		0.00	0.00	0.0%
	37.00	1.20	0.00	0.00	0.00		0.00	0.00	0.0%
	37.50	1.13	0.00	0.00	0.00		0.00	0.00	0.0%
	38.00	0.58	0.00	0.00	0.00		0.00	0.00	0.0%
	38.50	0.42	0.00	0.00	0.00		0.00	0.00	0.0%
	39.00	0.66	0.00	0.00	0.00		0.00	0.00	0.0%
	39.50	0.58	0.00	0.00	0.00		0.00	0.00	0.0%
	40.00	0.42	0.00	0.00	0.00		0.00	0.00	0.0%
	40.50	0.42	0.00	0.00	0.00		0.00	0.00	0.0%
S	40.90	0.21	0.00	0.00	0.00		0.00	0.00	0.0%
TOTALS ----------					23.66	0.7 (Max.)	8.48	7.37	100.0%

Manning's n = 0.1342
Hydraulic Radius= 0.358463492

STREAM NAME: Upper Gold Creek
XS LOCATION: Upper Gold Creek approx. 1 mile DS of confluence with Lampheir Creek
XS NUMBER: ONE

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
	8.48	6.42	-24.3%
1.43	8.48	12.27	44.7%
1.45	8.48	11.80	39.1%
1.47	8.48	11.32	33.5%
1.49	8.48	10.85	27.9%
1.51	8.48	10.37	22.3%
1.53	8.48	9.90	16.8%
1.55	8.48	9.43	11.2%
1.57	8.48	8.96	5.7%
1.59	8.48	8.50	0.2%
1.61	8.48	8.03	-5.3%
1.63	8.48	7.56	-10.8%
1.64	8.48	7.33	-13.5%
1.65	8.48	7.10	-16.2%
1.66	8.48	6.88	-18.9%
1.67	8.48	6.65	-21.6%
1.68	8.48	6.42	-24.3%
1.69	8.48	6.19	-26.9%
1.70	8.48	5.97	-29.6%
1.71	8.48	5.75	-32.2%
1.72	8.48	5.52	-34.9%
1.73	8.48	5.30	-37.5%
1.75	8.48	4.86	-42.6%
1.77	8.48	4.43	-47.7%
1.79	8.48	4.01	-52.8%
1.81	8.48	3.59	-57.7%
1.83	8.48	3.18	-62.6%
1.85	8.48	2.78	-67.3%
1.87	8.48	2.39	-71.8%
1.89	8.48	2.03	-76.1%
1.91	8.48	1.69	-80.1%
1.93	8.48	1.39	-83.6%

WATERLINE AT ZERO
AREA ERROR = 1.586

STREAM NAME: Upper Gold Creek
XS LOCATION: Upper Gold Creek approx. 1 mile DS of confluence with Lampheir Creek
XS NUMBER: ONE

Constant Manning's n

GL = lowest Grassline elevation corrected for sag
STAGING TABLE *WL* = Waterline corrected for variations in field measured water surface elevations and sag

	DIST TO WATER (FT)	TOP WIDTH (FT)	AVG. DEPTH (FT)	MAX. DEPTH (FT)	AREA (SQ FT)	WETTED PERIM. (FT)	PERCENT WET PERIM (%)	HYDR RADIUS (FT)	FLOW (CFS)	AVG. VELOCITY (FT/SEC)	
GL	1.20	26.33	0.68	0.95	17.83	27.19	100.0%	0.66	23.18	1.30	
	1.24	25.41	0.67	0.91	16.91	26.24	96.5%	0.64	21.72	1.28	
	1.29	24.83	0.63	0.86	15.66	25.63	94.3%	0.61	19.41	1.24	
	1.34	24.36	0.59	0.81	14.42	25.14	92.5%	0.57	17.16	1.19	
	1.39	24.06	0.55	0.76	13.21	24.81	91.2%	0.53	14.96	1.13	
	1.44	23.85	0.50	0.71	12.02	24.57	90.4%	0.49	12.85	1.07	
	1.49	23.64	0.46	0.66	10.83	24.33	89.5%	0.45	10.88	1.00	*Preliminary summer flow r
	1.54	23.50	0.41	0.61	9.65	24.14	88.8%	0.40	9.02	0.93	
WL	1.59	23.37	0.36	0.56	8.48	23.99	88.2%	0.35	7.30	0.86	*Preliminary winter flow rec
	1.64	23.01	0.32	0.51	7.32	23.58	86.7%	0.31	5.78	0.79	
	1.69	22.55	0.27	0.46	6.18	23.07	84.9%	0.27	4.42	0.72	
	1.74	21.89	0.23	0.41	5.07	22.35	82.2%	0.23	3.25	0.64	
	1.79	21.13	0.19	0.36	3.99	21.52	79.2%	0.19	2.24	0.56	
	1.84	20.00	0.15	0.31	2.96	20.33	74.8%	0.15	1.41	0.48	
	1.89	17.50	0.12	0.26	2.01	17.76	65.3%	0.11	0.81	0.40	
	1.94	13.46	0.09	0.21	1.24	13.65	50.2%	0.09	0.43	0.35	
	1.99	9.94	0.07	0.16	0.66	10.07	37.0%	0.07	0.18	0.28	
	2.04	4.93	0.06	0.11	0.32	5.00	18.4%	0.06	0.09	0.28	
	2.09	2.99	0.04	0.06	0.13	3.02	11.1%	0.04	0.03	0.21	
	2.14	1.48	0.01	0.01	0.02	1.48	5.4%	0.01	0.00	0.09	

STREAM NAME: Upper Gold Creek
XS LOCATION: Upper Gold Creek approx. 1 mile DS of confluence with Lampheir Creek
XS NUMBER: ONE

SUMMARY SHEET

MEASURED FLOW (Qm)=	7.37	cfs
CALCULATED FLOW (Qc)=	7.30	cfs
(Qm-Qc)/Qm * 100 =	0.9	%
MEASURED WATERLINE (WLm)=	1.68	ft
CALCULATED WATERLINE (WLc)=	1.59	ft
(WLm-WLc)/WLm * 100 =	5.3	%
MAX MEASURED DEPTH (Dm)=	0.70	ft
MAX CALCULATED DEPTH (Dc)=	0.56	ft
(Dm-Dc)/Dm * 100	19.4	%
MEAN VELOCITY=	0.86	ft/sec
MANNING'S N=	0.134	
SLOPE=	0.0242	ft/ft
.4 * Qm =	2.9	cfs
2.5 * Qm=	18.4	cfs

