DRAFT INSTREAM FLOW 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 recommendation for an instream flow water right on East Muddy Creek, located in Water Division 4.

Location and Land Status. East Muddy Creek originates at the confluence of Little Muddy Creek and Clear Fork, approximately 20 miles southwest of Carbondale. The creek flows into Paonia Reservoir. This recommendation covers a reach that starts at the confluence with Lee Creek and extends to the confluence with West Muddy Creek. This stream reach covers a distance of approximately 6.36 miles. The BLM manages approximately 0.85 miles of this stream reach, while 5.51 miles are in private ownership.

Biological Summary. East Muddy Creek is a cold-water, low to moderate gradient stream. It flows through a mountain valley approximately 0.5 miles in width. The stream cuts through alluvial deposits in some locations and is constrained by bedrock in locations where the stream comes close to valley walls. The stream generally has medium-sized substrate, consisting of gravels, cobbles, and small boulders. The stream has a good mix of pool and riffle habitat for supporting salmonids.

Fisheries surveys have revealed self-sustaining populations of speckled dace, mottled sculpin, bluehead sucker, rainbow trout, fathead minnow and white sucker. Speckled dace, mottled sculpin and bluehead suckers are native species, and the bluehead sucker appears on BLM's sensitive species list. Since Paonia Reservoir prevents migration of fishes between East Muddy Creek and the Gunnison River, it is likely that East Muddy Creek provides year-round habitat for bluehead sucker.

The riparian community in this part of East Muddy Creek is generally comprised of willow species, alder, spruce and narrowleaf cottonwood. In general, the riparian community is in good condition, provides some shading and cover for fish habitat, and provides stream stability during flood events.

R2Cross Analysis. BLM collected the following R2Cross data from East Fork Muddy Creek:

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)
06/01/2018 #1	45.34 cfs	49.9 feet	15.16 cfs	32.41 cfs
06/01/2018 #2	43.24 cfs	42.4 feet	6.80 cfs	15.59 cfs
09/24/2019 #1	11.58 cfs	50.5 feet	13.42 cfs	17.19 cfs
09/24/2019 #2	12.17 cfs	44.5 feet	9.48 cfs	27.91 cfs
		Averages:	11.22 cfs	23.28 cfs

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

> 23.25 cubic feet per second is recommended for the snowmelt runoff period from April 1 through July 15. This recommendation is driven by the wetted perimeter criteria in a majority to the cross section data collected. Wetting 50 to 60 percent of the channel, as recommended by the R2Cross manual for streams 40 to 60 feet in width, will provide important physical habitat during a time of year when the fish population is completing key life cycle functions.
>
> 17.0 cubic feet per second is recommended for the late summer and fall period between July 16 and November 30. This recommendation is driven by limited water availability during this period. This flow rate will generally meet the average velocity and average depth criteria in the cross sections analyzed, while providing approximately 50% wetted perimeter in the wider cross sections.
>
> 11.20 cubic feet per second is recommended during the winter period between December 1 and March 31. This recommendation is driven by limited water availability during the winter. This flow rate either meets or comes close to meeting the average depth and average velocity criteria in cross sections analyzed and should prevent icing in pools.
>
> 17.0 cubic feet per second is recommended from March 1 to March 31. This is the period when frozen portions of the stream channel start to melt, and this fish population starts to become more active. This flow rate will generally meet the average velocity and average depth criteria, while providing approximately 50% wetted perimeter in the wider cross sections.

Water Availability. The BLM recommends relying upon two data sources to confirm water availability. The first information source is USGS Gage 09130500 (East Muddy Creek Near Bardine, CO). This gage was operated between 1934 and 1953, reflecting a 20-year period of record. The gage records will have to be adjusted to account for new diversions below the gage that have commenced since 1953. In addition, the gage data will need be adjusted to reflect the fact that some tributaries enter the creek downstream of the gage. The second data source is comprised of reservoir content records for Paonia Reservoir, located downstream. Daily fill

volumes can be converted to incoming flow rates from East Muddy Creek. If this data source is used, any inflow to the reservoir from West Muddy Creek would have to be subtracted out to accurately reflect water availability in the recommended instream flow reach.

The BLM is aware of only one active surface water right in the proposed reach, the John Medved Ditch 4, which is decreed for 1.5 cfs. Upstream from the proposed instream reach, BLM is aware of at least 25 active surface water rights, totaling just under 100 cfs in decreed diversion rates.

Relationship to Land Management Plans. The BLM land use plan for this area calls for actions to maintain and enhance riparian and fisheries habitat. In general, any proposed new land use, such as right-of-way corridors or mineral development, must be implemented with no surface occupancy to avoid impacts to the creek. Any proposed land uses along this creek are also carefully reviewed and mitigated to prevent impacts to sensitive aquatic species which appear on BLM's sensitive species list. Establishing an instream flow water right would assist in meeting these objectives.

Data sheets, R2Cross output, fishery survey information, and photographs of the cross section were included with BLM's draft recommendation in February 2020. BLM thanks both Colorado Parks and Wildlife and the Colorado Water Conservation Board 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,

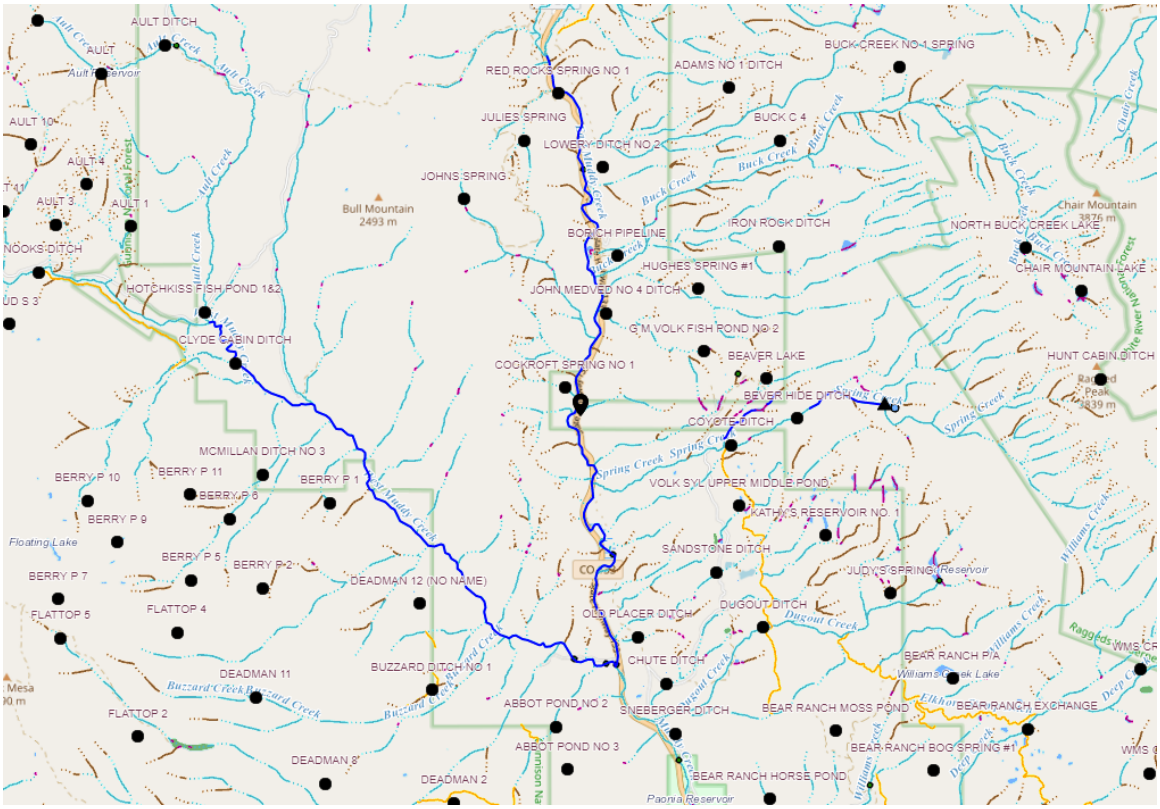
Allan Bittner
Deputy State Director
Resources

