USDA United States Department of Agriculture | Forest Service | San Juan National Forest

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File Code: 2500
Date: March 6, 2017

Linda Bassi
Section Chief
Colorado Water Conservation Board
1313 Sherman Street, Room 721
Denver, CO 80203

Dear Ms. Bassi:

The U.S.D.A. Forest Service ("Forest Service") is writing this letter to formally communicate its recommendation for an instream flow water right on Little Sand Creek pursuant to the rules of the Colorado Instream Flow and Natural Lake Level Program. The stream is located in Colorado Water Division 7.

Natural Environment: The natural resource values which contribute to the overall natural environment to be preserved in Little Sand Creek include hybrid cutthroat trout and brook trout, aquatic macroinvertebrates, riparian vegetation, wetlands, and water-dependent wildlife. Little Sand Creek is tributary to Weminuche Creek and it serves as important spawning habitat for the resident brown trout fishery in Weminuche Creek.

Location and Land Status: Little Sand Creek is located approximately 21 miles northwest of the town of Pagosa Springs. Little Sand Creek is tributary to Weminuche Creek which is tributary to the Piedra River. The recommended reach is approximately 8.1 miles in length and is entirely located on lands managed by the San Juan National Forest.

Segment:
Upper Terminus Headwaters:
Latitude: 37°31'20.811" N Longitude: 107°19'7.512" W
Lower Terminus Confluence Weminuche Creek:
Latitude: 37°26'6.393" N Longitude: 107°14'30.419" W

Biological Summary: Little Sand Creek is a cold-water, moderate-to-high gradient mountain stream which flows through a forested landscape. The upper and middle portions of the reach are confined and exhibit low sinuosity, with little to no floodplain. Portions of the mid and upper watershed burned in 2012 during the Little Sand Wildfire. The lower portion of the reach is lower gradient, is more sinuous, and has a developed floodplain with associated wetlands and meadows. Numerous beaver ponds exist in the lower portions of the reach. In general, the condition of Little Sand Creek is good.

Fisheries surveys were conducted by Colorado Parks and Wildlife (CPW) and the Forest Service in 1976 and 1999. The stream contains a self-sustaining population of hybridized cutthroat trout (*Oncorhynchus clarki spp.*) and brook trout (*Salvelinus fontinalis*).

Riparian vegetation is a key component of stream health for Little Sand Creek. The riparian corridor is in good condition and provides abundant woody debris, shade, cover, nutrients, and aquatic habitat. It is comprised of a mix of conifers, aspen, alder, willow, and narrowleaf cottonwood. Numerous beaver dams have created habitat complexity and associated wetlands.

R2Cross Analysis: The Forest Service collected standard R2Cross data at several riffle cross sections in Little Sand Creek in 2016. Data was collected and analyzed using the methodology described in the June 2006 CWCB R2Cross Manual and was processed using the 2008 version of the R2Cross model.

R2Cross can be run using a constant Manning's n that is calculated by the program, or Manning's n can be defined using field measurements of channel roughness. The R2Cross model results using a constant Manning's n roughness coefficient are valid or "in range" when the model output yields summer and winter flow recommendations between 0.4 and 2.5 times the stream discharge measured at the time of field survey.

The Forest Service collected standard pebble count data at each R2Cross cross section on Little Sand Creek in order to calculate Manning's n roughness coefficient. Pebble counts were used to calculate Manning's n only where initial analysis indicated R2Cross model results were not "in range". For Little Sand Creek where model results were not in range, the R2Cross field data was processed using the R2Cross model subroutine for a Thorne-Zevenbergen Staging Table. This allowed full utilization of the R2Cross field data collected in 2016. The table below shows a combination of model outputs using the fixed Manning's n subroutine and outputs from the user-defined Thorne-Zevenbergen Manning's n subroutine.

R2Cross Model Results for Little Sand Creek				
LOCATION	DATE OF DATA COLLECTION	CHANNEL TOP-WIDTH	2 OF 3 INSTREAM FLOW CRITERIA (WINTER)	3 OF 3 INSTREAM FLOW CRITERIA (SUMMER)
Cross Section 2	7/14/2016	23.07 feet	*3.2 cfs	*4.4 cfs
Cross Section 3	7/14/2016	18.86 feet	1.1 cfs	*7.6 cfs
Cross Section 4	8/31/2016	26.70 feet	*3.3 cfs	*16.3 cfs
Cross Section 5	8/31/2016	14.99 feet	1.4 cfs	*2.7 cfs
Cross Section 6	8/31/2016	17.98 feet	0.6 cfs	*2.0 cfs
		Average	**1.9 cfs**	**6.6 cfs**

*Results calculated using the R2Cross Thorne-Zevenbergen Subroutine.

