DRAFT RECOMMENDATION – SUBJECT TO CHANGE

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 Stinking Gulch, located in Water Division 6.

Location and Land Status. Stinking Gulch is tributary to Milk Creek approximately 12 miles southwest of Craig. This recommendation covers the stream reach beginning at the headwaters (Latitude 40.26072 Latitude -107.63441) and extends downstream to the confluence with Milk Creek (Latitude 40.34206 Latitude -107.75393), a distance of 16.1 miles. Of this reach, BLM manages 1.3 miles, while 14.1 miles are in private ownership.

Biological Summary. Stinking Gulch has two morphologically distinct reaches. In the headwaters portions of the watershed, Stinking Gulch is moderate gradient stream in a valley approximately 0.5 miles in width. The stream has a stable channel and small substrate size, ranging from silt to gravel. This portion of stream has a good mix of riffle, run, and pool habitat to support native fish populations. Just to the west of Monument Butte, Stinking Gulch descends into a much wider valley, and the stream becomes very low gradient. This portion of Stinking Gulch is characterized by a meandering channel, abundant side-channel and backwater habitat, few riffles, and slow stream velocities, which provides good rearing habitat for young-of-the year native fish species. Water quality and stream temperatures appear to favor native species.

Fish surveys indicate that the upper portion of the creek supports native Speckled Dace and nonnative Creek Chub. The lower, low gradient portion of the creek provides habitat for native species, including flannelmouth suckers, bluehead suckers, roundtail chub, and speckled dace. However, some non-native species also inhabit the creek, including Creek Chub, Red-Side Shiner, Sand Shiner, and White Sucker, among others. The lower portion of the creek appears to provide some spawning habitat for native species that generally reside in the Yampa River. The water contributed to Milk Creek by Stinking Gulch during base flow periods provides important support to the native fish habitat in Milk Creek

The creek supports a riparian community comprised of sedges, rushes and riparian grasses. The riparian community has been impacted by historic grazing practices but is now on an upward trend.

R2Cross Analysis. BLM collected the following R2Cross data from Stinking Gulch.

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)
8/1/2017 #1	1.32 cfs	7.39 feet	1.17 cfs	1.37 cfs
8/1/2017 #2	1.14 cfs	9.51 feet	0.63 cfs	1.91 cfs
		Averages:	**0.90 cfs**	**1.64 cfs**

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

NOTE: THE RECOMMENDED FLOW RATES BELOW ARE SUBJECT TO FURTHER DATA COLLECTION, MODELING, AND WATER AVAILABILITY ANALYSIS.

1.6 cubic feet per second is recommended from April 1 to July 31. This period covers the snowmelt period and spawning activities by native fishes. In the riffle cross sections collected, the recommended flow rates are driven by the average depth criteria. This flow rate should also provide adequate depths for spawning within the extensive lower gradient portions of the creek that are dominated by pools.

0.9 cubic feet per second is recommended from August 1 to March 31, the base flow period. This recommendation is driven by the average depth criteria and wetted perimeter criteria. BLM believes that maintaining 0.9 cfs will prevent adequate physical habitat during late summer and fall and should keep pools sufficiently free of ice to allow overwintering of fish. This flow rate will also ensure that Stinking Gulch continues to provide an important base flow contribution to the native fish habitat in Milk Creek during base flow periods.

Water Availability. BLM is aware of only one decreed surface diversions within this reach. McCleery Ditch is authorized to divert up to 0.2 cfs under a 1990 priority. In addition, there are several decreed water rights on springs in the upper portion of the watershed. BLM is not aware of any historical gage data for this creek. BLM recommends referring to CSUFlows and Streamstats for data on water availability. In addition, BLM recommends using USGS gage 09250000 (Milk Creek near Thornburgh, CO) as an indicator of the magnitude and timing of snowmelt runoff and base flows in the Milk Creek watershed.

Relationship to Management Plans. The Little Snake Resource Management Plan identifies management of streams supporting sensitive fish species as a priority for BLM. The plan specifies that BLM will work to improve riparian and 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. The objective of this cooperation is to protect habitats for sensitive species, thereby avoiding the listing of the species under the Endangered Species Act.

Data sheets, R2Cross output, fishery survey information, and photographs of the cross section were included with BLM's draft recommendation in February 2024. BLM thanks both Colorado Parks and Wildlife and the CWCB for their cooperation in this effort.