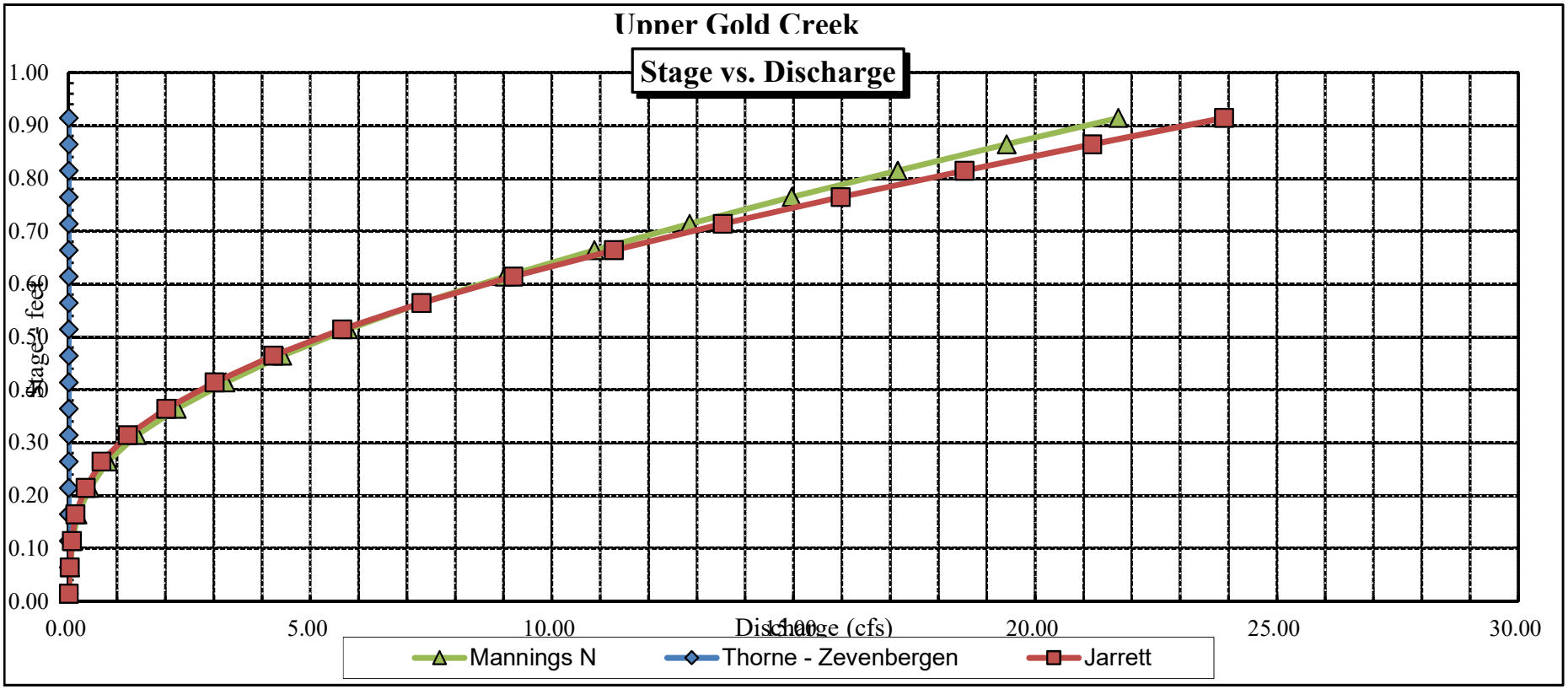
RECOMMENDED INSTREAM FLOW:
==========

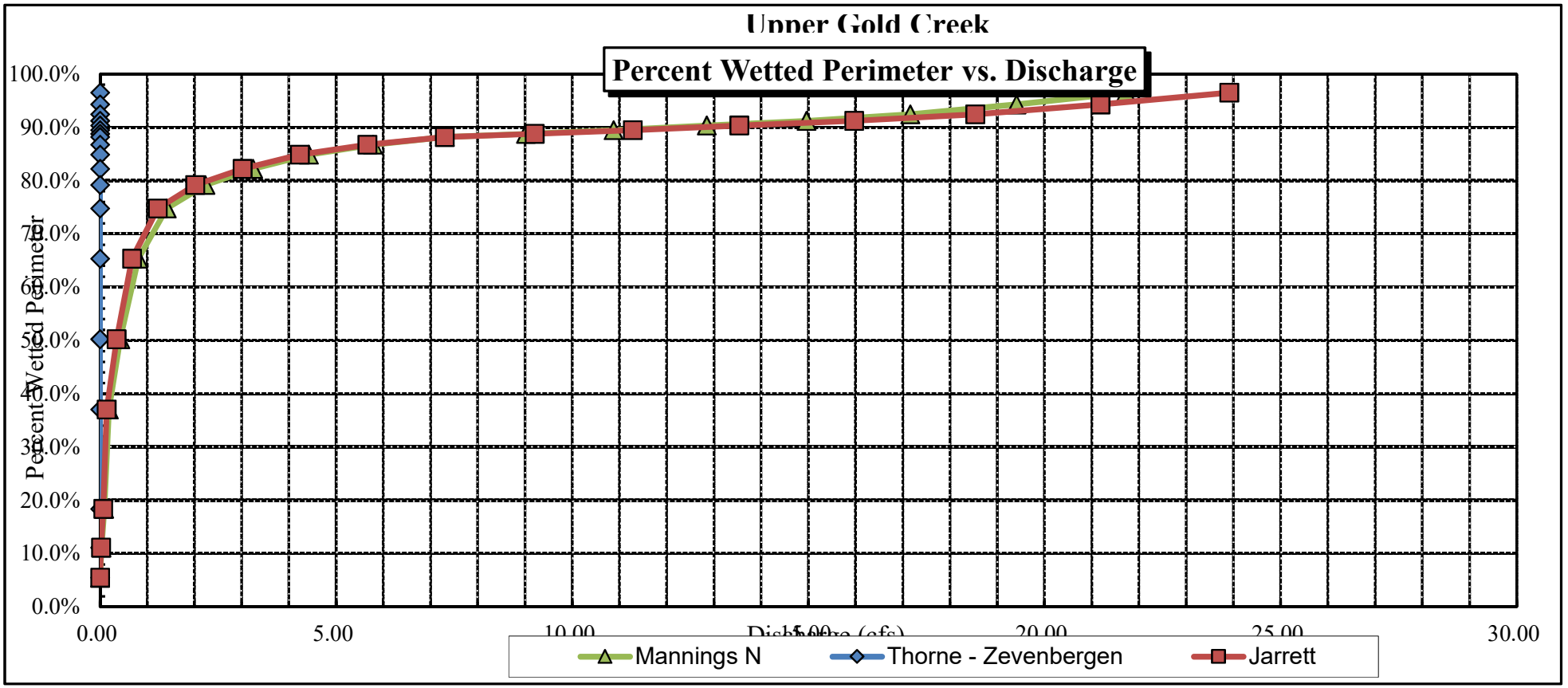
FLOW (CFS)	PERIOD
==========	========
_____	_____
_____	_____
_____	_____
_____	_____