Biologic Instream Flow Recommendation: For the reach of Little Sand Creek from its headwaters to the confluence with Weminuche Creek, the Forest Service recommends the following:

Biological Instream Flow Recommendation Little Sand Creek	
TIME PERIOD	FLOW AMOUNT
January 1 – February 28	1.5 cfs
March 1 – March 31	1.9 cfs
April 1 – April 15	3.6 cfs
April 16 – July 31	6.6 cfs
August 1 – September 15	3.0 cfs
September 16 – September 30	2.4 cfs
October 1 – November 30	3.0 cfs
December 1 – December 31	1.5 cfs

Based on currently available data and information the FS has determined, these are the minimum flow amounts needed for fish population survival and to preserve the natural environment (described above) to a reasonable degree in the subject reach of Little Sand Creek.

Water Availability: Little Sand Creek is a free flowing stream with no existing water rights or diversions and it has no stream gage record. The CWCB conducts the analysis to determine if water is available for an instream flow appropriation.

The final assessment of water availability could result in reductions of the recommended flow amounts and/or modifications of the Forest Service flow recommendation duration. If this is the case, and future investigations indicate additional water is available, the Forest Service would recommend appropriating the additional water up to the recommended flow amounts and duration to preserve the natural environment to a reasonable degree.

Relationship to Land Management Plans: Forest Service watershed and aquatic habitat conservation is based on several key federal laws that set a consistent land-and-water stewardship vision (see Appendix). These laws direct Forest Service actions to protect watersheds and aquatic habitat through sound management. In addition, the San Juan Forest Plan calls for Little Sand Creek to be managed to provide ecological conditions sufficient to support a diversity of native and desired non-native fish species, and other aquatic biota in the long-term. The Forest Plan also directs that the management of riparian areas and wetlands maintain or restore the composition, structure, and function of these ecosystems. In addition, aquatic habitat should support well-distributed populations of vertebrate and invertebrate species.

Establishing an instream flow water right on Little Sand Creek utilizing the Colorado Instream

Flow and Natural Lake Level Program, would assist in meeting the Forest Service management obligations and Forest Plan direction summarized above. Thank you for considering the Forest Service recommendation for Little Sand Creek. If you have any questions regarding our instream flow recommendation, please feel free to contact me or Forest Hydrologist Kelly Palmer at (970) 385-1232 or at kapalmer@fs.fed.us.

Sincerely,

Kara L Chadwick

KARA L. CHADWICK
Forest Supervisor

cc: Maribeth Gustafson, Steve Lohr, Anthony Madrid, Kelly Palmer

Appendix A

LAWS, REGULATION, AND POLICY GUIDING U.S. FOREST SERVICE AQUATIC RESOURCE MANAGEMENT

Forest Service watershed and aquatic habitat conservation is based on several key federal laws (listed below in chronological order) that set a consistent land-and-water stewardship vision. These laws direct Forest Service actions to protect watersheds and aquatic habitat through sound management. Brief summaries of these laws and their direction for management related to watersheds and aquatic habitat are included below. Federal regulations contain the current interpretations and direction specific to these laws.

1. Organic Administration Act of 1897 (16 U.S.C. 475). This law defines original National Forest purposes to improve and protect the forest, secure favorable conditions of water flows, and furnish a continuous supply of timber. Years of concern about watershed damage led to creation of the National Forest System. Watersheds must be cared for to sustain their hydrologic function as "sponge-and-filter" systems that absorb and store water and naturally regulate runoff. The goals are good vegetation and ground cover, streams in dynamic equilibrium with their channels and flood plains, and natural conveyance of water and sediment.

2. Multiple Use-Sustained Yield Act of 1960 (16 U.S.C. 528). This law expands National Forest purposes to include watershed, wildlife and fish, outdoor recreation, range, and timber and to sustain native ecosystems. Renewable surface resources are to be managed for multiple use and sustained yield of the several products and services that they provide. The principles of multiple use and sustained yield include the provision that the productivity of the land shall not be impaired.