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

Sincerely,

Allan Bittner
Deputy State Director
Resources

cc: Kymm Gresset, Little Snake Field Office
Eric Scherff, Little Snake Field Office
Elijah Water, Little Snake Field Office

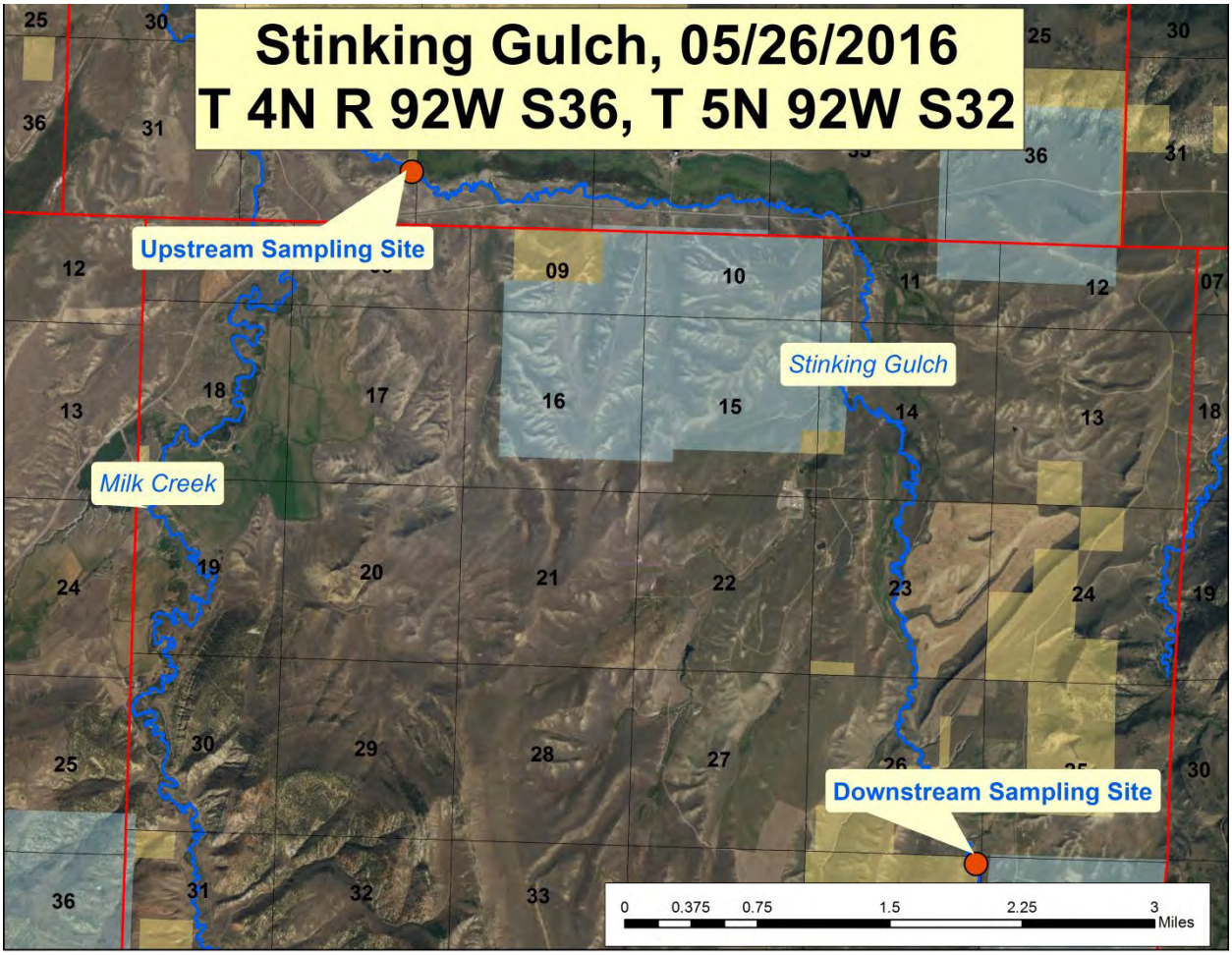
Little Snake Field Office

Stream Sampling May 2016

Stinking Gulch – Water Code #28262

Introduction:

Stinking Gulch, located northeast of Meeker, Colorado on BLM lands managed by the Little Snake Field Office, was sampled on May 26, 2016. Stinking Gulch is tributary to Milk Creek, which is tributary to the Yampa River. The stream was sampled to determine fishery status and species composition as well as to determine if any of the Bluehead Suckers stocked into Milk Creek during the summer of 2015 had moved into this tributary stream. Two sites were sampled using one backpack electroshocker at each location. Creek Chub, Red-Side Shiner, White Sucker, Flannelmouth Sucker, and Speckled Dace were the only species seen or collected. Personnel present included Jenn Logan and crew, CPW, and Tom Fresques and Kristen Doyle, BLM.