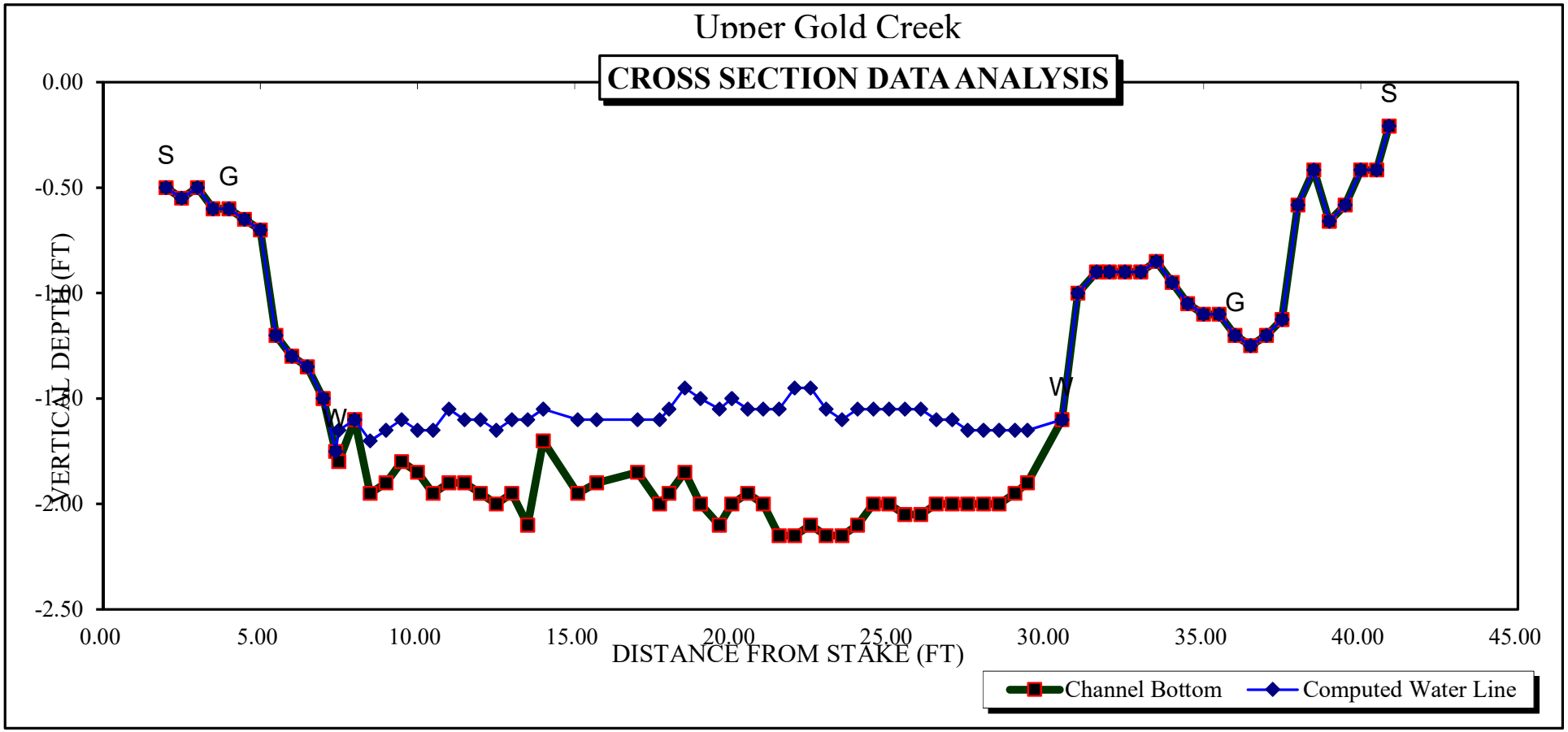
RATIONALE FOR RECOMMENDATION:
==========

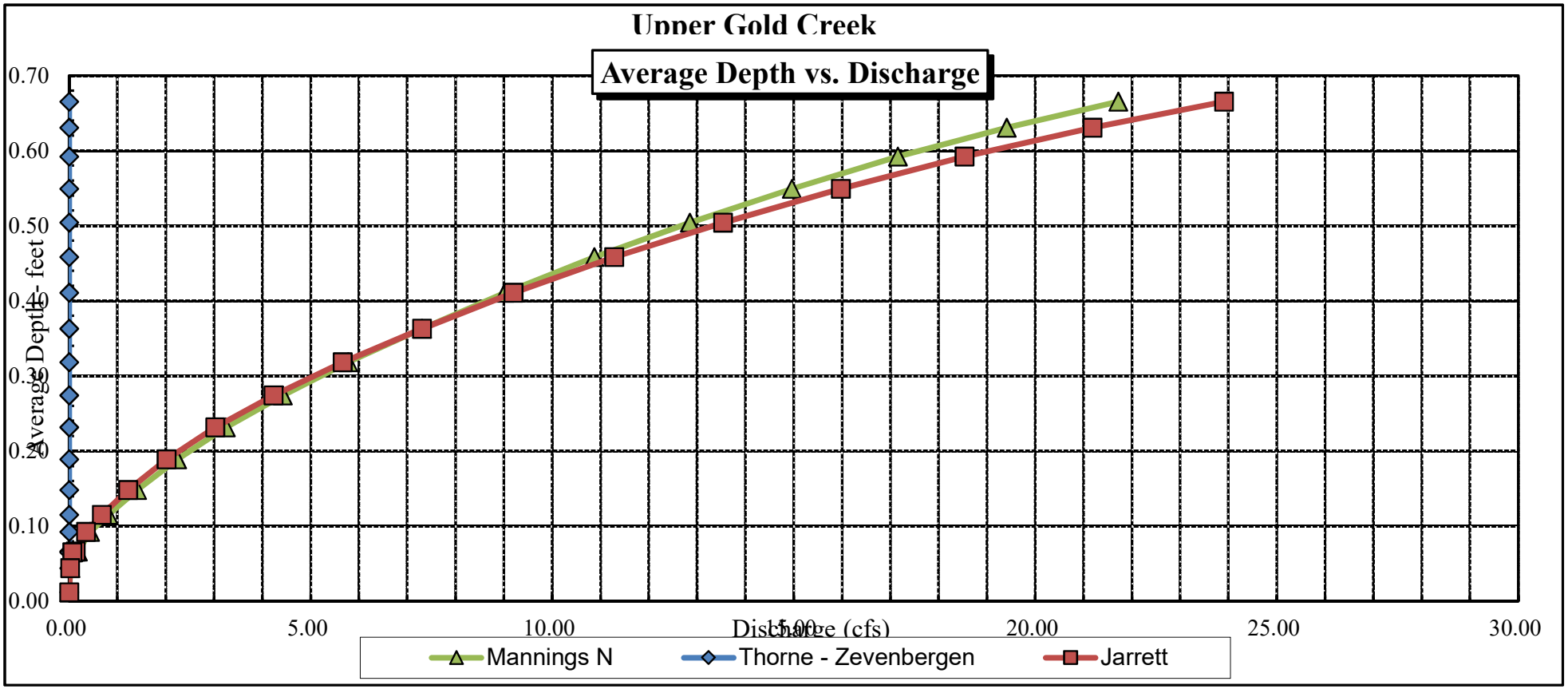
RECOMMENDATION BY: ..... AGENCY..... DATE:.....