3. Endangered Species Act of 1973 (16 U.S.C. 1531-1536, 1538-1540). This law conserves endangered and threatened species of wildlife, fish, and plants and the ecosystems on which they depend. Federal agencies must conserve endangered and threatened species and cooperate with State and local agencies to resolve resource issues (Section 2). Each Federal agency shall, with the consultation and help of the Secretary of Interior, ensure that any action authorized, funded, or done by the agency is unlikely to jeopardize the continued existence of any endangered or threatened species or result in adverse modification of their critical habitat (Section 7).

4. National Forest Management Act of 1976 (16 U.S.C. 1600-1602, 1604, 1606, 1608-1614). The Forest Service must be a leader in conserving natural resources (Section 2). Programs must protect and, where appropriate, improve the quality of soil and water (Section 5). The overall goal of managing the National Forest System is to sustain the multiple uses of its renewable resources in perpetuity while maintaining the long-term productivity of the land. Maintaining or restoring the health of the land enables the National Forest System to provide a sustainable flow of uses, benefits, products, services and visitor opportunities (36 CFR 219.1 (2005)). The overall goal of the ecological element of sustainability is to provide a framework to contribute to sustaining native ecological systems by providing ecological conditions to support a diversity of native plant and animal species (36 CFR 219.10 (2005)).

Ecological conditions are the components of the biological and physical environment that can affect diversity of plant and animal communities and the productive capacity of ecological systems. These components could include the abundance and distribution of aquatic and terrestrial habitats, roads and other structural developments, human uses, and invasive, exotic species (36 CFR 219.16 (2005)).

5. Federal Land Policy and Management Act of 1976 (43 U.S.C. 1752). Rights-of-way for water diversion, storage, and/or distribution systems, and other uses must include terms and conditions to protect the environment and otherwise comply with the requirements of Section 505, including section (a) (ii): "minimize damage to scenic and esthetic values and fish and wildlife habitat and otherwise protect the environment".

6. Clean Water Act of 1977 (33 U.S.C. 1251, 1254, 1323, 1324, 1329, 1342, 1344). This series of laws was written to restore and maintain the chemical, physical, and biological integrity of the Nation's waters (Section 101). Congress sought to sustain the integrity of water quality and aquatic habitat so that waters of the United States will support diverse, productive, stable aquatic ecosystems with a balanced range of aquatic habitats. All issues are framed by the intent of Congress to improve and preserve the quality of the Nation's waters (540 F2.d 1023; 543 F2.d 1198; 612 F2.d 1231; 97 S.Ct 1340; 97 S.Ct 1672).

Waters of the United States include perennial and intermittent streams, lakes, wetlands, and their tributaries. Aquatic ecosystems are waters of the United States that serve as habitat for interrelated and interacting communities and populations of plants and animals (40 CFR 230.3). Impacts to flow patterns, temperature, dissolved oxygen, sediment, and pollutant levels must be controlled (33 U.S.C. 1311 and 1314; 843 F2.d 1194; 753 F2.d 759). Physical features needed to support existing uses for anti-degradation include substrate, cover, flow, depth, pools, and riffles (40 CFR 131.10, 230.10, and 230.11).

7. Forest Plans. The purpose of the San Juan National Forest Land and Resource Management Plan (Forest Plan) is to provide strategic guidance for future management of all National Forest System lands managed by the San Juan National Forest. It provides a framework for informed decision making, while guiding resource management programs, practices, uses, and projects.

To ensure the long-term sustainability of ecosystems, humans must manage within the physical and biological capabilities of the land, maintain all of the ecological components and processes, and not irreversibly alter ecosystem integrity and resilience. The concept of sustainability is a fundamental component of the Forest Plan and is guided by the Multiple-Use Sustained-Yield Act (MUSY) and the Federal Land Policy and Management Act (FLPMA). Ecological sustainability is intended to provide the ecological conditions that maintain or restore the diversity of native ecosystems and natural disturbance processes. This in turn will maintain suitable habitats for a wide range of plant and animal species and provide for the diversity and viability of plant and animal species, populations and communities.

For lands managed by the USFS, the Planning Rule in 36 CFR 219.19 specifically requires that "[f]ish and wildlife habitat shall be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area," and "[f]or planning purposes, a viable population shall be regarded as one which has the estimated numbers and distribution of reproductive individuals to insure [sic] its continued existence is well distributed in the planning area." Regulation 36 CFR 219.26 requires that "[f]orest planning shall provide for diversity of plant and animal communities and tree species consistent with the overall multiple-use objectives of the planning area. Such diversity shall be considered throughout the planning process." In addition, the FLPMA specifies that special uses granted by the Secretary of Agriculture are subject to terms and conditions that "minimize damage to fish and wildlife habitat and otherwise protect the environment." Agency actions should avoid or minimize impacts to species whose viability has been identified as a concern. USFS actions must not result in loss of population viability or create significant trends toward federal listing (FSM 2670.32).