Cc: Jedd Sondergard, Uncompahgre FO
Suzanne Copping, Uncompahgre FO
Stephanie Connolly, Southwest District

R2Cross RESULTS

Stream Name: East Muddy Creek
Stream Locations: Approx 1.0 mile upstream from confluence with Spring Creek
Fieldwork Date: 06/01/2018
Cross-section: 1
Observers: R. Smith, J. Sondergard
Coordinate System: UTM Zone 13
X (easting): 295335
Y (northing): 4322956
Date Processed: 05/29/2023
Slope: 0.0056
Discharge: R2Cross data file: 45.34 (cfs)
Computation method: Ferguson VPE
R2Cross data filename: East Muddy Creek 6-1-18 #1 New.xlsx
R2Cross version: 2.0.2

LOCATION



ANALYSIS RESULTS

Habitat Criteria Results

Bankfull top width (ft) = 49.9

	Habitat Criteria	Discharge (cfs) Meeting Criteria
Mean Depth (ft)	0.5	15.16
Percent Wetted Perimeter (%)	55.0	32.41
Mean Velocity (ft/s)	1.0	10.7

STAGING TABLE

Feature	Distance to Water (ft)	Top Width (ft)	Mean Depth (ft)	Maximum Depth (ft)	Area (sq ft)	Wetted Perimeter (ft)	Percent Wetted Perimeter	Hydraulic Radius (ft)	Manning's n	Mean Velocity (ft/s)	Discharge (cfs)
Bankfull	3.55	49.9	1.58	2.5	78.65	50.41	100.0	1.56	0.04	4.02	315.88
	3.6	49.32	1.55	2.45	76.28	49.82	98.82	1.53	0.04	3.95	301.34
	3.65	48.7	1.52	2.4	73.83	49.2	97.59	1.5	0.04	3.88	286.52
	3.7	48.09	1.48	2.35	71.41	48.58	96.36	1.47	0.04	3.81	272.08
	3.75	47.48	1.45	2.3	69.02	47.96	95.13	1.44	0.04	3.74	258.03
	3.8	46.86	1.42	2.25	66.66	47.33	93.9	1.41	0.04	3.67	244.37
	3.85	46.25	1.39	2.2	64.33	46.71	92.66	1.38	0.04	3.59	231.1
	3.9	45.64	1.36	2.15	62.03	46.09	91.43	1.35	0.04	3.52	218.21
	3.95	44.91	1.33	2.1	59.77	45.36	89.98	1.32	0.04	3.45	206.2
	4.0	44.18	1.3	2.05	57.54	44.62	88.51	1.29	0.04	3.38	194.59
	4.05	43.44	1.27	2.0	55.35	43.88	87.04	1.26	0.04	3.31	183.36
	4.1	42.71	1.25	1.95	53.2	43.14	85.57	1.23	0.04	3.24	172.5
	4.15	41.98	1.22	1.9	51.08	42.4	84.1	1.2	0.04	3.17	162.01
	4.2	41.18	1.19	1.85	49.0	41.59	82.5	1.18	0.04	3.1	152.13
	4.25	40.33	1.16	1.8	46.96	40.73	80.8	1.15	0.04	3.04	142.8
	4.3	39.48	1.14	1.75	44.97	39.88	79.1	1.13	0.04	2.98	133.83
	4.35	38.62	1.11	1.7	43.01	39.02	77.4	1.1	0.04	2.91	125.21
	4.4	37.89	1.08	1.65	41.1	38.27	75.92	1.07	0.04	2.84	116.61
	4.45	37.18	1.05	1.6	39.23	37.56	74.51	1.04	0.04	2.76	108.23
	4.5	36.48	1.02	1.55	37.38	36.85	73.1	1.01	0.04	2.68	100.19
	4.55	35.77	0.99	1.5	35.58	36.14	71.69	0.98	0.04	2.6	92.5
	4.6	35.07	0.96	1.45	33.81	35.43	70.28	0.95	0.04	2.52	85.13
	4.65	34.37	0.93	1.4	32.07	34.72	68.87	0.92	0.04	2.44	78.09
	4.7	33.44	0.91	1.35	30.38	33.78	67.02	0.9	0.04	2.37	71.9
	4.75	32.5	0.88	1.3	28.73	32.84	65.15	0.87	0.04	2.3	66.06

	4.8	31.57	0.86	1.25	27.13	31.9	63.28	0.85	0.04	2.23	60.53
	4.85	30.63	0.83	1.2	25.57	30.95	61.4	0.83	0.05	2.16	55.31
	4.9	29.69	0.81	1.15	24.06	30.01	59.53	0.8	0.05	2.09	50.39
Waterline	4.95	28.81	0.78	1.1	22.6	29.13	57.78	0.78	0.05	2.02	45.66
	5.0	28.3	0.75	1.05	21.17	28.6	56.73	0.74	0.05	1.92	40.61
	5.05	27.8	0.71	1.0	19.77	28.09	55.72	0.7	0.05	1.81	35.82
	5.1	27.3	0.67	0.95	18.39	27.58	54.71	0.67	0.05	1.7	31.33
	5.15	26.85	0.63	0.9	17.04	27.12	53.8	0.63	0.05	1.59	27.08
	5.2	26.44	0.59	0.85	15.71	26.69	52.95	0.59	0.05	1.47	23.1
	5.25	26.02	0.55	0.8	14.4	26.26	52.1	0.55	0.06	1.35	19.44
	5.3	25.6	0.51	0.75	13.1	25.84	51.25	0.51	0.06	1.23	16.09
	5.35	25.19	0.47	0.7	11.84	25.41	50.4	0.47	0.06	1.1	13.06
	5.4	24.53	0.43	0.65	10.59	24.74	49.08	0.43	0.06	0.99	10.5
	5.45	23.86	0.39	0.6	9.38	24.06	47.74	0.39	0.07	0.88	8.23
	5.5	23.51	0.35	0.55	8.2	23.7	47.02	0.35	0.07	0.75	6.14
	5.55	23.18	0.3	0.5	7.03	23.35	46.33	0.3	0.08	0.62	4.36
	5.6	22.85	0.26	0.45	5.88	23.01	45.64	0.26	0.09	0.49	2.91
	5.65	22.51	0.21	0.4	4.75	22.66	44.95	0.21	0.1	0.37	1.77
	5.7	22.18	0.16	0.35	3.63	22.31	44.26	0.16	0.13	0.26	0.94
	5.75	21.05	0.12	0.3	2.55	21.17	42.0	0.12	0.16	0.17	0.43
	5.8	15.66	0.11	0.25	1.67	15.75	31.25	0.11	0.18	0.14	0.23
	5.85	12.16	0.08	0.2	0.98	12.23	24.25	0.08	0.23	0.09	0.09
	5.9	7.89	0.06	0.15	0.5	7.94	15.75	0.06	0.27	0.06	0.03
	5.95	4.64	0.04	0.1	0.19	4.66	9.25	0.04	0.4	0.03	0.01
	6.0	1.78	0.04	0.05	0.07	1.79	3.55	0.04	0.39	0.03	0.0
	6.04	1.23	0.01	0.01	0.02	1.23	2.43	0.01	0.98	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) =	45.34	(cfs)
Calculated Flow (Qc) =	45.53	(cfs)
(Qm-Qc)/Qm * 100 =	-0.44%	
Measured Waterline (WLm) =	4.92	(ft)
Calculated Waterline (WLc) =	4.95	(ft)
(WLm-WLc)/WLm * 100 =	-0.46%	
Max Measured Depth (Dm) =	1.1	(ft)
Max Calculated Depth (Dc) =	1.1	(ft)
(Dm-Dc)/Dm * 100 =	-0.20%	
Mean Velocity =	2.01	(ft/s)
Manning's n =	0.047	
0.4 * Qm =	18.13	(cfs)
2.5 * Qm =	113.34	(cfs)