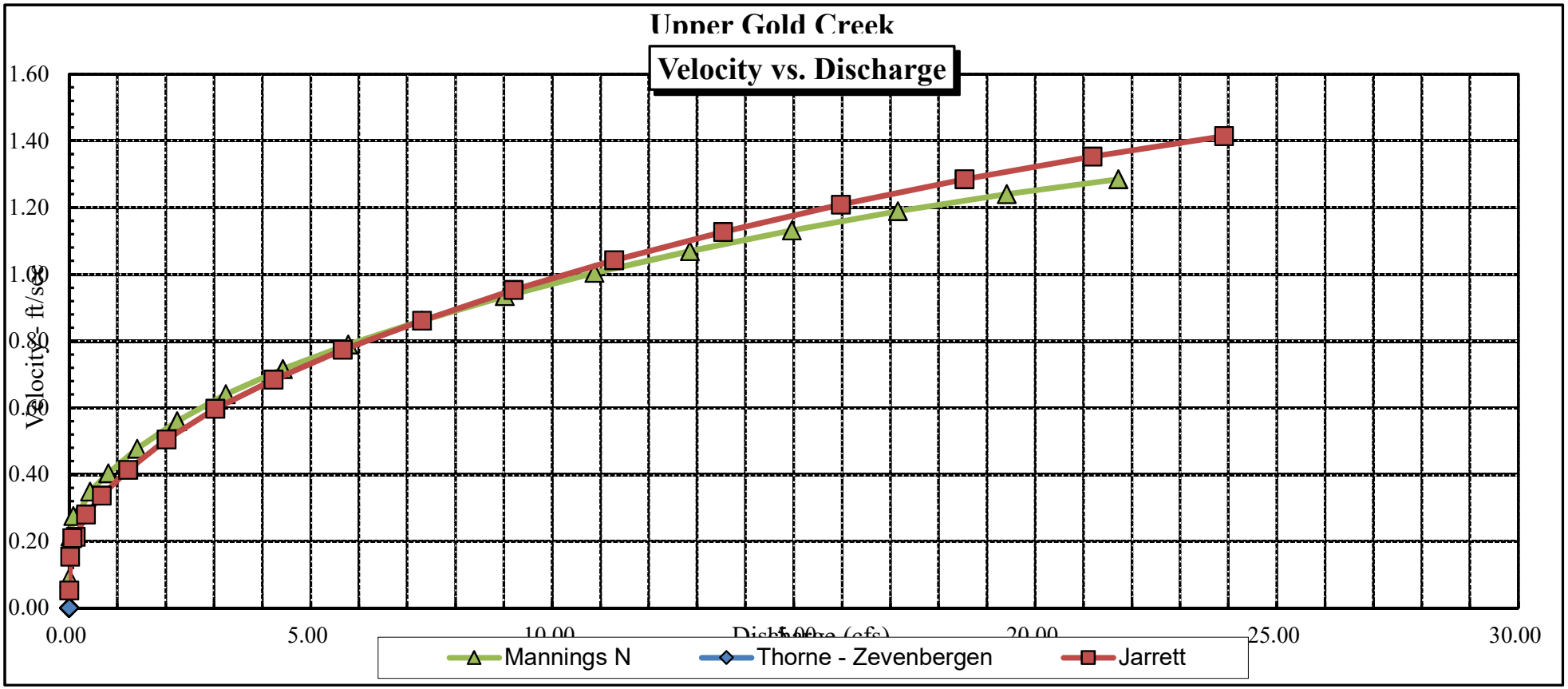
CWCB REVIEW BY: ..... DATE:.....


Upper Gold Creek
Stage vs. Discharge
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Stage, feet
0.00
5.00
10.00
15.00
20.00
25.00
30.00
Discharge (cfs)
Mannings N
Thorne - Zevenbergen
Jarrett


Upper Gold Creek
Percent Wetted Perimeter vs. Discharge
Percent Wetted Perimeter
100.0%
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
0.00
5.00
10.00
15.00
20.00
25.00
30.00
Mannings N
Thorne - Zevenbergen
Jarrett


Upper Gold Creek
CROSS SECTION DATA ANALYSIS
0.00
-0.50
-1.00
-1.50
-2.00
-2.50
VERTICAL DEPTH (FT)
0.00
5.00
10.00
15.00
20.00
25.00
30.00
35.00
40.00
45.00
DISTANCE FROM STAKE (FT)
S
G
W
W
G
S
Channel Bottom
Computed Water Line


Upper Gold Creek
Average Depth vs. Discharge
Average Depth - feet
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0.00
5.00
10.00
15.00
20.00
25.00
30.00
Discharge (cfs)
Mannings N
Thorne - Zevenbergen
Jarrett


Upper Gold Creek
Velocity vs. Discharge
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
Velocity - ft/sec
0.00
5.00
10.00
15.00
20.00
25.00
30.00
Mannings N
Thorne - Zevenbergen
Jarrett

COLORADO
Colorado Water Conservation Board
Department of Natural Resources

CWCB ISF site visit notes
Collected using the ESRI Survey123 app on a Samsung tablet

Location description	Gold Creek - D4
Water division	4
Visit date	5/24/2018
Collected by	Jack Landers
General observations	Channel has intermittent beaver pond complexes, healthy riparian community, good floodplain connectivity. Channel between beaver ponds is relatively high gradient with very little pool habitat. Road follows creek for most of its length. At least one active beaver pond.
Wildlife observations	Numerous beaver ponds throughout length, observed fish in ponds (species unknown). Observed song birds and dippers, evidence of ungulate browsing in willow riparian community.
Location	13N 360781 4274570

COLORADO
Colorado Water Conservation Board
Department of Natural Resources

CWCB discharge measurement data
Collected using the ESRI Survey123 app on a Samsung tablet

Stream name	Gold Creek
Location description	Gold Creek - D4
Water division	4
Visit date	4/4/2018
Collected by CWCB staff	Jack Landers
Collected by non-CWCB staff	N/A
Non-CWCB entity	N/A
Measurement method	0.6
Equipment	Flowtracker2_sn_2H1747037
Site name	Gold Creek - D4
Measurement number	404
Weather	clear
Wind	calm
Cross-section description	run, large cobble substrate
Flow conditions	turbulent
Measurement start time	08:19
Flow amount	3.4087
Measurement rating	Poor(>8%)
Discharge comments:	
Location	13N 360580 4273682

COLORADO
Colorado Water Conservation Board
Department of Natural Resources

CWCB discharge measurement data
Collected using the ESRI Survey123 app on a Samsung tablet

Stream name	Gold Creek
Location description	Gold Creek D4
Water division	4
Visit date	5/24/2018
Collected by CWCB staff	Jack Landers
Collected by non-CWCB staff	N/A
Non-CWCB entity	N/A
Measurement method	wadingADV
Equipment	Flowtracker1_P2355
Site name	GOLDCRD4
Measurement number	2
Weather	clear, no recent precip
Wind	calm
Cross-section description	riffle, large cobbles
Flow conditions	turbulent
Measurement start time	09:00
Flow amount	23.742
Measurement rating	Fair(8%)
Discharge comments:	hard to find good xsec, mostly riffles, few pools and runs. beaver ponds in other areas
Location	13N 360810 4274605