For riparian area and wetland ecosystems, aquatic ecosystems, and terrestrial ecosystems, specific management direction has been developed that is intended to address the legal, regulatory, and policy requirements for species diversity and population viability. The process applied was to identify a range of key ecosystem elements, determine the importance of those elements to maintaining species diversity and population viability (e.g. limiting factors), define desired future conditions and land management objectives for those elements, and ensure that appropriate management standards and guidelines are in place that address the ecological needs of species and populations. In general, management standards have been developed for those elements determined to have an overriding influence on species diversity or long-term population viability, while other elements that have less influence are typically addressed through the application of guidelines.

TOPOG MAPS: Oakbrush Ridge
Bear Mountain
Granite Lake

SAND CREEK, LITTLE

Southwest Region — Code No. 38108 XX

Section No. 1 — Date: October 28, 1976

Primary Drainage: Weminuche Creek, Piedra River

Major Drainage: San Juan River, Code No. 40-SJ

Terminus: Lower

Location: Confluence with Weminuche Creek

T 37 N, R 4 W, Sec. 25

Width: 10 ft. Elevation: 7700 ft.

Terminus: Upper

Location: Headwaters

T 38 N, R 4 W, Sec. 17

Width: 1.0 ft. Elevation: 10,630 ft.
Estimated Flow: 1.0 cfs
pH: 7.3 pHTH: 0 ppm MO: 41 ppm
Hardness: 86 ppm Conductivity: 94 Mohm/cm
Stream Profile: No
Water Temperature @14:45 - 31°F

SECTION SUMMARY

Meander Factor: 1.05 Length: 7.8 Miles

Width: 5 ft. Flow: Normal
Acreage: 5.0

County: Hinsdale Miles: 7.8

Beaver Dams: Numerous

Physical Stream Damage: None

Accessibility:
4-Wheel Drive: 0.3 Miles
Established Trail: 6.0 Miles
No Established Trail: 1.5 Miles

Land Status:
USFS: 7.8 Miles

Stocking:
None: 7.8 Miles

Aquatic Vegetation:
Filamentous Algae: Absent
Watercress: No

Stream Size:
Minor Stream 4' - 9'

Gradient: 7.1%

Fishery Value: Unknown

Fishery Value - Limiting Factors:
Low Temperatures - A-15
Excessive Siltation - E-1

FISH SAMPLING

Only Station

Elevation: 9367 ft.
Sampling Method: Electro-fishing - 50'
Length: 50 ft.
Sampling: Adequate
Scales Collected: No

Estimated % of Fish Biomass:
Game Fish: 100%

ELECTRO-FISHING RECORD
Station #2: Upper Road Crossing USFS 631
Distance: 50 ft. Width: 4 ft.
Equipment Used: Battery Back Pack
Personnel: Smith, Weiler, Lashmett, Vigil, Hawkins, Warner

		SIZE LENGTH IN INCHES							
Sta.	Species	1	2	3	4	5	6	Total	Average
1	Cutthroat			2				2	3.4

Comments: Station #2: Cutthroat - 20 g

CDOW STREAM SURVEY (1991 REVISION)
LEVEL 2: FIELD SURVEY SUMMARY

STREAM: Sand Creek, Little SEC#: 1 WATER CODE: 38108 CDOW REGION: WE

SURVEYORS: M. Japhet, M. Reid, C. Ellis, D. Chacon, N. Tallowich DATE OF SURVEY: 08/24/99

SURVEY LOCATION: T R S ELEVATION: 9,390 ft. STATION #:1

UTM ZONE: 13 S UTM X: 029698 UTM Y: 4152982

LOCATION DESCRIPTION: above FS Road 631

STREAM FLOW PROFILE (Y or N): N IF YES-DATE AND TYPE:

HABITAT EVALUATION (Y or N): N IF YES-DATE AND TYPE:

WATER CHEMISTRY ANALYSIS (Y or N): N IF YES-ATTACH SEPARATE ANALYSIS SHEET

FISH PRESENT (Y or N): Y POP. EST. METHOD: two-pass removal STATION LENGTH: 500 (FEET)