FIELD DATA

Feature	Station (ft)	Rod Height (ft)	Water depth (ft)	Velocity (ft/s)
Bankfull	0	3.5		
	4	4.17		
	8	4.65		
Waterline	11.9	4.95	0	0
	13	5.15	0.2	0.33
	14	5.35	0.4	1.19
	15	5.45	0.5	2.19
	16	5.75	0.8	1.68
	17	5.85	0.9	2.3
	18	5.75	0.8	1.92
	19	5.75	0.8	2.43
	20	5.85	0.9	1.89
	21	5.75	0.8	2.48
	22	5.95	1	2.53
	23	5.85	0.9	2.86
	24	5.85	0.9	2.64
	25	5.75	0.8	2.58
	26	5.85	0.9	2.56
	27	5.95	1	2.34
	28	5.95	1	2.42
	29	5.85	0.9	1.65
	30	5.95	1	1.71
	31	5.85	0.9	1.57
	32	6.05	1.1	1.63
	33	6.05	1.1	1.46
	34	5.95	1	1.81
	35	5.95	1	2
	36	5.75	0.8	1.73
	37	5.75	0.8	1.64
	38	5.7	0.75	1.65

	39	5.4	0.45	1.46
	40	5.1	0.2	0.54
Waterline	40.9	4.9	0	0
	44	4.36		
	48	3.9		
Bankfull	50.2	3.55		

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
1.12	0.2	0.21	0.07	0.15
1.02	0.4	0.4	0.48	1.05
1	0.5	0.5	1.09	2.42
1.04	0.8	0.8	1.34	2.96
1	0.9	0.9	2.07	4.57
1	0.8	0.8	1.54	3.39
1	0.8	0.8	1.94	4.29
1	0.9	0.9	1.7	3.75
1	0.8	0.8	1.98	4.38
1.02	1	1	2.53	5.58
1	0.9	0.9	2.57	5.68
1	0.9	0.9	2.38	5.24
1	0.8	0.8	2.06	4.55
1	0.9	0.9	2.3	5.08
1	1	1	2.34	5.16
1	1	1	2.42	5.34
1	0.9	0.9	1.49	3.27
1	1	1	1.71	3.77
1	0.9	0.9	1.41	3.12
1.02	1.1	1.1	1.79	3.96
1	1.1	1.1	1.61	3.54
1	1	1	1.81	3.99
1	1	1	2	4.41
1.02	0.8	0.8	1.38	3.05
1	0.8	0.8	1.31	2.89
1	0.75	0.75	1.24	2.73

1.04	0.45	0.45	0.66	1.45
1.04	0.2	0.19	0.1	0.23
0.92	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0

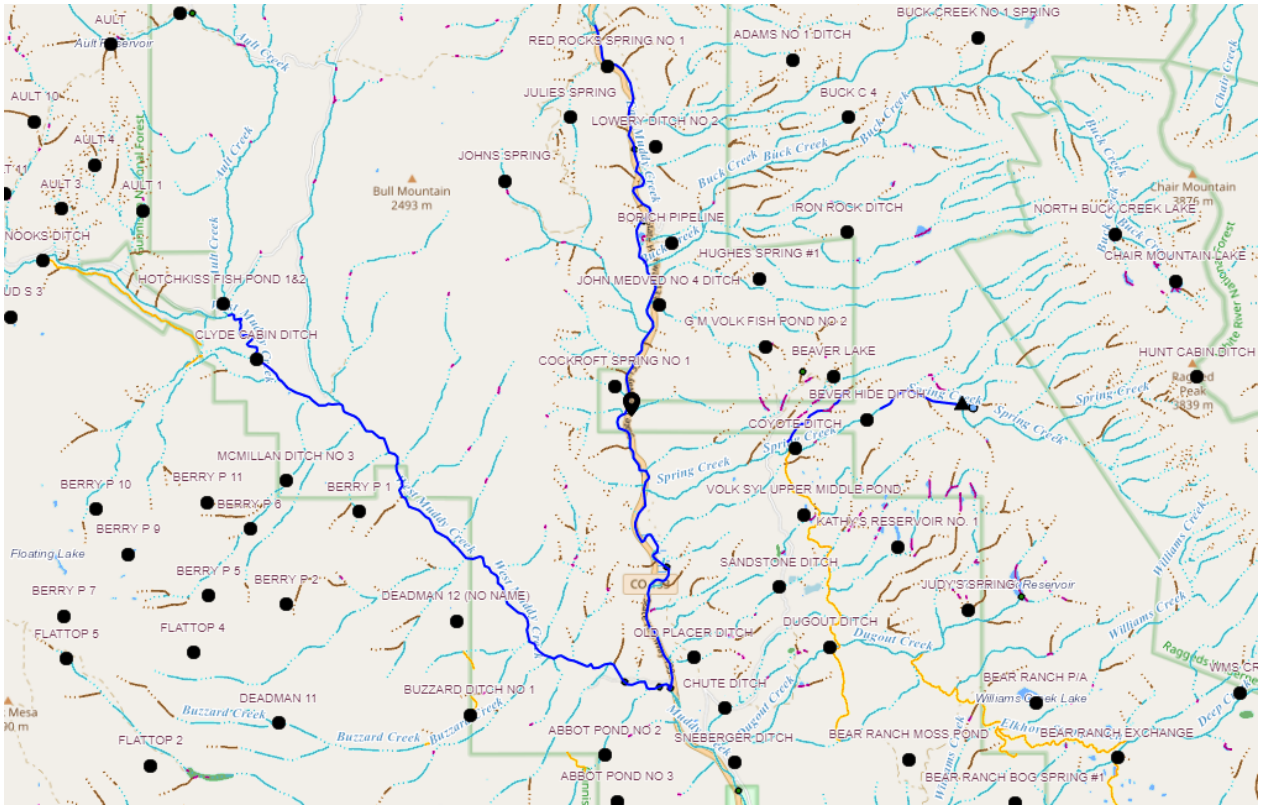
DISCLAIMER

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

R2Cross RESULTS

Stream Name: East Muddy Creek
Stream Locations: Approx. 1.0 mile upstream from confluence with Spring Creek
Fieldwork Date: 06/01/2018
Cross-section: 2
Observers: R. Smith, J Sondergard
Coordinate System: UTM Zone 13
X (easting): 295345
Y (northing): 4323005
Date Processed: 05/29/2023
Slope: 0.0048
Discharge: R2Cross data file: 43.24 (cfs)
Computation method: Ferguson VPE
R2Cross data filename: East Muddy Creek 6-1-18 #2 New.xlsx
R2Cross version: 2.0.2

LOCATION



ANALYSIS RESULTS

Habitat Criteria Results

Bankfull top width (ft) = 42.37

	Habitat Criteria	Discharge (cfs) Meeting Criteria
Mean Depth (ft)	0.4	6.8
Percent Wetted Perimeter (%)	51.2	1.53
Mean Velocity (ft/s)	1.0	15.59

STAGING TABLE

Feature	Distance to Water (ft)	Top Width (ft)	Mean Depth (ft)	Maximum Depth (ft)	Area (sq ft)	Wetted Perimeter (ft)	Percent Wetted Perimeter	Hydraulic Radius (ft)	Manning's n	Mean Velocity (ft/s)	Discharge (cfs)
Bankfull	3.43	42.37	1.41	2.17	59.78	43.44	100.0	1.38	0.05	2.78	166.19
	3.45	42.1	1.4	2.15	58.93	43.16	99.36	1.37	0.05	2.76	162.5
	3.5	41.42	1.37	2.1	56.85	42.47	97.78	1.34	0.05	2.7	153.53
	3.55	40.74	1.35	2.05	54.79	41.78	96.19	1.31	0.05	2.64	144.85
	3.6	40.06	1.32	2.0	52.77	41.09	94.61	1.28	0.05	2.59	136.47
	3.65	39.38	1.29	1.95	50.79	40.41	93.02	1.26	0.05	2.53	128.38
	3.7	38.69	1.26	1.9	48.84	39.72	91.43	1.23	0.05	2.47	120.58
	3.75	38.01	1.23	1.85	46.92	39.03	89.85	1.2	0.05	2.41	113.06
	3.8	37.33	1.21	1.8	45.03	38.34	88.26	1.17	0.05	2.35	105.83
	3.85	36.65	1.18	1.75	43.18	37.65	86.67	1.15	0.05	2.29	98.88
	3.9	35.79	1.16	1.7	41.37	36.78	84.68	1.12	0.05	2.24	92.72
	3.95	34.89	1.14	1.65	39.61	35.87	82.57	1.1	0.05	2.2	86.96
	4.0	34.0	1.11	1.6	37.88	34.97	80.52	1.08	0.05	2.15	81.42
	4.05	33.15	1.09	1.55	36.2	34.11	78.52	1.06	0.05	2.1	76.06
	4.1	32.29	1.07	1.5	34.57	33.24	76.53	1.04	0.05	2.05	70.97
	4.15	31.43	1.05	1.45	32.98	32.38	74.54	1.02	0.05	2.01	66.12
	4.2	30.77	1.02	1.4	31.42	31.7	72.98	0.99	0.05	1.94	61.07
	4.25	30.1	0.99	1.35	29.9	31.03	71.43	0.96	0.05	1.88	56.27
	4.3	29.43	0.97	1.3	28.41	30.35	69.87	0.94	0.05	1.82	51.7
	4.35	28.77	0.94	1.25	26.96	29.67	68.31	0.91	0.05	1.76	47.35
Waterline	4.4	28.1	0.91	1.2	25.53	29.0	66.75	0.88	0.06	1.69	43.24
	4.45	27.7	0.87	1.15	24.14	28.58	65.8	0.84	0.06	1.61	38.89
	4.5	27.3	0.83	1.1	22.76	28.17	64.85	0.81	0.06	1.53	34.77
	4.55	27.05	0.79	1.05	21.41	27.9	64.23	0.77	0.06	1.43	30.69
	4.6	26.8	0.75	1.0	20.06	27.63	63.61	0.73	0.06	1.34	26.86