Discharge Measurement Summary

File Information

File name	20180404_Gold Creek - D4.ft
Start date and time	4/4/2018 8:21 AM
Calculations engine	FlowTracker2
Data collection mode	Discharge

Discharge Summary

Start time	4/4/2018 8:24:19 AM	End time	4/4/2018 8:47:27 AM
# Stations	20	Avg interval	40
Mean depth	0.374 ft		
Mean velocity	0.7237 ft/s	Total width	12.600 ft
Mean SNR	34 dB	Total area	4.7100 ft²
Mean temp	31.968 °F	Total discharge	3.4087 ft³/s

System Information

Sensor type	Top Setting
Handheld serial number	FT2H1747037
Probe serial number	FT2P1747048
Probe firmware	1.23
Handheld software	1.4

Site Details

Site name	Gold Creek - D4
Site number	0404
Operator(s)	Jack Landers
Comment	Spot meas

Discharge Uncertainty

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	0.5%	7.5%
Velocity	1.9%	14.4%
Width	0.2%	0.2%
Method	2.7%	
# Stations	2.5%	
Overall	4.3%	16.3%

Discharge Settings

Discharge equation	Mid Section
Discharge uncertainty	IVE
Discharge reference	Rated

Station Warning Settings

Station discharge caution	5.00	%
Station discharge warning	10.00	%
Maximum depth change	50.00	%
Maximum spacing change	100.00	%

Summary overview

No changes were made to this file
Quality control warnings

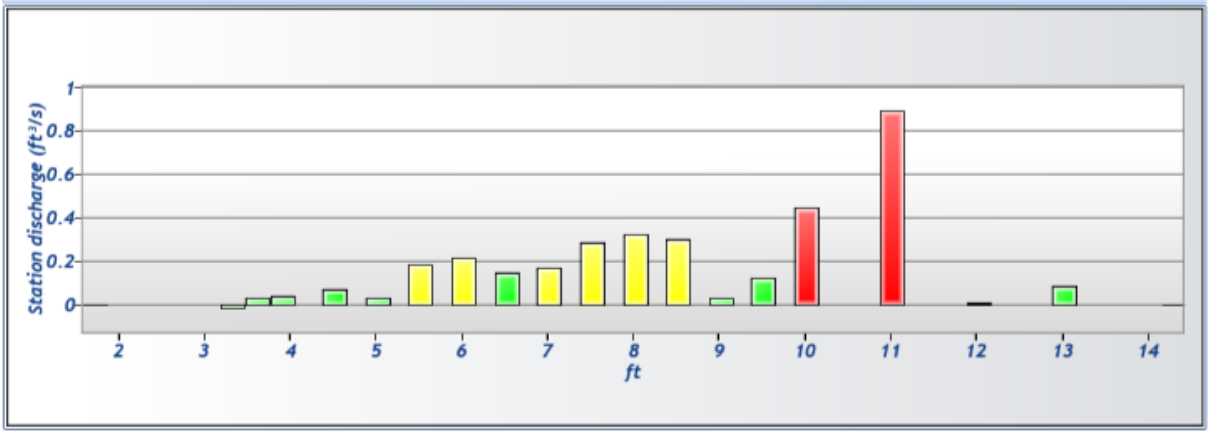
Data Collection Settings

Salinity	0.000	PSS-78
Temperature		°F
Sound speed		ft/s
Mounting correction	0.00	%