AVG. WIDTH: 7.8 (FEET) TOTAL STATION AREA: 0.09 (ACRES)

FLOW (CFS) AT TIME OF SURVEY: NA METHOD:

LIMITING FACTORS TO FISHERY: none

COMMENTS: No fish migration barriers found were found at this station. DWM Reid reports brook trout present in beaver ponds on Little Sand Creek about 1/4 mile below this station. No record of fish stocking exists for Little Sand Creek, although stocking in the upper end of the drainage could have easily been accomplished via Forest Service Road 631. Ten of the fish caught in this survey were collected for genetic testing; the remainder were returned to the water. Two fish had a few spots on the head and all fish had numerous, evenly distributed spots, suggesting rainbow trout influence. Trout biomass and density estimates shown below are based on Seber-Le Cren population estimate for trout > or = 10 cm (4 in) where C1=22, C2=3, N=25.5, and 95% confidence limit = + or - 1.8.

LENGTH FREQUENCY RECORD (CM)

SPECIES	0 | 2	2 | 4	4 | 6	6 | 8	8 | 10	10 | 12	12 | 14	14 | 16	16 | 18	18 | 20	20 | 22	22 | 24	24 | 26	26 | 28	28 | 30	30 | 32	32 | 34	34 | 36	36 | 38	38 | 40	40 | 42	42 | 44	44 | 46	46 | 48	48 | 50	50 | UP
NAT				2	1	3	10	2	7	3															
INCHES			2		4		6		8		10		12		14		16		18		20				

SUMMARY INFORMATION

SPECIES	NO. FISH CAUGHT	AVG. LENGTH	LENGTH RANGE	AVG. WEIGHT (Grams)	WEIGHT RANGE (Grams)	% TOTAL CATCH	BIOMASS lb/Acre	DENSITY No./Acre	DENSITY Conf. Int.
NAT	28	14 cm (5.5 in)	6.8-20 cm (2.7-8 in)	30 g.	5-95 g.	100 %	22.6	283	278-303 (95%)

FISH COLLECTION RECORD

STREAM NAME: Little Sand Creek CODE #: 38108 STATION #: 1

LOCATION: above FS Road 631 DATE: 08/24/99

UTM ZONE: 13 S E 029648 N 4152982 T R S

COUNTY: Hinsdale TOPO MAP NAME: Granite Lake

PERSONNEL: M. Japhet, M. Reid, C. Ellis, D. Chacon, N. Tallowich LENGTH OF STATION: 500 ft

AVG. WIDTH: 7.8 ft ACREAGE: 0.089 POP EST MADE? Yes

COLLECTION CODE NO.: MJ-99-LSC

SPECIMEN RECORD

SPECIMEN CODE	SPECIES	LENGTH (cm)	WEIGHT (g)	SPECIMEN CODE	SPECIES	LENGTH (cm)	WEIGHT (g)
01	NAT	17.8	50				
02	NAT	20	95				
03	NAT	18.5	75				
04	NAT	17.5	60				
05	NAT	16.5	50				
06	NAT	19.5	75				
07	NAT	17.7	60				
08	NAT	16.2	50				
09	NAT	13.7	30				
10	NAT	12.8	20				

COMMENTS: No record of stocking exists for Little Sand Creek, however easy vehicle access to the headwaters at this location should not rule out undocumented stocking in the past. No fish migration barriers were found. DWM Reid reports brook trout present in beaver ponds on Little Sand Creek about 1/4 mile below this station. Specimen Nos. 03 and 06 have a few spots on head suggesting possible rainbow trout hybridization. All trout specimens had numerous, evenly distributed spots, even towards the front of the fish, again suggesting rainbow trout influence.