	4.65	26.62	0.7	0.95	18.72	27.42	63.13	0.68	0.06	1.24	23.21
	4.7	26.43	0.66	0.9	17.4	27.21	62.65	0.64	0.07	1.14	19.83
	4.75	26.25	0.61	0.85	16.08	27.0	62.17	0.6	0.07	1.04	16.73
	4.8	26.07	0.57	0.8	14.77	26.79	61.68	0.55	0.07	0.94	13.89
	4.85	25.73	0.52	0.75	13.48	26.4	60.78	0.51	0.08	0.85	11.44
	4.9	25.39	0.48	0.7	12.2	26.01	59.87	0.47	0.08	0.76	9.24
	4.95	25.05	0.44	0.65	10.94	25.61	58.97	0.43	0.09	0.67	7.29
	5.0	24.71	0.39	0.6	9.69	25.22	58.06	0.38	0.09	0.58	5.59
	5.05	23.98	0.35	0.55	8.48	24.44	56.26	0.35	0.1	0.5	4.23
	5.1	23.24	0.31	0.5	7.3	23.65	54.45	0.31	0.11	0.42	3.09
	5.15	22.5	0.27	0.45	6.15	22.87	52.65	0.27	0.12	0.35	2.14
	5.2	21.76	0.23	0.4	5.05	22.08	50.84	0.23	0.14	0.27	1.39
	5.25	20.86	0.19	0.35	3.98	21.14	48.67	0.19	0.16	0.21	0.83
	5.3	18.95	0.16	0.3	2.96	19.2	44.2	0.15	0.19	0.15	0.46
	5.35	16.71	0.12	0.25	2.07	16.9	38.92	0.12	0.23	0.11	0.23
	5.4	12.47	0.1	0.2	1.29	12.61	29.03	0.1	0.27	0.08	0.11
	5.45	9.57	0.08	0.15	0.74	9.66	22.24	0.08	0.34	0.05	0.04
	5.5	5.67	0.06	0.1	0.33	5.71	13.16	0.06	0.43	0.04	0.01
	5.55	3.33	0.03	0.05	0.11	3.36	7.73	0.03	0.69	0.02	0.0
	5.58	1.7	0.01	0.01	0.02	1.71	3.93	0.01	1.6	0.0	0.0

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

MODEL SUMMARY

Measured Flow (Qm) =	43.24	(cfs)
Calculated Flow (Qc) =	43.24	(cfs)
(Qm-Qc)/Qm * 100 =	0.01%	
Measured Waterline (WLm) =	4.28	(ft)
Calculated Waterline (WLc) =	4.4	(ft)
(WLm-WLc)/WLm * 100 =	-2.92%	
Max Measured Depth (Dm) =	1.2	(ft)
Max Calculated Depth (Dc) =	1.2	(ft)
(Dm-Dc)/Dm * 100 =	0.00%	
Mean Velocity =	1.69	(ft/s)
Manning's n =	0.056	
0.4 * Qm =	17.3	(cfs)
2.5 * Qm =	108.1	(cfs)

FIELD DATA

Feature	Station (ft)	Rod Height (ft)	Water depth (ft)	Velocity (ft/s)
	0	2.94		
Bankfull	4	3.43		
	8	3.86		
Waterline	12	4.15		
	14.5	4.4	0	0
	15	4.5	0.1	0.13
	16	5	0.6	0.81
	17	5.1	0.7	1.56
	18	5.2	0.8	1.7
	19	5.3	0.9	1.99
	20	5.3	0.9	1.09
	21	5.4	1	1.88
	22	5.4	1	2.01
	23	5.3	0.9	1.58
	24	5.4	1	2.03
	25	5.5	1.1	2.86
	26	5.4	1	2.14
	27	5.5	1.1	2.06
	28	5.5	1.1	1.9
	29	5.4	1	1.52
	30	5.5	1.1	2.38
	31	5.6	1.2	1.51
	32	5.5	1.1	1.99
	33	5.6	1.2	2.19
	34	5.6	1.2	1.6
	35	5.3	0.9	2.29
	36	5.6	1.2	1.54
	37	5.5	1.1	1.41
	38	4.8	0.4	0.98
	39	5.4	1	1.06

	40	5.4	1	0.69
	41	5.2	0.8	0.31
	42	4.6	0.2	0
Waterline	42.6	4.4	0	0
	44	3.98		
Bankfull	46.5	3.4		

COMPUTED FROM MEASURED FIELD DATA

Wetted Perimeter (ft)	Water Depth (ft)	Area (ft^2)	Discharge (cfs)	Percent Discharge
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0.51	0.1	0.07	0.01	0.02
1.12	0.6	0.6	0.49	1.12
1	0.7	0.7	1.09	2.52
1	0.8	0.8	1.36	3.15
1	0.9	0.9	1.79	4.14
1	0.9	0.9	0.98	2.27
1	1	1	1.88	4.35
1	1	1	2.01	4.65
1	0.9	0.9	1.42	3.29
1	1	1	2.03	4.7
1	1.1	1.1	3.15	7.28
1	1	1	2.14	4.95
1	1.1	1.1	2.27	5.24
1	1.1	1.1	2.09	4.83
1	1	1	1.52	3.52
1	1.1	1.1	2.62	6.05
1	1.2	1.2	1.81	4.19
1	1.1	1.1	2.19	5.06
1	1.2	1.2	2.63	6.08
1	1.2	1.2	1.92	4.44
1.04	0.9	0.9	2.06	4.77
1.04	1.2	1.2	1.85	4.27
1	1.1	1.1	1.55	3.59
1.22	0.4	0.4	0.39	0.91
1.17	1	1	1.06	2.45

1	1	1	0.69	1.6
1.02	0.8	0.8	0.25	0.57
1.17	0.2	0.16	0	0
0.63	0	0	0	0
0	0	0	0	0
0	0	0	0	0