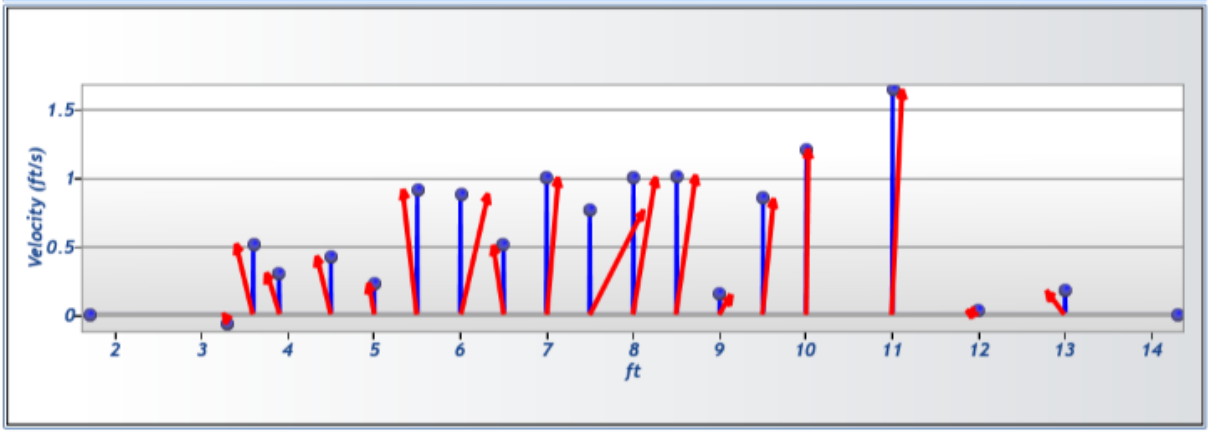
Quality Control Settings

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

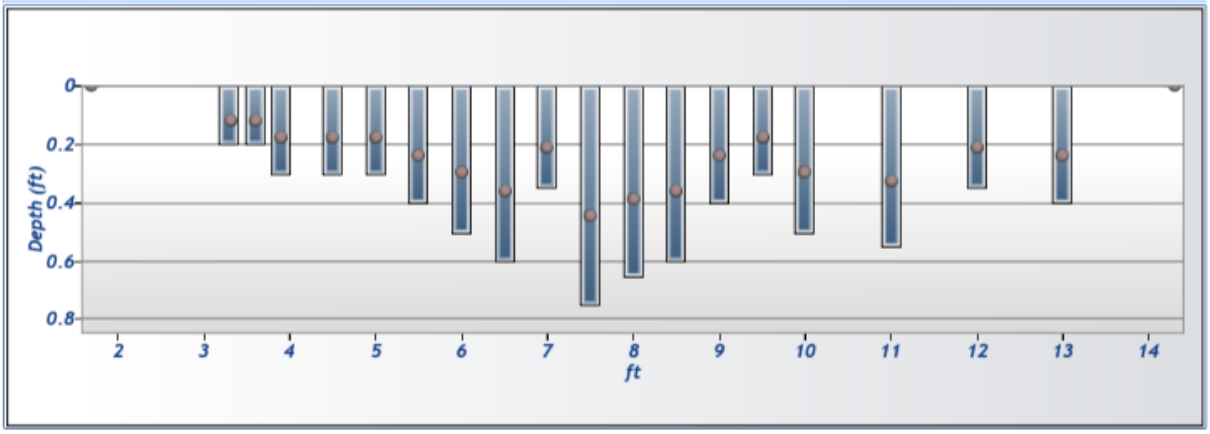
Discharge chart



Velocity chart



Depth chart



Measurement results

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	8:24 AM	1.700	None	0.000	0.0000	0.000	0	0.0000	1.0000	-0.0662	0.0000	0.0000	0.00	✓	
1	8:24 AM	3.300	0.6	0.200	0.6000	0.120	80	-0.0662	1.0000	-0.0662	0.1900	-0.0126	-0.37	✓	
2	8:26 AM	3.600	0.6	0.200	0.6000	0.120	80	0.5144	1.0000	0.5144	0.0600	0.0309	0.91	✓	
3	8:27 AM	3.900	0.6	0.300	0.6000	0.180	80	0.3046	1.0000	0.3046	0.1350	0.0411	1.21	✓	
4	8:28 AM	4.500	0.6	0.300	0.6000	0.180	80	0.4273	1.0000	0.4273	0.1650	0.0705	2.07	✓	
5	8:30 AM	5.000	0.6	0.300	0.6000	0.180	80	0.2319	1.0000	0.2319	0.1500	0.0348	1.02	✓	
6	8:31 AM	5.500	0.6	0.400	0.6000	0.240	80	0.9134	1.0000	0.9134	0.2000	0.1827	5.36	✓	
7	8:32 AM	6.000	0.6	0.500	0.6000	0.300	80	0.8760	1.0000	0.8760	0.2500	0.2190	6.43	✓	
8	8:33 AM	6.500	0.6	0.600	0.6000	0.360	80	0.5051	1.0000	0.5051	0.3000	0.1515	4.45	✓	
9	8:35 AM	7.000	0.6	0.350	0.6000	0.210	80	0.9970	1.0000	0.9970	0.1750	0.1745	5.12	✓	
10	8:36 AM	7.500	0.6	0.750	0.6000	0.450	80	0.7636	1.0000	0.7636	0.3750	0.2863	8.40	✓	
11	8:37 AM	8.000	0.6	0.650	0.6000	0.390	80	0.9961	1.0000	0.9961	0.3250	0.3237	9.50	✓	
12	8:38 AM	8.500	0.6	0.600	0.6000	0.360	80	1.0118	1.0000	1.0118	0.3000	0.3036	8.91	✓	
13	8:39 AM	9.000	0.6	0.400	0.6000	0.240	80	0.1518	1.0000	0.1518	0.2000	0.0304	0.89	✓	
14	8:41 AM	9.500	0.6	0.300	0.6000	0.180	80	0.8453	1.0000	0.8453	0.1500	0.1268	3.72	✓	
15	8:42 AM	10.000	0.6	0.500	0.6000	0.300	80	1.2052	1.0000	1.2052	0.3750	0.4520	13.26	✓	
16	8:43 AM	11.000	0.6	0.550	0.6000	0.330	80	1.6372	1.0000	1.6372	0.5500	0.9005	26.42	✓	
17	8:44 AM	12.000	0.6	0.350	0.6000	0.210	80	0.0313	1.0000	0.0313	0.3500	0.0110	0.32	✓	
18	8:46 AM	13.000	0.6	0.400	0.6000	0.240	80	0.1785	1.0000	0.1785	0.4600	0.0821	2.41	✓	
19	8:47 AM	14.300	None	0.000	0.0000	0.000	0	0.0000	1.0000	0.1785	0.0000	0.0000	0.00	✓	

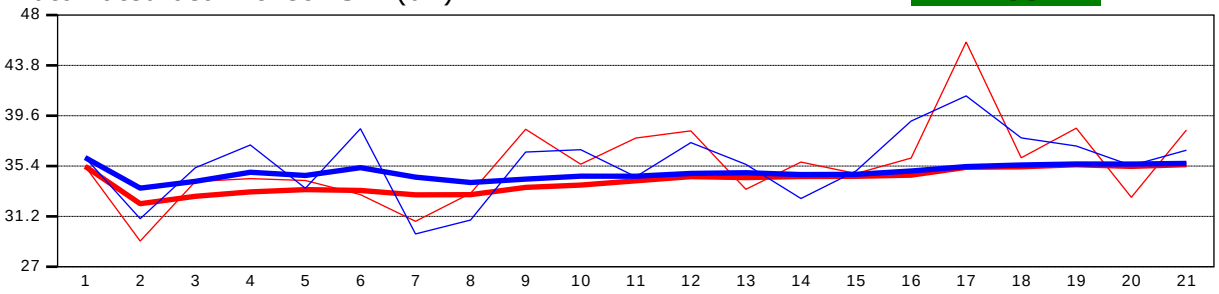
Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
1	8:24 AM	3.300	0.6	0.200	0.6000	0.120	Boundary Interference,Beam SNRs Not Similar,Velocity Angle > QC
2	8:26 AM	3.600	0.6	0.200	0.6000	0.120	Stn Spacing > QC,Velocity Angle > QC
3	8:27 AM	3.900	0.6	0.300	0.6000	0.180	Stn Spacing > QC,Velocity Angle > QC
4	8:28 AM	4.500	0.6	0.300	0.6000	0.180	Velocity Angle > QC
8	8:33 AM	6.500	0.6	0.600	0.6000	0.360	Boundary Interference,SNR Threshold Variation,Standard Error > QC
10	8:36 AM	7.500	0.6	0.750	0.6000	0.450	Boundary Interference,Standard Error > QC,Velocity Angle > QC
11	8:37 AM	8.000	0.6	0.650	0.6000	0.390	Standard Error > QC
12	8:38 AM	8.500	0.6	0.600	0.6000	0.360	Standard Error > QC
13	8:39 AM	9.000	0.6	0.400	0.6000	0.240	Velocity Angle > QC
14	8:41 AM	9.500	0.6	0.300	0.6000	0.180	Standard Error > QC
15	8:42 AM	10.000	0.6	0.500	0.6000	0.300	Standard Error > QC,High Stn % Discharge
16	8:43 AM	11.000	0.6	0.550	0.6000	0.330	Standard Error > QC,High Stn % Discharge
18	8:46 AM	13.000	0.6	0.400	0.6000	0.240	Velocity Angle > QC