ELECTROFISHING RECORD

STREAM NAME: Sand Creek, Little CODE #: 38108 STATION # 1

LOCATION: above FS road 631 crossing DATE: 8/24/99

PERSONNEL: Japhet, Reid, Ellis, Chacon, Tallowich LENGTH OF STATION: 500

AVG. WIDTH 7.8 FT ACREAGE 0.09 ELEVATION 9390ft POP EST MADE? X Yes ___ No

UTM 13S 0296485 4152982

FISH SAMPLE

SPECIES	LENGTH (cm)	WGT (g)
NAT	17	55
	13	15
	15	30
	13.5	20
	12.8	20
	12.8	15
	11.2	10
	13	15
	13.5	25
	11.3	10
	6.5	5
	12.8	15
	6.8	5
	12.3	15
CUT C1	17.8	55
02	20	95
03	18.5	75
04	17.5	60
05	16.5	50
06	19.5	75
07	17.7	60
08	16.2	50
09	13.7	30
10	12.8	20

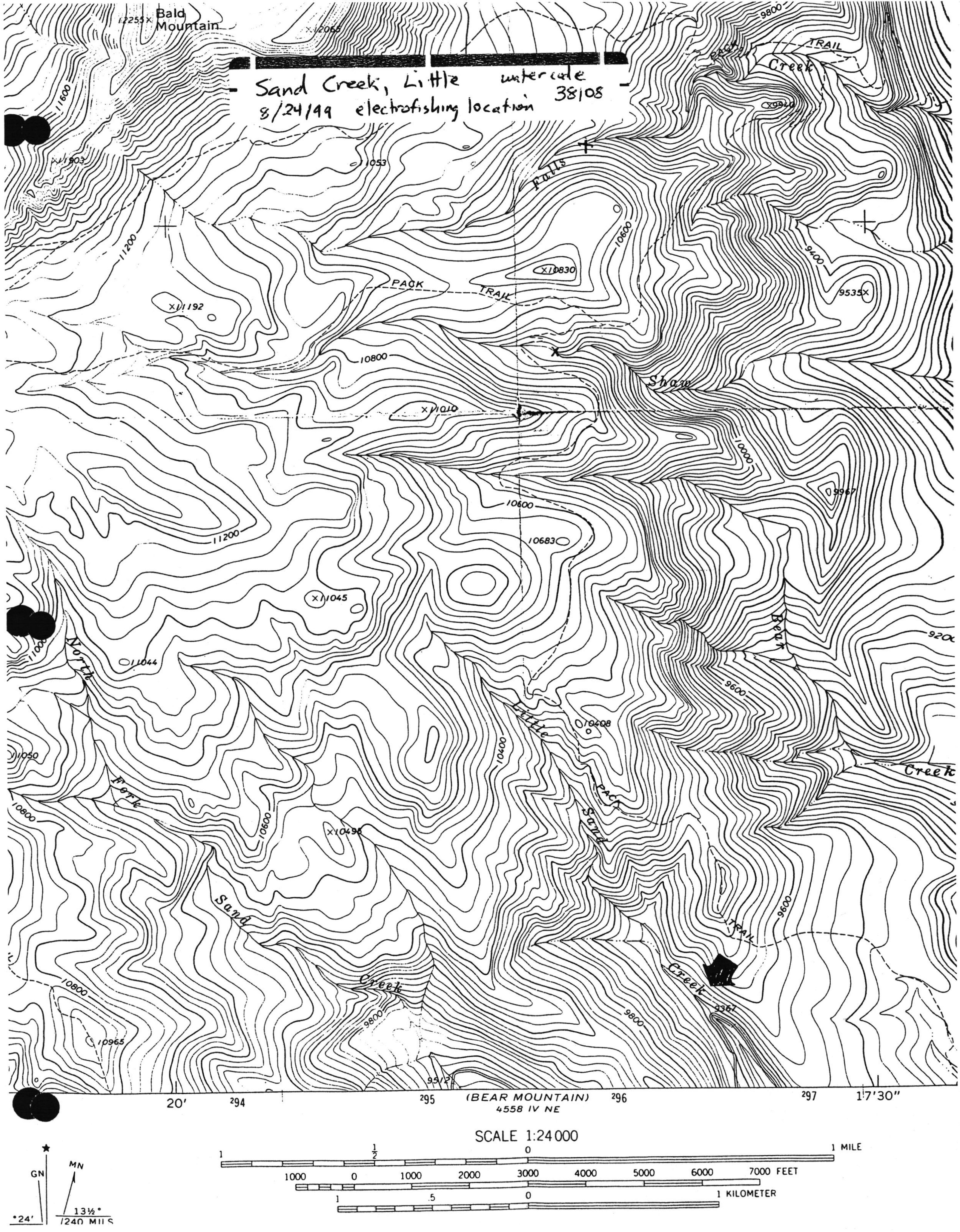
SPECIES	LENGTH (cm)	WGT (g)