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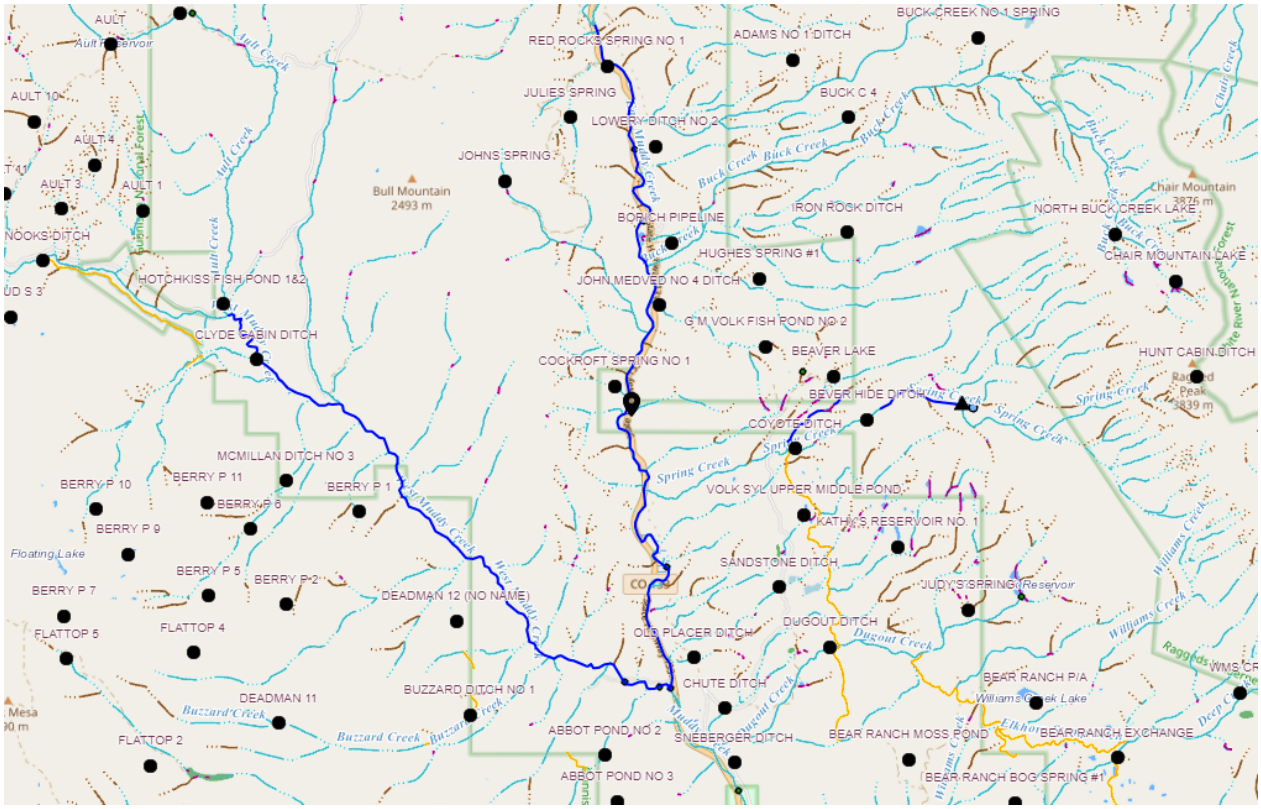
R2Cross RESULTS

Stream Name: East Muddy Creek
Stream Locations: Approx 1.57 miles upstream from Paonia Reservoir
Fieldwork Date: 09/24/2019
Cross-section: 1
Observers: J. Sondergard
Coordinate System: UTM Zone 13
X (easting): 295348.2
Y (northing): 4322971.9
Date Processed: 05/29/2023
Slope: 0.009
Discharge: R2Cross data file: 11.58 (cfs)
Computation method: Ferguson VPE
R2Cross data filename: East Muddy Creek 9-24-19 #1.xlsx
R2Cross version: 2.0.2

LOCATION



ANALYSIS RESULTS

Habitat Criteria Results

Bankfull top width (ft) = 50.54

	Habitat Criteria	Discharge (cfs) Meeting Criteria
Mean Depth (ft)	0.5	17.19
Percent Wetted Perimeter (%)	55.3	3.52
Mean Velocity (ft/s)	1.0	13.42

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	2.74	50.54	1.71	2.76	86.19	51.49	100.0	1.67	0.04	4.68	403.78
	2.75	50.41	1.7	2.75	85.69	51.36	99.74	1.67	0.04	4.67	400.23
	2.8	49.73	1.67	2.7	83.19	50.67	98.41	1.64	0.04	4.6	382.51
	2.85	49.05	1.65	2.65	80.72	49.99	97.08	1.61	0.04	4.53	365.26
	2.9	48.38	1.62	2.6	78.28	49.3	95.75	1.59	0.04	4.45	348.48
	2.95	47.7	1.59	2.55	75.88	48.62	94.42	1.56	0.04	4.38	332.15
	3.0	47.03	1.56	2.5	73.51	47.93	93.08	1.53	0.04	4.3	316.28
	3.05	46.35	1.54	2.45	71.18	47.25	91.75	1.51	0.04	4.23	300.86
	3.1	45.67	1.51	2.4	68.87	46.56	90.42	1.48	0.04	4.15	285.88
	3.15	45.0	1.48	2.35	66.61	45.88	89.09	1.45	0.04	4.07	271.35
	3.2	44.33	1.45	2.3	64.37	45.2	87.78	1.42	0.04	4.0	257.2
	3.25	43.68	1.42	2.25	62.17	44.54	86.5	1.4	0.04	3.91	243.39
	3.3	43.03	1.39	2.2	60.01	43.88	85.22	1.37	0.05	3.83	230.01
	3.35	42.38	1.37	2.15	57.87	43.22	83.94	1.34	0.05	3.75	217.06
	3.4	41.73	1.34	2.1	55.77	42.56	82.66	1.31	0.05	3.67	204.53
	3.45	41.08	1.31	2.05	53.7	41.9	81.37	1.28	0.05	3.58	192.42
	3.5	40.43	1.28	2.0	51.66	41.24	80.09	1.25	0.05	3.5	180.72
	3.55	39.79	1.25	1.95	49.65	40.58	78.81	1.22	0.05	3.41	169.43
	3.6	39.14	1.22	1.9	47.68	39.92	77.53	1.19	0.05	3.33	158.55
	3.65	38.49	1.19	1.85	45.74	39.26	76.25	1.16	0.05	3.24	148.07
	3.7	37.84	1.16	1.8	43.83	38.6	74.97	1.14	0.05	3.15	137.99
	3.75	37.19	1.13	1.75	41.96	37.94	73.69	1.11	0.05	3.06	128.31
	3.8	36.54	1.1	1.7	40.11	37.28	72.41	1.08	0.05	2.97	119.02
	3.85	35.89	1.07	1.65	38.3	36.62	71.12	1.05	0.05	2.87	110.11
	3.9	35.24	1.04	1.6	36.53	35.96	69.84	1.02	0.05	2.78	101.59

	3.95	34.59	1.01	1.55	34.78	35.3	68.56	0.99	0.05	2.69	93.45
	4.0	34.14	0.97	1.5	33.06	34.85	67.67	0.95	0.05	2.57	85.09
	4.05	33.75	0.93	1.45	31.37	34.44	66.88	0.91	0.05	2.45	76.99
	4.1	33.35	0.89	1.4	29.69	34.03	66.08	0.87	0.06	2.33	69.28
	4.15	32.96	0.85	1.35	28.03	33.62	65.29	0.83	0.06	2.21	61.98
	4.2	32.56	0.81	1.3	26.39	33.21	64.5	0.79	0.06	2.09	55.08
	4.25	32.17	0.77	1.25	24.77	32.81	63.71	0.76	0.06	1.96	48.59
	4.3	31.77	0.73	1.2	23.18	32.4	62.91	0.72	0.06	1.83	42.52
	4.35	31.38	0.69	1.15	21.6	31.99	62.12	0.68	0.06	1.71	36.85
	4.4	30.98	0.65	1.1	20.04	31.58	61.33	0.63	0.07	1.58	31.6
	4.45	30.58	0.6	1.05	18.5	31.17	60.54	0.59	0.07	1.45	26.77
	4.5	30.19	0.56	1.0	16.98	30.77	59.75	0.55	0.07	1.32	22.35
	4.55	29.79	0.52	0.95	15.48	30.36	58.95	0.51	0.08	1.19	18.36
	4.6	29.4	0.48	0.9	14.0	29.95	58.16	0.47	0.08	1.06	14.77
Waterline	4.65	29.01	0.43	0.85	12.54	29.54	57.37	0.42	0.09	0.93	11.61
	4.7	28.73	0.39	0.8	11.1	29.24	56.78	0.38	0.09	0.79	8.8
	4.75	28.45	0.34	0.75	9.67	28.94	56.2	0.33	0.1	0.66	6.42
	4.8	28.18	0.29	0.7	8.25	28.64	55.61	0.29	0.11	0.54	4.44
	4.85	27.9	0.25	0.65	6.85	28.34	55.03	0.24	0.13	0.42	2.86
	4.9	26.57	0.21	0.6	5.49	26.96	52.35	0.2	0.15	0.33	1.79
	4.95	25.9	0.16	0.55	4.18	26.26	50.99	0.16	0.18	0.23	0.95
	5.0	22.24	0.13	0.5	2.97	22.53	43.76	0.13	0.21	0.17	0.51
	5.05	17.73	0.11	0.45	1.97	17.96	34.89	0.11	0.25	0.13	0.26
	5.1	13.48	0.09	0.4	1.19	13.65	26.51	0.09	0.3	0.09	0.11
	5.15	5.84	0.11	0.35	0.66	5.95	11.56	0.11	0.24	0.13	0.09
	5.2	3.36	0.13	0.3	0.43	3.45	6.69	0.12	0.22	0.16	0.07
	5.25	2.22	0.13	0.25	0.29	2.28	4.43	0.13	0.22	0.16	0.05
	5.3	1.82	0.1	0.2	0.19	1.87	3.64	0.1	0.26	0.12	0.02
	5.35	1.43	0.08	0.15	0.11	1.47	2.85	0.07	0.34	0.07	0.01
	5.4	0.95	0.05	0.1	0.05	0.98	1.9	0.05	0.48	0.04	0.0
	5.45	0.48	0.03	0.05	0.01	0.49	0.95	0.02	0.85	0.01	0.0
	5.49	0.14	0.01	0.01	0.0	0.15	0.28	0.01	2.33	0.0	0.0