Stinking Gulch - Lower Sample Reach

Stinking Gulch Upper Sample Reach

Flannelmouth Sucker

Red-Side Shiner

Discussion:

Upstream Site

Stinking Gulch is a small perennial stream. This site contained native Speckled Dace, and nonnative Creek Chub. No other species were seen or collected.

Riparian vegetation at this site was comprised primarily of sedges, rushes, mertensia, and riparian grasses. Adequate stream shading and cover was lacking as vegetation was limited in density and diversity. Raw banks were common and upland vegetation was encroaching into the riparian area. The stream looked and functioned more like a ditch than a natural stream. Stream habitat was primarily long slow runs and pools with limited riffle habitat. Some pools were relatively deep (1'-3'). Substrate is primarily fine sediments with some cobble and gravel at limited riffle sites. Stream temperature was cold 38.8°F – likely too cold for target native fish to spawn this high up in the watershed.

Downstream Site

This site contained native Flannelmouth Sucker, and Speckled Dace, and nonnative Creek Chub, White Sucker, and Red-Side Shiner. In addition to fish, northern leopard frogs were noted at this site. No other species were seen or collected.

Riparian vegetation at this site was similar to the upper site but contains more dense sedges and rushes. Stream shading and cover was better here but still limited as vegetation was limited in structure and diversity. Raw banks here appeared to be healing but some sloughing was still occurring. Stream habitat was comprised of small riffles, long slow runs, and pools. Some pools were relatively deep (1'-3'). Substrate is primarily fine sediments with some cobble and gravel at limited riffle sites. Stream temperature was cold 52°F but warmer than the upstream site. Temperatures are still too cold for target native fish spawning.

Recommendations:

- Periodically sample these 2 established sites to assess fishery status

COLORADO WATER CONSERVATION BOARD

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

COLORADO DIVISION OF WILDLIFE

LOCATION INFORMATION

STREAM NAME: Stinking Gulch						CROSS-SECTION NO.: 1	
CROSS-SECTION LOCATION: 4 miles upstream from CO Hwy 13 adjacent to State Land Board							
DATE: 8-1-17	OBSERVERS: R. Smith, E. Scharff						
LEGAL DESCRIPTION	¼ SECTION: NENE	SECTION: 35	TOWNSHIP: 4 N/S	RANGE: 92 E/W	PM: Sixth		
COUNTY: Moffat	WATERSHED: Milk Ck/Yampa R.	WATER DIVISION: 6	DOW WATER CODE: 78262				
MAP(S): USGS:	Zone 13 2728554						
USFS:	4462454						

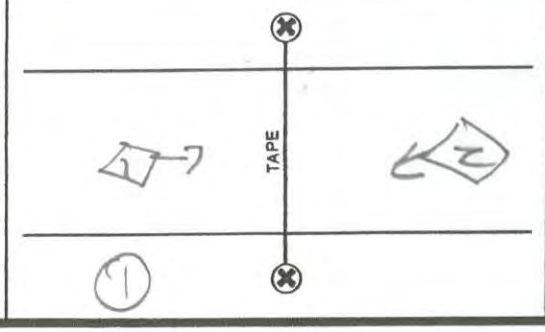
SUPPLEMENTAL DATA

TAG TAPE SECTION SAME AS DISCHARGE SECTION: (YES) NO	METER TYPE: M-M			
METER NUMBER:	DATE RATED:	CALIB/SPIN: _____ sec	TAPE WEIGHT: _____ lbs/foot	TAPE TENSION: _____ lbs
CHANNEL BED MATERIAL SIZE RANGE: silt to gravel	PHOTOGRAPHS TAKEN: (YES)/NO	NUMBER OF PHOTOGRAPHS: 2		

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	9.60/9.60
② WS Upstream	20.0	9.52
③ WS Downstream	28.0	9.76
SLOPE	0.24/48.0 = .005	

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: no stonefly, mayfly, caddisfly

COMMENTS

Grasses, sedges → riparian.
pH = 8.36
Cond = 1142 µS
Temp = 21° C

DISCHARGE/CROSS SECTION NOTES

STREAM NAME: Stinking Gulch	CROSS-SECTION NO.: 1	DATE: 8-1-17	SHEET ___ OF ___
BEGINNING OF MEASUREMENT	EDGE OF WATER LOOKING DOWNSTREAM: (0.0 AT STAKE) LEFT / RIGHT	Gage Reading: ____ ft	TIME: 12:30 pm.