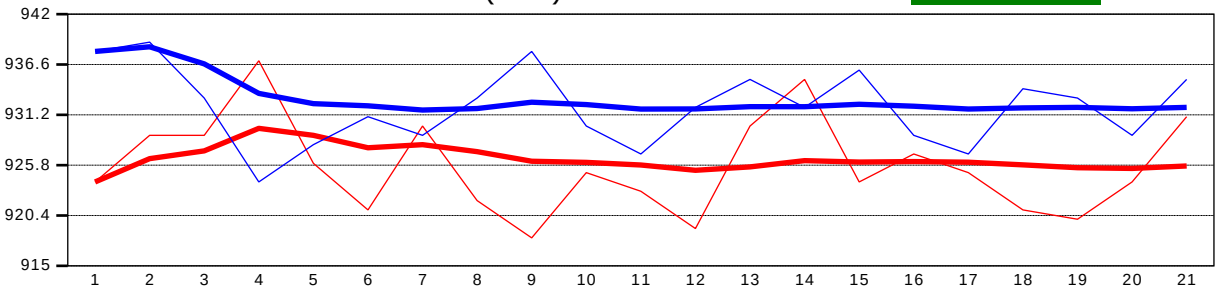
11/20/2018 12:05:42 PM

Automated beam check Start time 4/4/2018 8:23:31 AM

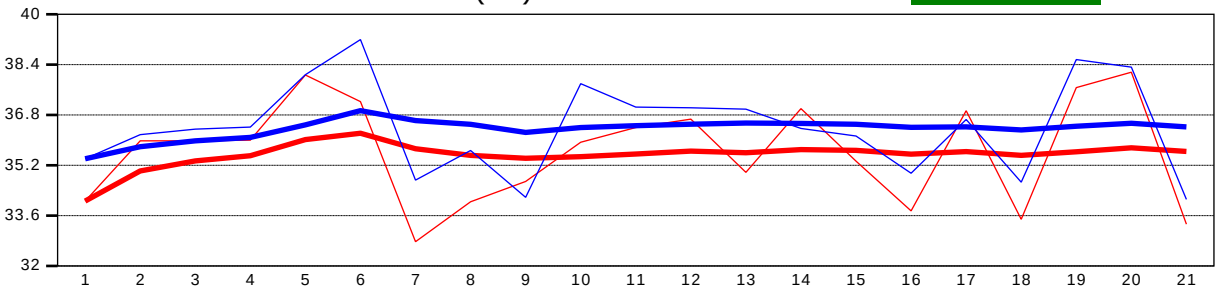
Automated beam check SNR(dB) PASS



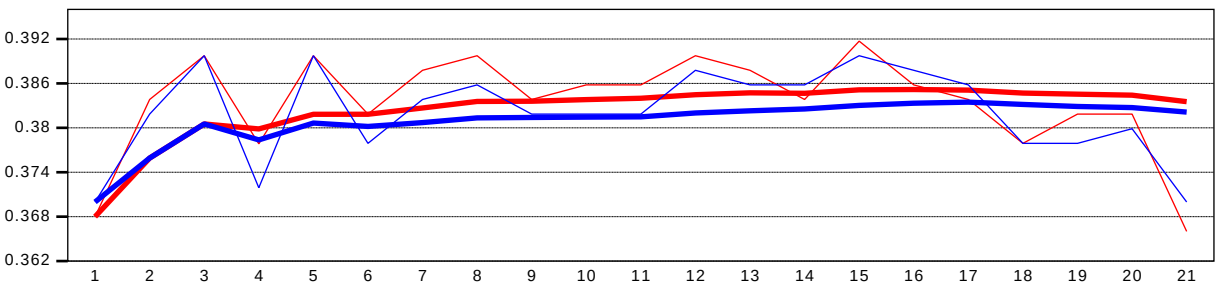
Automated beam check Noise level(cnts) PASS



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

File Information

File name	GOLDCRD4.002.FlowTracker1.ft
Start date and time	5/24/2018 9:00 AM
Calculations engine	FlowTracker1
Data collection mode	Discharge

Discharge Summary

Start time	5/24/2018 9:00:00 AM	End time	5/24/2018 9:17:00 AM
# Stations	20	Avg interval	40
Mean depth	0.673 ft		
Mean velocity	1.8551 ft/s	Total width	18.999 ft
Mean SNR	36 dB	Total area	12.7983 ft²
Mean temp	37.094 °F	Total discharge	23.7421 ft³/s

System Information

Sensor type	Unknown
Handheld serial number	P2355
Probe serial number	P2355
Probe firmware	3.9
Handheld software	3.9

Site Details

Site name	GOLD CREEK D4
Site number	
Operator(s)	JACK LANDERS
Comment	

Discharge Uncertainty

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	0.4%	3.8%
Velocity	1.8%	6.7%
Width	0.1%	0.1%
Method	2.0%	
# Stations	2.5%	
Overall	3.8%	7.8%

Discharge Settings

Discharge equation	Mid Section
Discharge uncertainty	IVE
Discharge reference	Measured

Station Warning Settings

Station discharge caution	5.00	%
Station discharge warning	10.00	%
Maximum depth change	50.00	%
Maximum spacing change	100.00	%