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

MODEL SUMMARY

Measured Flow (Qm) =	11.58	(cfs)
Calculated Flow (Qc) =	11.59	(cfs)
(Qm-Qc)/Qm * 100 =	-0.10%	
Measured Waterline (WLm) =	4.64	(ft)
Calculated Waterline (WLc) =	4.65	(ft)
(WLm-WLc)/WLm * 100 =	-0.10%	
Max Measured Depth (Dm) =	0.85	(ft)
Max Calculated Depth (Dc) =	0.85	(ft)
(Dm-Dc)/Dm * 100 =	-0.02%	
Mean Velocity =	0.92	(ft/s)
Manning's n =	0.086	
0.4 * Qm =	4.63	(cfs)
2.5 * Qm =	28.96	(cfs)

FIELD DATA

Feature	Station (ft)	Rod Height (ft)	Water depth (ft)	Velocity (ft/s)
	2.9	1.79		
Bankfull	5.3	2.74		
	17.25	3.96		
Waterline	20.45	4.64	0	0
	21.4	4.85	0.2	0
	22	5.1	0.45	0.63
	23	5.15	0.5	1.23
	24	5.1	0.45	0.6
	25	5	0.35	1.05
	26	5.15	0.5	1.34
	27	5.05	0.4	1.68
	28	5.15	0.5	1.4
	29	5.15	0.5	0.67
	30	5.05	0.4	1.52
	31	5.15	0.5	2.11
	32	5.05	0.4	1.78
	33	4.95	0.3	2.26
	34	5.05	0.4	1.55
	35	4.95	0.3	1.09
	36	5.05	0.4	0.48
	37	4.9	0.25	0.86
	38	4.85	0.2	0.69
	39	5.15	0.5	0.01
	40	5.15	0.5	0.31
	41	5.25	0.6	0.1
	42	5.05	0.4	0.24
	43	4.95	0.3	1.07
	44	5.05	0.4	1.4
	45	5.2	0.55	0.6
	46	5.15	0.5	0.55

	47	5.35	0.7	0.76
	48	5.5	0.85	0.9
	49	5.15	0.5	0.22
Waterline	49.5	4.65	0	0
	54.2	3.18		
Bankfull	56.25	2.63		
	56.85	2.12		

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
0.97	0.2	0.15	0	0
0.65	0.45	0.36	0.23	1.96
1	0.5	0.5	0.61	5.31
1	0.45	0.45	0.27	2.33
1	0.35	0.35	0.37	3.17
1.01	0.5	0.5	0.67	5.78
1	0.4	0.4	0.67	5.8
1	0.5	0.5	0.7	6.04
1	0.5	0.5	0.34	2.89
1	0.4	0.4	0.61	5.25
1	0.5	0.5	1.05	9.11
1	0.4	0.4	0.71	6.15
1	0.3	0.3	0.68	5.85
1	0.4	0.4	0.62	5.35
1	0.3	0.3	0.33	2.82
1	0.4	0.4	0.19	1.66
1.01	0.25	0.25	0.21	1.86
1	0.2	0.2	0.14	1.19
1.04	0.5	0.5	0.01	0.04
1	0.5	0.5	0.15	1.34
1	0.6	0.6	0.06	0.52
1.02	0.4	0.4	0.1	0.83
1	0.3	0.3	0.32	2.77
1	0.4	0.4	0.56	4.83
1.01	0.55	0.55	0.33	2.85
1	0.5	0.5	0.28	2.37

1.02	0.7	0.7	0.53	4.59
1.01	0.85	0.85	0.77	6.61
1.06	0.5	0.38	0.08	0.71
0.71	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0

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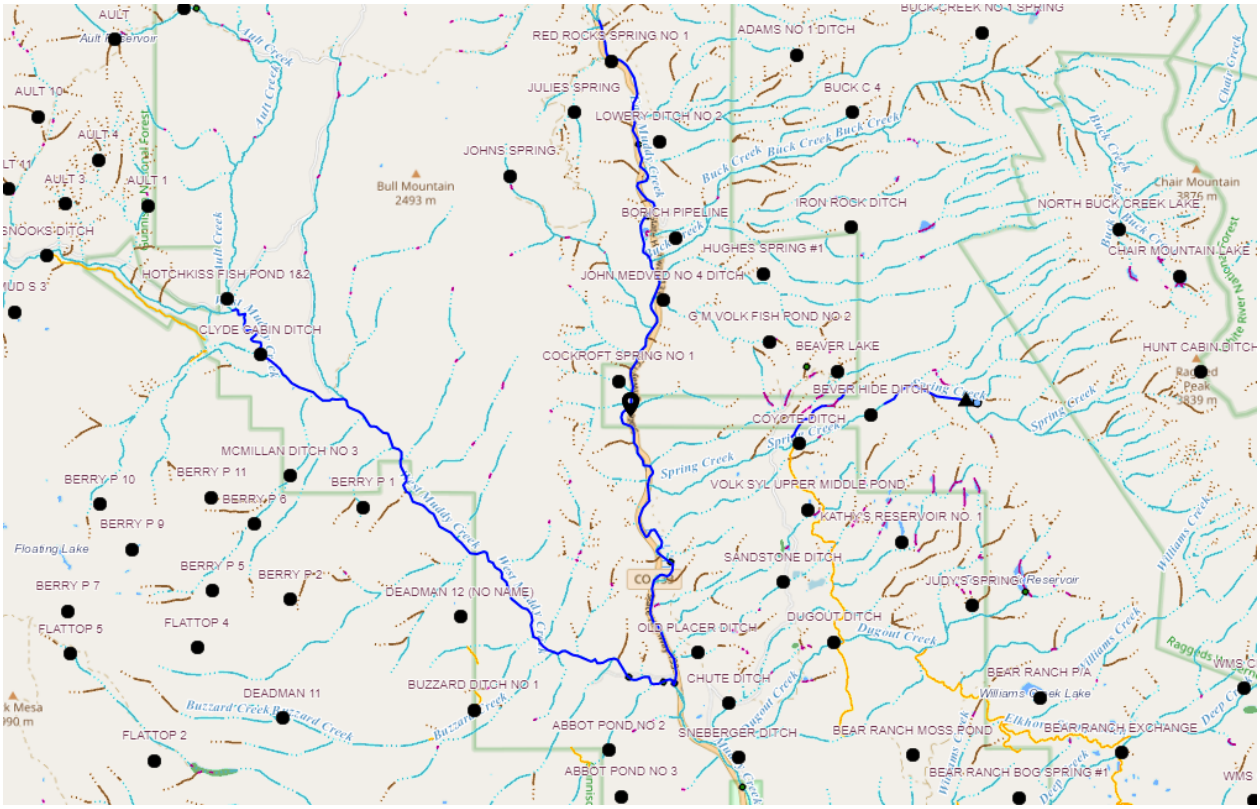
R2Cross RESULTS