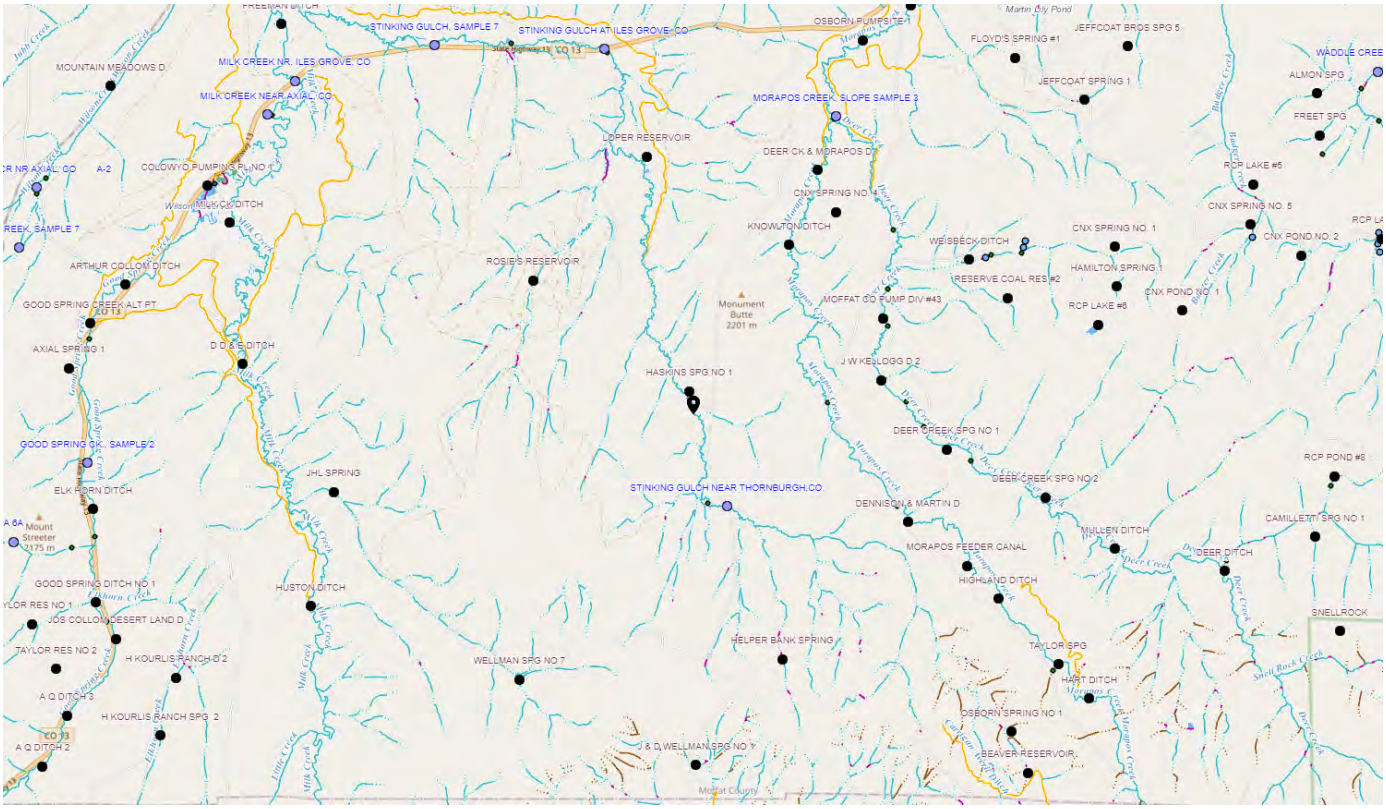
Stake (S) Grassline (G) Waterline (W) Rock (R)	Distance From Initial Point (ft)	Width (ft)	Total Vertical Depth From Tape/Inst (ft)	Water Depth (ft)	Depth of Observation (ft)	Revolutions	Time (sec)	Velocity (ft/sec) At Point	Velocity (ft/sec) Mean in Vertical	Area (ft^2)	Discharge (cfs)
RS	0.8		7.20								
G	1.6		8.22								
W	1.8		9.60								
	2.3		9.75	0.15				0.49			
	2.6		9.80	0.20				0.70			
	2.9		9.85	0.25				0.91			
	3.2		9.85	0.25				0.93			
	3.5		9.80	0.20				1.24			
	3.8		9.80	0.20				1.28			
	4.1		9.85	0.25				1.29			
	4.4		9.85	0.25				1.38			
	4.7		9.85	0.25				1.27			
	5.0		9.8	0.20				1.26			
	5.3		9.8	0.20				1.19			
	5.6		9.8	0.20				1.28			
	5.9		9.75	0.15				1.39			
	6.2		9.8	0.20				1.22			
	6.5		9.8	0.20				1.10			
	6.8		9.8	0.20				1.01			
	7.1		9.80	0.20				0.99			
	7.4		9.90	0.30				1.13			
	7.7		9.80	0.20				0.27			
	8.1			0				0			
W	8.1		9.60								
G	9.0		8.28								
LS	9.8		7.53								
TOTALS:											