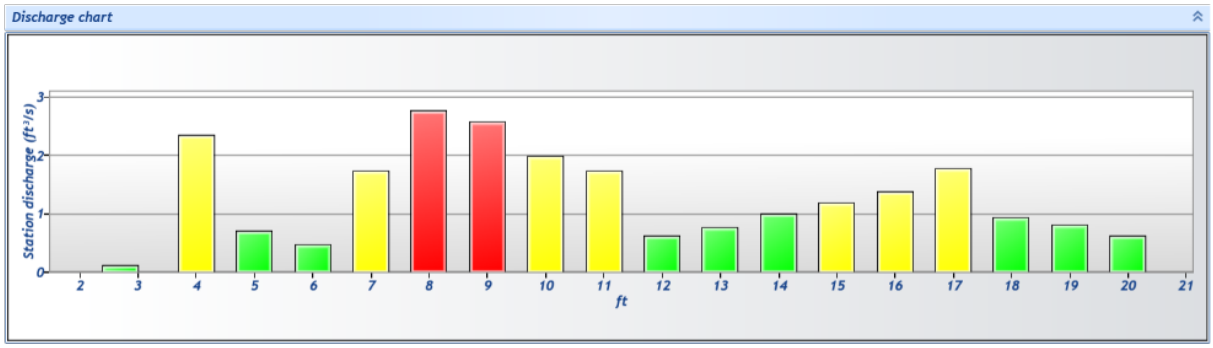
Summary overview

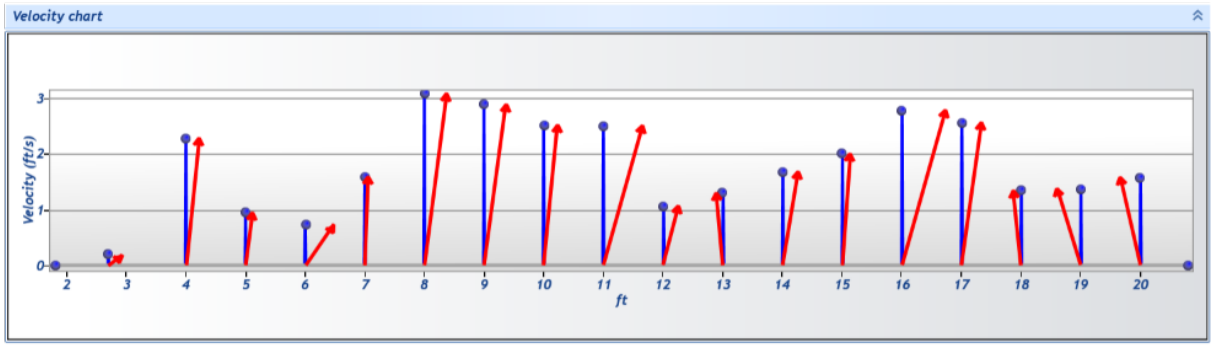
Data Collection Settings

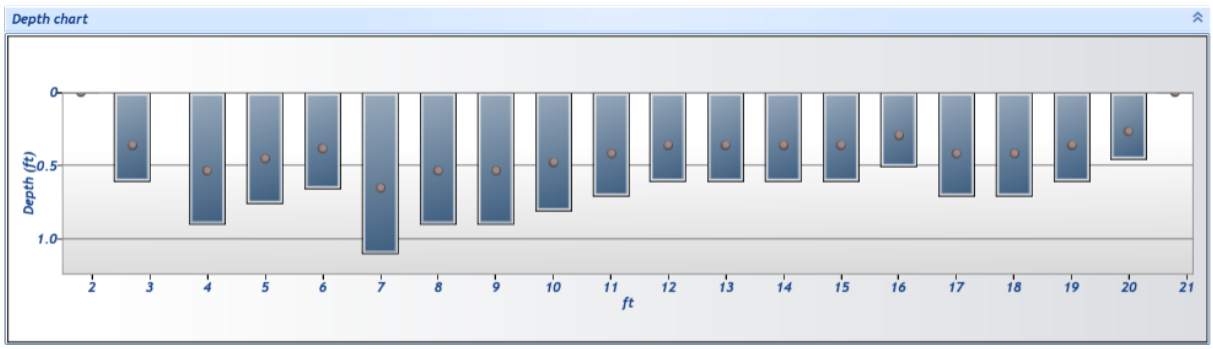
Salinity	0.000	PSS-78
Temperature		°F
Sound speed		ft/s
Mounting correction	0.00	%

Quality Control Settings

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


Discharge chart
Station discharge (ft³/s)
0
1
2
3
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
ft


Velocity chart
Velocity (ft/s)
0
1
2
3
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
ft


Depth chart
Depth (ft)
0
0.5
1.0
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
ft

Measurement results

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	9:00 AM	1.804	None	0.000	0.0000	0.000	0	0.0000	1.0000	0.0000	0.0000	0.0000	0.00	✓
1	9:00 AM	2.700	0.6	0.600	0.6000	0.361	40	0.1946	1.0000	0.1946	0.6566	0.1271	0.50	✓
2	9:01 AM	3.999	0.6	0.899	0.6000	0.538	40	2.2808	1.0000	2.2808	1.0333	2.3590	9.90	✓
3	9:03 AM	5.000	0.6	0.751	0.6000	0.453	40	0.9501	1.0000	0.9501	0.7535	0.7134	3.00	✓
4	9:04 AM	6.001	0.6	0.650	0.6000	0.390	40	0.7392	1.0000	0.7392	0.6458	0.4803	2.00	✓
5	9:05 AM	7.001	0.6	1.099	0.6000	0.659	40	1.5807	1.0000	1.5807	1.0979	1.7375	7.30	✓
6	9:06 AM	7.999	0.6	0.899	0.6000	0.538	40	3.0778	1.0000	3.0778	0.9042	2.7687	11.70	✓
7	9:07 AM	8.999	0.6	0.899	0.6000	0.538	40	2.8819	1.0000	2.8819	0.9042	2.5921	10.90	✓
8	9:08 AM	10.000	0.6	0.801	0.6000	0.479	40	2.5082	1.0000	2.5082	0.7965	2.0059	8.50	✓
9	9:09 AM	11.001	0.6	0.699	0.6000	0.420	40	2.5000	1.0000	2.5000	0.6997	1.7516	7.40	✓
10	9:10 AM	12.001	0.6	0.600	0.6000	0.361	40	1.0679	1.0000	1.0679	0.6028	0.6392	2.70	✓
11	9:11 AM	12.999	0.6	0.600	0.6000	0.361	40	1.2946	1.0000	1.2946	0.6028	0.7769	3.30	✓
12	9:12 AM	13.999	0.6	0.600	0.6000	0.361	40	1.6722	1.0000	1.6722	0.6028	1.0029	4.20	✓
13	9:13 AM	15.000	0.6	0.600	0.6000	0.361	40	2.0056	1.0000	2.0056	0.6028	1.2042	5.10	✓
14	9:14 AM	16.001	0.6	0.499	0.6000	0.299	40	2.7769	1.0000	2.7769	0.4951	1.3879	5.80	✓
15	9:15 AM	17.001	0.6	0.699	0.6000	0.420	40	2.5535	1.0000	2.5535	0.6997	1.7869	7.50	✓
16	9:15 AM	17.999	0.6	0.699	0.6000	0.420	40	1.3392	1.0000	1.3392	0.6997	0.9394	3.90	✓
17	9:16 AM	18.999	0.6	0.600	0.6000	0.361	40	1.3753	1.0000	1.3753	0.6028	0.8264	3.50	✓
18	9:17 AM	20.000	0.6	0.449	0.6000	0.269	40	1.5748	1.0000	1.5748	0.4090	0.6392	2.70	✓
19	9:17 AM	20.801	None	0.000	0.0000	0.000	0	0.0000	1.0000	0.0000	0.0000	0.0000	0.00	✓

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
1	9:00 AM	2.700	0.6	0.600	0.6000	0.361	Beam SNRs Not Similar,Large SNR Variation,SNR Threshold Variation,Standard Error > QC,High % Spikes,Velocity Angle > QC
2	9:01 AM	3.999	0.6	0.899	0.6000	0.538	Standard Error > QC
3	9:03 AM	5.000	0.6	0.751	0.6000	0.453	Standard Error > QC
4	9:04 AM	6.001	0.6	0.650	0.6000	0.390	Standard Error > QC,Velocity Angle > QC
5	9:05 AM	7.001	0.6	1.099	0.6000	0.659	Standard Error > QC
6	9:06 AM	7.999	0.6	0.899	0.6000	0.538	Standard Error > QC,High Stn % Discharge
7	9:07 AM	8.999	0.6	0.899	0.6000	0.538	Standard Error > QC,High Stn % Discharge
8	9:08 AM	10.000	0.6	0.801	0.6000	0.479	Standard Error > QC
9	9:09 AM	11.001	0.6	0.699	0.6000	0.420	Standard Error > QC
10	9:10 AM	12.001	0.6	0.600	0.6000	0.361	Standard Error > QC
11	9:11 AM	12.999	0.6	0.600	0.6000	0.361	Standard Error > QC
12	9:12 AM	13.999	0.6	0.600	0.6000	0.361	Standard Error > QC
13	9:13 AM	15.000	0.6	0.600	0.6000	0.361	Standard Error > QC
14	9:14 AM	16.001	0.6	0.499	0.6000	0.299	Standard Error > QC
15	9:15 AM	17.001	0.6	0.699	0.6000	0.420	Standard Error > QC
16	9:15 AM	17.999	0.6	0.699	0.6000	0.420	Standard Error > QC
17	9:16 AM	18.999	0.6	0.600	0.6000	0.361	Standard Error > QC
18	9:17 AM	20.000	0.6	0.449	0.6000	0.269	Standard Error > QC