Stream Name: East Muddy Creek
Stream Locations: Approx. 1.75 miles upstream from Paonia Reservoir
Fieldwork Date: 09/24/2019
Cross-section: 2
Observers: J. Sondergard
Coordinate System: Lat/Long
X (easting): -107.364728
Y (northing): 39.03145
Date Processed: 05/29/2023
Slope: 0.003
Discharge: R2Cross data file: 12.17 (cfs)
Computation method: Ferguson VPE
R2Cross data filename: East Muddy Creek 9-24-19 #2.xlsx
R2Cross version: 2.0.2

LOCATION



ANALYSIS RESULTS

Habitat Criteria Results

Bankfull top width (ft) = 44.45

	Habitat Criteria	Discharge (cfs) Meeting Criteria
Mean Depth (ft)	0.4	9.48
Percent Wetted Perimeter (%)	52.2	27.91
Mean Velocity (ft/s)	1.0	7.91

STAGING TABLE

Feature	Distance to Water (ft)	Top Width (ft)	Mean Depth (ft)	Maximum Depth (ft)	Area (sq ft)	Wetted Perimeter (ft)	Percent Wetted Perimeter	Hydraulic Radius (ft)	Manning's n	Mean Velocity (ft/s)	Discharge (cfs)
Bankfull	3.55	44.45	1.3	2.4	57.98	45.07	100.0	1.29	0.03	3.0	173.98
	3.6	43.41	1.29	2.35	55.8	44.02	97.68	1.27	0.03	2.96	165.42
	3.65	42.36	1.27	2.3	53.65	42.97	95.34	1.25	0.03	2.93	157.16
	3.7	41.32	1.25	2.25	51.56	41.92	93.01	1.23	0.03	2.89	149.22
	3.75	40.27	1.23	2.2	49.52	40.87	90.67	1.21	0.03	2.86	141.59
	3.8	39.23	1.21	2.15	47.53	39.82	88.34	1.19	0.03	2.82	134.27
	3.85	38.18	1.19	2.1	45.6	38.76	86.0	1.18	0.03	2.79	127.26
	3.9	37.14	1.18	2.05	43.71	37.71	83.67	1.16	0.03	2.76	120.55
	3.95	36.1	1.16	2.0	41.88	36.66	81.34	1.14	0.03	2.73	114.13
	4.0	35.05	1.14	1.95	40.11	35.61	79.0	1.13	0.03	2.69	108.01
	4.05	34.01	1.13	1.9	38.38	34.56	76.67	1.11	0.03	2.66	102.17
	4.1	32.96	1.11	1.85	36.7	33.5	74.33	1.1	0.03	2.63	96.61
	4.15	31.92	1.1	1.8	35.08	32.45	72.0	1.08	0.03	2.6	91.32
	4.2	30.87	1.09	1.75	33.51	31.4	69.67	1.07	0.03	2.58	86.3
	4.25	29.83	1.07	1.7	32.0	30.35	67.33	1.05	0.03	2.55	81.55
	4.3	28.78	1.06	1.65	30.53	29.3	65.0	1.04	0.03	2.52	77.06
	4.35	27.74	1.05	1.6	29.12	28.24	62.66	1.03	0.03	2.5	72.82
	4.4	26.69	1.04	1.55	27.76	27.19	60.33	1.02	0.03	2.48	68.84
	4.45	26.06	1.01	1.5	26.44	26.55	58.91	1.0	0.03	2.43	64.22
	4.5	25.71	0.98	1.45	25.15	26.19	58.1	0.96	0.03	2.35	59.2
	4.55	25.37	0.94	1.4	23.87	25.82	57.29	0.92	0.03	2.28	54.36
	4.6	25.02	0.9	1.35	22.61	25.46	56.48	0.89	0.03	2.2	49.71
	4.65	24.67	0.87	1.3	21.37	25.1	55.69	0.85	0.03	2.12	45.25
	4.7	24.33	0.83	1.25	20.14	24.74	54.9	0.81	0.03	2.03	40.97
	4.75	23.99	0.79	1.2	18.94	24.39	54.11	0.78	0.04	1.95	36.88

	4.8	23.65	0.75	1.15	17.74	24.03	53.32	0.74	0.04	1.86	32.98
	4.85	23.31	0.71	1.1	16.57	23.68	52.53	0.7	0.04	1.77	29.28
	4.9	22.97	0.67	1.05	15.41	23.32	51.74	0.66	0.04	1.67	25.78
	4.95	22.63	0.63	1.0	14.27	22.97	50.95	0.62	0.04	1.57	22.47
	5.0	22.28	0.59	0.95	13.15	22.61	50.17	0.58	0.04	1.47	19.37
	5.05	21.94	0.55	0.9	12.05	22.26	49.38	0.54	0.04	1.37	16.48
	5.1	21.6	0.51	0.85	10.96	21.9	48.59	0.5	0.04	1.26	13.8
Waterline	5.15	19.87	0.5	0.8	9.88	20.15	44.71	0.49	0.04	1.23	12.19
	5.2	19.56	0.45	0.75	8.9	19.83	43.99	0.45	0.04	1.12	9.97
	5.25	19.25	0.41	0.7	7.93	19.5	43.26	0.41	0.04	1.0	7.95
	5.3	18.94	0.37	0.65	6.97	19.17	42.53	0.36	0.05	0.88	6.15
	5.35	18.63	0.32	0.6	6.03	18.85	41.82	0.32	0.05	0.76	4.57
	5.4	16.82	0.31	0.55	5.15	17.02	37.75	0.3	0.05	0.71	3.64
	5.45	15.75	0.28	0.5	4.33	15.93	35.34	0.27	0.06	0.62	2.68
	5.5	15.01	0.24	0.45	3.57	15.18	33.67	0.23	0.06	0.51	1.83
	5.55	13.14	0.22	0.4	2.86	13.29	29.49	0.22	0.06	0.46	1.31
	5.6	11.95	0.19	0.35	2.23	12.08	26.8	0.18	0.07	0.37	0.83
	5.65	10.01	0.17	0.3	1.69	10.11	22.44	0.17	0.08	0.32	0.54
	5.7	8.56	0.14	0.25	1.22	8.65	19.2	0.14	0.09	0.26	0.31
	5.75	5.45	0.16	0.2	0.85	5.52	12.24	0.15	0.08	0.29	0.24
	5.8	5.08	0.11	0.15	0.58	5.14	11.41	0.11	0.1	0.19	0.11
	5.85	4.73	0.07	0.1	0.34	4.77	10.58	0.07	0.15	0.09	0.03
	5.9	3.37	0.04	0.05	0.13	3.39	7.51	0.04	0.23	0.04	0.01
	5.93	2.41	0.01	0.01	0.03	2.41	5.36	0.01	0.57	0.01	0.0

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

MODEL SUMMARY

Measured Flow (Qm) =	12.17	(cfs)
Calculated Flow (Qc) =	12.19	(cfs)
(Qm-Qc)/Qm * 100 =	-0.09%	
Measured Waterline (WLm) =	5.14	(ft)
Calculated Waterline (WLc) =	5.15	(ft)
(WLm-WLc)/WLm * 100 =	-0.09%	
Max Measured Depth (Dm) =	0.8	(ft)
Max Calculated Depth (Dc) =	0.8	(ft)
(Dm-Dc)/Dm * 100 =	-0.02%	
Mean Velocity =	1.23	(ft/s)
Manning's n =	0.041	
0.4 * Qm =	4.87	(cfs)
2.5 * Qm =	30.43	(cfs)