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

R2Cross RESULTS

Stream Name: Stinking Gulch
Stream Locations: 4 miles upstream from CO Highway 13 adjacent to lands owned by State Land Board
Fieldwork Date: 08/01/2017
Cross-section: 1
Observers: R. Smith, E. Scherff
Coordinate System: UTM Zone 13
X (easting): 272854
Y (northing): 4462454
Date Processed: 02/26/2024
Slope: 0.005
Discharge: R2Cross data file: 1.32 (cfs)
Computation method: Ferguson VPE
R2Cross data filename: Stinking Gulch 8-1-2017 #1 ERAMS Data Sheet.xlsx
R2Cross version: 2.0.2

LOCATION



ANALYSIS RESULTS

Habitat Criteria Results

Bankfull top width (ft) = 7.39

	Habitat Criteria	Discharge (cfs) Meeting Criteria
Mean Depth (ft)	0.2	1.37
Percent Wetted Perimeter (%)	50.0	0.07
Mean Velocity (ft/s)	1.0	1.17

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	8.28	7.39	1.39	1.62	10.28	9.36	100.0	1.1	0.03	4.44	45.58
	8.3	7.37	1.37	1.6	10.13	9.32	99.53	1.09	0.03	4.41	44.62
	8.35	7.33	1.33	1.55	9.76	9.21	98.34	1.06	0.03	4.33	42.25
	8.4	7.29	1.29	1.5	9.4	9.1	97.15	1.03	0.03	4.25	39.93
	8.45	7.25	1.25	1.45	9.03	8.98	95.97	1.01	0.03	4.17	37.66
	8.5	7.21	1.2	1.4	8.67	8.87	94.78	0.98	0.03	4.09	35.43
	8.55	7.17	1.16	1.35	8.31	8.76	93.6	0.95	0.03	4.0	33.25
	8.6	7.13	1.12	1.3	7.95	8.65	92.41	0.92	0.03	3.91	31.13
	8.65	7.09	1.07	1.25	7.6	8.54	91.22	0.89	0.03	3.82	29.05
	8.7	7.04	1.03	1.2	7.24	8.43	90.04	0.86	0.03	3.73	27.02
	8.75	7.0	0.98	1.15	6.89	8.32	88.85	0.83	0.03	3.63	25.05
	8.8	6.96	0.94	1.1	6.54	8.21	87.67	0.8	0.03	3.53	23.13
	8.85	6.92	0.9	1.05	6.2	8.1	86.48	0.77	0.03	3.43	21.26
	8.9	6.88	0.85	1.0	5.85	7.99	85.29	0.73	0.03	3.32	19.45
	8.95	6.84	0.81	0.95	5.51	7.87	84.11	0.7	0.03	3.21	17.7
	9.0	6.8	0.76	0.9	5.17	7.76	82.92	0.67	0.03	3.1	16.01
	9.05	6.75	0.72	0.85	4.83	7.65	81.74	0.63	0.03	2.98	14.38
	9.1	6.71	0.67	0.8	4.49	7.54	80.55	0.6	0.03	2.85	12.81
	9.15	6.67	0.62	0.75	4.16	7.43	79.36	0.56	0.03	2.72	11.3
	9.2	6.63	0.58	0.7	3.83	7.32	78.18	0.52	0.03	2.58	9.87
	9.25	6.59	0.53	0.65	3.5	7.21	76.99	0.48	0.03	2.43	8.5
	9.3	6.55	0.48	0.6	3.17	7.1	75.8	0.45	0.03	2.28	7.21
	9.35	6.51	0.44	0.55	2.84	6.99	74.62	0.41	0.03	2.11	6.0
	9.4	6.47	0.39	0.5	2.52	6.87	73.43	0.37	0.03	1.94	4.87
	9.45	6.42	0.34	0.45	2.19	6.76	72.25	0.32	0.03	1.75	3.83