SPECIES	LENGTH (cm)	WGT (g)
	SECOND PASS	

SPECIES	LENGTH (cm)	WGT (g)
NAT	17	40
	14.8	35
	11	15
	8.8	5

10.3
8.8
5.4
6.9
} widths

no apparent fish barriers found



Sand Creek, Little watercode 38108
8/24/99 electrofishing location
Bald Mountain
12255
11903
11053
11200
11192
PACK TRAIL
10830
10600
9400
9535
Creek
Falls
10800
Shaw
11010
10000
9967
10683
11045
11044
North Fork
Bear
9600
10408
Little
Creek
11050
10400
PACK
Sand
10496
Sand Creek
TRAIL
Creek
9367
9800
10965
20'
294
295
(BEAR MOUNTAIN)
4558 IV NE
296
297
17'30"
SCALE 1:24 000
1 ½ 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 .5 0 1 KILOMETER
GN
MN
13½°
240 MILS
24'

ICAP entered 8/5

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

COLORADO WATER CONSERVATION BOARD

COLORADO DIVISION OF WILDLIFE

B

LOCATION INFORMATION

STREAM NAME: LITTLE SAND						CROSS-SECTION NO.: XS 2
CROSS-SECTION LOCATION: upstream of XS1, downstream of XS3						
DATE: 7/14/16	OBSERVERS: KAMPF, CADENHEAD, SEEBACH, PORTER					
LEGAL DESCRIPTION	¼ SECTION: SE	SECTION: 13	TOWNSHIP: 37 (N/S)	RANGE: 4 W (E/W)	PM: NMPM	
COUNTY: Hinsdale	WATERSHED: San Juan	WATER DIVISION: 7	DOW WATER CODE: 38108			
MAPS: USGS: OAK BRUSH RIDGE						
MAPS: USFS: SJNF - Visitors Map						

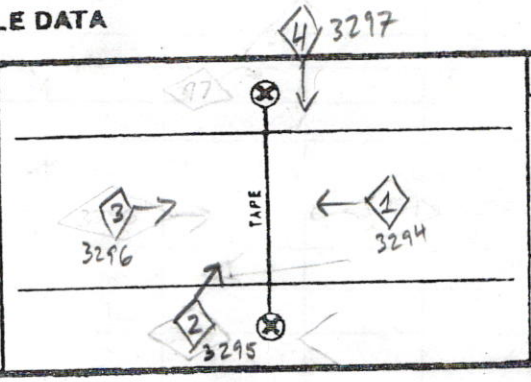
SUPPLEMENTAL DATA

SAG TAPE SECTION SAME AS DISCHARGE SECTION: YES / NO	METER TYPE: MARSH MC-BURNEY			
METER NUMBER:	DATE RATED:	CALIB/SPIN ____ sec	TAPE WEIGHT ____ lbs/foot	TAPE TENSION ____ lbs
CHANNEL BED MATERIAL SIZE RANGE	PHOTOGRAPHS TAKEN (YES/NO)	NUMBER OF PHOTOGRAPHS: 4		

CHANNEL PROFILE DATA

STATION	DISTANCE FROM TAPE (ft)	ROD READING (ft)	
Tape @ Stake LB	0.0		
Tape @ Stake RB	0.0		
WS @ Tape LB/RB	0.0	7.6 6.04	15.6 6.09
WS Upstream	12.2 TTL	6.00	6.36
WS Downstream			
SLOPE	0.0295		

SKETCH



LEGEND: Stake ⊗ Station ① Photo ① Direction of Flow

AQUATIC SAMPLING SUMMARY

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

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

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

AQUATIC INSECTS IN STREAM SECTION BY COMMON OR SCIENTIFIC ORDER NAME

COMMENTS

UTM: 13S 0301536 4145623

FORM #ISF FO 1-85

LBF 2.1 4.89

DISCHARGE/CROSS SECTION NOTES

STREAM NAME: LITTLE SAND | CROSS-SECTION NO: XS2 | DATE: 7/14/16 | SHEET 1 OF 2

BEGINNING OF MEASUREMENT | EDGE OF WATER LOOKING DOWNSTREAM (0.0 AT STAKE) | (LEFT) / RIGHT | Gage Reading. _____ ft | TIME 14:05 - 14:50