FIELD DATA

Feature	Station (ft)	Rod Height (ft)	Water depth (ft)	Velocity (ft/s)
	1	2.75		
Bankfull	3.65	3.55		
	8.05	4.62		
Waterline	10.1	5.14	0	0
	11	5.45	0.3	0.55
	12	5.55	0.4	0.07
	13	5.7	0.55	1.23
	14	5.75	0.6	1.5
	15	5.75	0.6	1.36
	16	5.65	0.5	1.45
	17	5.75	0.6	0.65
	18	5.95	0.8	1.43
	19	5.95	0.8	1.72
	20	5.85	0.7	1.65
	21	5.95	0.8	1.57
	22	5.95	0.8	1.24
	23	5.5	0.35	1.53
	24	5.55	0.4	1.22
	25	5.65	0.5	1.27
	26	5.6	0.45	1.31
	27	5.4	0.25	0.71
	28	5.35	0.2	0.17
	29	5.45	0.3	0.33
	30	5.15	0	0
Waterline	31.4	5.15	0	0
	33.5	4.42		
Bankfull	58.5	2.93		
	65.6	1.96		

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
0.95	0.3	0.28	0.16	1.29
1	0.4	0.4	0.03	0.23
1.01	0.55	0.55	0.68	5.56
1	0.6	0.6	0.9	7.39
1	0.6	0.6	0.82	6.7
1	0.5	0.5	0.72	5.96
1	0.6	0.6	0.39	3.2
1.02	0.8	0.8	1.14	9.4
1	0.8	0.8	1.38	11.3
1	0.7	0.7	1.16	9.49
1	0.8	0.8	1.26	10.32
1	0.8	0.8	0.99	8.15
1.1	0.35	0.35	0.54	4.4
1	0.4	0.4	0.49	4.01
1	0.5	0.5	0.64	5.22
1	0.45	0.45	0.59	4.84
1.02	0.25	0.25	0.18	1.46
1	0.2	0.2	0.03	0.28
1	0.3	0.3	0.1	0.81
1.04	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0

DISCLAIMER

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Combined Summaries

Water **41741** **Muddy Creek** Date **7/17/2012**

Station **GU0040** **ABV Dugout Creek (EM-1)**

Drainage **Gunnison River** UtmX **296304** UtmY **4318625** Elevation **6478 ft**

Length **722 ft** Width **41.60 ft** Area **0.69 acre**

Surveyors **K. Thompson, S. Sherman, P. Jones, N. Thompson**

Gear **BPEF** Effort **2.00** Metric **PASS** Protocol **FULL HABITAT**

Proportional Stocking Density and Catch/Unit Effort

Species	Total Catch	Min Cut inch	Max Cut inch	Total used	Proportional Stock Density (%)	Percent Stock Size	Percent Quality Size	Percent Preferred Size	Percent Memorable Size	Percent Trophy Size	Max Length inches
BLUEHEAD SUCKER	112	5.91		112							9.49
BROOK TROUT	2	5.12		2	0.00	100.00					8.86
FLANNELMOUTH SUCKER	2	5.91		2							5.28
FATHEAD MINNOW	60			60							2.20
MOTTLED SCULPIN	102			102							4.80
NORTHERN PIKE	5	3.94		5							6.77
SPECKLED DACE	187			187							5.04
SUCKER (S.U.)	5			5							0.00
WHITE SUCKER	60	5.91		60	0.00	100.00					9.57
WHITE-BLUEHEAD SUCKER HYBRID	11			11							11.26
WHITE-FLANNELMOUTH HYBRID	1			1							0.00

Combined Summaries

Water **41741** **Muddy Creek** Date **7/17/2012**

Station **GU0040** **ABV Dugout Creek (EM-1)**

Mean, Minimum and Maximum Length and Weight

Species	Total Catch	Min cut inch	Max cut inch	Total Used	Length (inches) Mean	Length (inches) Minimum	Length (inches) Maximum	Weight (lb) Mean	Weight (lb) Minimum	Weight (lb) Maximum
BLUEHEAD SUCKER	112	5.91		112	3.85	2.44	9.49	0.04	0.00	0.33
BROOK TROUT	2	5.12		2	8.33	7.80	8.86	0.27	0.24	0.31
FLANNELMOUTH SUCKER	2	5.91		2	5.28	5.28	5.28	0.05	0.05	0.05
FATHEAD MINNOW	60			60	1.99	1.73	2.20	0.00	0.00	0.01
MOTTLED SCULPIN	102			102	3.53	2.40	4.80	0.03	0.01	0.07
NORTHERN PIKE	5	3.94		5	6.09	5.59	6.77	0.06	0.03	0.07
SPECKLED DACE	187			187	3.48	1.97	5.04	0.02	0.00	0.07
SUCKER (S.U.)	5			5		0.00	0.00		0.00	0.00
WHITE SUCKER	60	5.91		60	4.77	2.83	9.57	0.06	0.01	0.26
WHITE-BLUEHEAD SUCKER HYBRID	11			11	8.31	3.82	11.26	0.25	0.01	0.46
WHITE-FLANNELMOUTH HYBRID	1			1		0.00	0.00		0.00	0.00

Combined Summaries

Water **41741** **Muddy Creek** Date **7/17/2012**

Station **GU0040** **ABV Dugout Creek (EM-1)**

Relative Abundance and Catch/Unit Effort

Species	Total Catch	Min.Cut inch	Max.Cut inch	Total used	Weight Lbs	Percent Number	Percent Weight	Catch per Unit Effort Number/Effort	Catch per Unit Effort Lbs/Effort
BLUEHEAD SUCKER	112	5.91		112	2.88	20.48	27.13	56.00	1.44
BROOK TROUT	2	5.12		2	0.55	0.37	5.14	1.00	0.27
FLANNELMOUTH SUCKER	2	5.91		2	0.05	0.37	0.46	1.00	0.02
FATHEAD MINNOW	60			60	0.01	10.97	0.14	30.00	0.01
MOTTLED SCULPIN	102			102	1.15	18.65	10.85	51.00	0.58
NORTHERN PIKE	5	3.94		5	0.28	0.91	2.59	2.50	0.14
SPECKLED DACE	187			187	1.67	34.19	15.71	93.50	0.84
SUCKER (S.U.)	5			5	0.00	0.91	0.00	2.50	0.00
WHITE SUCKER	60	5.91		60	1.81	10.97	17.00	30.00	0.90
WHITE-BLUEHEAD SUCKER HYBRID	11			11	2.23	2.01	21.00	5.50	1.12
WHITE-FLANNELMOUTH HYBRID	1			1	0.00	0.18	0.00	0.50	0.00

Combined Summaries

Water **41741** **Muddy Creek** Date **7/17/2012**

Station **GU0040** **ABV Dugout Creek (EM-1)**

Abundance and Biomass

Species	Total Catch	Min.Cut inch	Max.Cut inch	Total Used	Population estimate	Biomass Lbs	Percent Number	Percent Weight	Density estimates Lb/Acre	Density estimates Fish/Acre	Density estimates Fish/Mile
BLUEHEAD SUCKER	112	5.91		112		2.88	20.48	27.13	4.18	162.48	819.29
BROOK TROUT	2	5.12		2		0.55	0.37	5.14	0.79	2.90	14.63
FLANNELMOUTH SUCKER	2	5.91		2		0.05	0.37	0.46	0.07	2.90	14.63
FATHEAD MINNOW	60			60		0.01	10.97	0.14	0.02	87.04	438.90
MOTTLED SCULPIN	102			102		1.15	18.65	10.85	1.67	147.97	746.13
NORTHERN PIKE	5	3.94		5		0.28	0.91	2.59	0.40	7.25	36.58
SPECKLED DACE	187			187		1.67	34.19	15.71	2.42	271.28	1,367.91
SUCKER (S.U.)	5			5		0.00	0.91	0.00	0.00	7.25	36.58
WHITE SUCKER	60	5.91		60		1.81	10.97	17.00	2.62	87.04	438.90
WHITE-BLUEHEAD SUCKER HYBRID	11			11		2.23	2.01	21.00	3.24	15.96	80.47
WHITE-FLANNELMOUTH HYBRID	1			1		0.00	0.18	0.00	0.00	1.45	7.32

Notes: 2x LR-24 BPEF; Primary purpose of survey is three species occupancy. Often no more than 40 specimens of individual species were weighed and measured and the remainder were counted. Therefore population estimates are not completely accurate. Leopard Frog.