	9.5	6.38	0.29	0.4	1.87	6.65	71.06	0.28	0.03	1.54	2.89
	9.55	6.34	0.25	0.35	1.56	6.54	69.87	0.24	0.03	1.31	2.04
Waterline	9.6	6.3	0.2	0.3	1.24	6.43	68.69	0.19	0.03	1.07	1.32
	9.65	6.03	0.15	0.25	0.93	6.14	65.64	0.15	0.04	0.82	0.77
	9.7	5.77	0.11	0.2	0.64	5.86	62.58	0.11	0.04	0.56	0.36
	9.75	5.5	0.06	0.15	0.36	5.57	59.53	0.06	0.06	0.28	0.1
	9.8	2.7	0.04	0.1	0.11	2.75	29.37	0.04	0.09	0.14	0.01
	9.85	0.3	0.03	0.05	0.01	0.32	3.38	0.02	0.13	0.07	0.0
	9.88	0.09	0.01	0.02	0.0	0.09	1.01	0.01	0.34	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) =	1.32	(cfs)
Calculated Flow (Qc) =	1.32	(cfs)
(Qm-Qc)/Qm * 100 =	-0.01%	
Measured Waterline (WLm) =	9.6	(ft)
Calculated Waterline (WLc) =	9.6	(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 =	-0.00%	
Mean Velocity =	1.07	(ft/s)
Manning's n =	0.033	
0.4 * Qm =	0.53	(cfs)
2.5 * Qm =	3.31	(cfs)

FIELD DATA

Feature	Station (ft)	Rod Height (ft)	Water depth (ft)	Velocity (ft/s)
	0.8	7.2		
Bankfull	1.6	8.22		
Waterline	1.8	9.6	0	0
	2.3	9.75	0.15	0.49
	2.6	9.8	0.2	0.7
	2.9	9.85	0.25	0.91
	3.2	9.85	0.25	0.93
	3.5	9.8	0.2	1.24
	3.8	9.8	0.2	1.28
	4.1	9.85	0.25	1.29
	4.4	9.85	0.25	1.38
	4.7	9.85	0.25	1.27
	5	9.8	0.2	1.26
	5.3	9.8	0.2	1.19
	5.6	9.8	0.2	1.28
	5.9	9.75	0.15	1.39
	6.2	9.8	0.2	1.22
	6.5	9.8	0.2	1.1
	6.8	9.8	0.2	1.01
	7.1	9.8	0.2	0.99
	7.4	9.9	0.3	1.13
	7.7	9.8	0.2	0.27
Waterline	8.1	9.6	0	0
Bankfull	9	8.28		
	9.8	7.53		

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
0.52	0.15	0.06	0.03	2.22
0.3	0.2	0.06	0.04	3.18
0.3	0.25	0.07	0.07	5.16
0.3	0.25	0.07	0.07	5.28
0.3	0.2	0.06	0.07	5.63
0.3	0.2	0.06	0.08	5.81
0.3	0.25	0.08	0.1	7.32
0.3	0.25	0.08	0.1	7.83
0.3	0.25	0.07	0.1	7.2
0.3	0.2	0.06	0.08	5.72
0.3	0.2	0.06	0.07	5.4
0.3	0.2	0.06	0.08	5.81
0.3	0.15	0.04	0.06	4.73
0.3	0.2	0.06	0.07	5.54
0.3	0.2	0.06	0.07	4.99
0.3	0.2	0.06	0.06	4.58
0.3	0.2	0.06	0.06	4.49
0.32	0.3	0.09	0.1	7.69
0.32	0.2	0.07	0.02	1.43
0.45	0	0	0	0
0	0	0	0	0
0	0	0	0	0

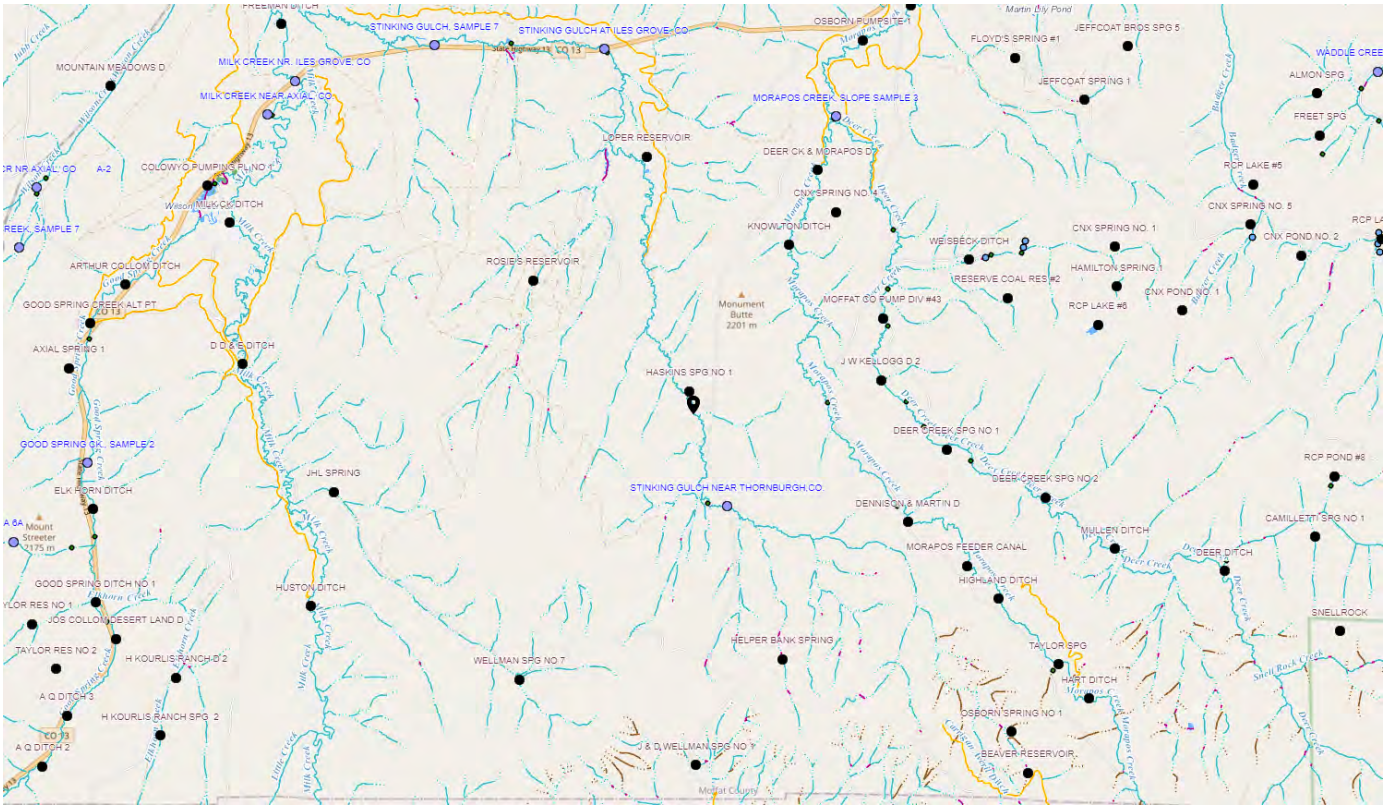
DISCLAIMER

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

R2Cross RESULTS

Stream Name: Stinking Gulch
Stream Locations: 4 miles upstream from CO Highway 13 adjacent to lands owned by State Land Board
Fieldwork Date: 08/01/2017
Cross-section: 2
Observers: R. Smith, E. Scherff
Coordinate System: UTM Zone 13
X (easting): 272854
Y (northing): 4462454
Date Processed: 02/26/2024
Slope: 0.005
Discharge: R2Cross data file: 1.14 (cfs)
Computation method: Ferguson VPE
R2Cross data filename: Stinking Gulch 8-1-2017 #2 ERAMS Data Sheet.xlsx
R2Cross version: 2.0.2

LOCATION



ANALYSIS RESULTS

Habitat Criteria Results

Bankfull top width (ft) = 9.51

	Habitat Criteria	Discharge (cfs) Meeting Criteria
Mean Depth (ft)	0.2	1.91
Percent Wetted Perimeter (%)	50.0	0.63
Mean Velocity (ft/s)	1.0	0.3

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	8.6	9.51	0.8	1.15	7.62	10.14	100.0	0.75	0.02	4.01	30.57
	8.6	9.51	0.8	1.15	7.62	10.14	100.0	0.75	0.02	4.01	30.57
	8.65	9.32	0.77	1.1	7.15	9.93	97.91	0.72	0.02	3.9	27.86
	8.7	9.14	0.73	1.05	6.69	9.72	95.81	0.69	0.02	3.78	25.27
	8.75	8.95	0.7	1.0	6.23	9.5	93.72	0.66	0.02	3.66	22.79
	8.8	8.77	0.66	0.95	5.79	9.29	91.63	0.62	0.02	3.53	20.44
	8.85	8.58	0.62	0.9	5.36	9.08	89.53	0.59	0.02	3.4	18.21
	8.9	8.4	0.59	0.85	4.93	8.87	87.44	0.56	0.02	3.26	16.1
	8.95	8.21	0.55	0.8	4.52	8.65	85.35	0.52	0.02	3.12	14.11
	9.0	8.01	0.51	0.75	4.11	8.43	83.14	0.49	0.02	2.98	12.24
	9.05	7.8	0.48	0.7	3.72	8.19	80.78	0.45	0.02	2.83	10.52
	9.1	7.59	0.44	0.65	3.33	7.95	78.41	0.42	0.02	2.68	8.92
	9.15	7.38	0.4	0.6	2.96	7.71	76.04	0.38	0.02	2.51	7.43
	9.2	7.16	0.36	0.55	2.59	7.47	73.67	0.35	0.02	2.34	6.07
	9.25	6.95	0.32	0.5	2.24	7.23	71.3	0.31	0.02	2.16	4.83
	9.3	6.74	0.28	0.45	1.9	6.99	68.93	0.27	0.02	1.95	3.71
	9.35	6.53	0.24	0.4	1.57	6.75	66.56	0.23	0.02	1.74	2.72
	9.4	6.31	0.2	0.35	1.25	6.51	64.19	0.19	0.02	1.49	1.86
Waterline	9.45	6.1	0.15	0.3	0.93	6.27	61.82	0.15	0.02	1.21	1.14
	9.5	5.09	0.12	0.25	0.63	5.22	51.48	0.12	0.03	1.01	0.64
	9.55	2.88	0.14	0.2	0.4	2.96	29.22	0.13	0.02	1.1	0.44
	9.6	2.22	0.12	0.15	0.26	2.28	22.49	0.11	0.03	0.96	0.25
	9.65	1.86	0.09	0.1	0.16	1.9	18.72	0.08	0.03	0.71	0.11
	9.7	1.65	0.04	0.05	0.07	1.66	16.39	0.04	0.04	0.33	0.02
	9.73	1.33	0.01	0.02	0.02	1.34	13.2	0.01	0.08	0.07	0.0

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

MODEL SUMMARY

Measured Flow (Qm) =	1.14	(cfs)
Calculated Flow (Qc) =	1.14	(cfs)
(Qm-Qc)/Qm * 100 =	0.02%	
Measured Waterline (WLm) =	9.45	(ft)
Calculated Waterline (WLc) =	9.45	(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 =	0.00%	
Mean Velocity =	1.22	(ft/s)
Manning's n =	0.024	
0.4 * Qm =	0.45	(cfs)
2.5 * Qm =	2.84	(cfs)

FIELD DATA

Feature	Station (ft)	Rod Height (ft)	Water depth (ft)	Velocity (ft/s)
	1.4	6.74		
Bankfull	2.4	8.52		
	3.5	8.98		
Waterline	4	9.45	0	0
	4.3	9.7	0.25	1.04
	4.6	9.75	0.3	1.15
	4.9	9.75	0.3	1.08
	5.2	9.75	0.3	1.22
	5.5	9.75	0.3	1.5
	5.8	9.75	0.3	1.46
	6.1	9.65	0.2	1.37
	6.4	9.6	0.15	1.28
	6.7	9.6	0.15	1.3
	7	9.55	0.1	1.12
	7.3	9.5	0.05	0.89
	7.6	9.5	0.05	0.69
	7.9	9.5	0.05	0.76
	8.2	9.5	0.05	0.74
	8.5	9.55	0.1	1.05
	8.8	9.55	0.1	1.18
	9.1	9.55	0.1	1.36
	9.4	9.55	0.1	1.42
	9.7	9.55	0.1	1.18
	10	9.55	0.1	0.88
Waterline	10.1	9.45	0	0
	11.6	8.98		
Bankfull	12.1	8.6		
	16.4	6.62		

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
0.39	0.25	0.07	0.08	6.86
0.3	0.3	0.09	0.1	9.11
0.3	0.3	0.09	0.1	8.55
0.3	0.3	0.09	0.11	9.66
0.3	0.3	0.09	0.14	11.88
0.3	0.3	0.09	0.13	11.56
0.32	0.2	0.06	0.08	7.23
0.3	0.15	0.04	0.06	5.07
0.3	0.15	0.04	0.06	5.15
0.3	0.1	0.03	0.03	2.96
0.3	0.05	0.01	0.01	1.18
0.3	0.05	0.01	0.01	0.91
0.3	0.05	0.01	0.01	1
0.3	0.05	0.01	0.01	0.98
0.3	0.1	0.03	0.03	2.77
0.3	0.1	0.03	0.04	3.12
0.3	0.1	0.03	0.04	3.59
0.3	0.1	0.03	0.04	3.75
0.3	0.1	0.03	0.04	3.12
0.3	0.1	0.02	0.02	1.55
0.14	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0

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