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 At Point	Area (ft^2)	Discharge (cfs)
BM			5.20								
TOP	0.8		4.24								
(S) BOP	0.8		4.33								
(G)	2.1		4.89								
	2.7		5.10								
	2.8		5.48								
	3.4		5.91								
(G)	4.8		5.82								
	5.7		5.95								
	6.2		5.98								
TOR	6.7		5.78								
(W) LEW(w)	7.3		6.04								
	7.6		6.12	0.1					0		
	7.9		6.14	0.1					0		
	8.2		6.12	0					0		
	8.5		6.07	0					0		
	8.8		6.09	0.1					0.06		
	9.1		6.16	0.1					0		
	9.4		6.31	0.2					0		
	9.7		6.30	0.2					0.10		
	10.0		6.25	0.2					0.59		
	10.3		6.24	0.1					1.22		
	10.6		6.08	0.15					0.47		
ROCK	10.9		6.35	0					0		
	11.2		6.36	0.20					0.48		
	11.5		6.38	0.30					0.85		
	11.8		6.36	0.20					1.82		
	12.1		6.22	0.20					1.53		
	12.4		6.40	0.25					0		
	12.7		6.30	0.30					0.45		
	13.0		6.33	0.35					0.94		
	13.3		6.39	0.30					1.41		
	13.6		6.31	0.25					1.46		
	13.9		6.32	0.20					0.16		
	14.2		6.37	0.30					0.94		
	14.5		6.33	0.25					0.63		
	14.8		6.24	0.10					0		
	15.1		6.23	0.10					0		
	15.4		6.12	0.05					0		
(W) REW(w)	15.7		6.06	—					—		
	16.1		6.01								
	17.0		6.04								
TOTALS											

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

COLORADO WATER CONSERVATION BOARD

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

LOCATION INFORMATION

STREAM NAME: Little Sand							CROSS-SECTION NO.: XS2
CROSS-SECTION LOCATION: upstream of XS1, downstream of XS3							
DATE: 7/14/16	OBSERVERS: Kampf, Cadiente, Seebach, Porter						
LEGAL DESCRIPTION	¼ SECTION: SE	SECTION: 13	TOWNSHIP: 37 N/S	RANGE: 4 E/W	PM: NM		
COUNTY: Hinsdale	WATERSHED: San Juan	WATER DIVISION: 7	DOW WATER CODE: 38108				
MAP(S): USGS: Oakbrush Ridge	USFS: SJNF						

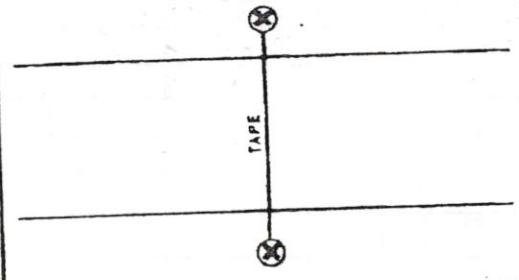
SUPPLEMENTAL DATA

SAG TAPE SECTION SAME AS DISCHARGE SECTION: YES / NO	METER TYPE: Marsh McBirney			
METER NUMBER:	DATE RATED:	CALIB/SPIN _____ sec	TAPE WEIGHT _____ lbs/foot	TAPE TENSION _____ lbs
CHANNEL BED MATERIAL SIZE RANGE	PHOTOGRAPHS TAKEN YES/NO	NUMBER OF PHOTOGRAPHS:		

CHANNEL PROFILE DATA

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	
② WS Upstream		
③ WS Downstream		
SLOPE		

SKETCH



LEGEND:
- Stake
- Station
- 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

FORM #ISF FD 1-85

DISCHARGE/CROSS SECTION NOTES

STREAM NAME: LITTLE STAN	CROSS-SECTION NO: XS 2	DATE: 7/14/16	SHEET 2 OF 2
BEGINNING OF MEASUREMENT: EDGE OF WATER LOOKING DOWNSTREAM (0.0 AT STAKE)	LEFT / RIGHT	Gage Reading: _____ ft	TIME

Stake (S) Grassline (G) Waterline (W) Rock (R)	Distance From Initial Point (ft)	Width (ft)	Total Vertical Depth From Tape/Inst (ft)	Water Depth (ft)	Depth of Observation (ft)	Revolutions	Time (sec)	Velocity (ft/sec)		Area (ft^2)	Discharge (cfs)
								At Point	Mean in Vertical		
	17.9		5.88								
	18.3		5.71								
	19.0		5.60								
	20.0		5.49								
	21.4		5.27								
	23.4		5.09								
	25.1		5.02								
G RBF	25.2		4.84								
	25.3		4.80								
	25.5		4.64								
	26.6		4.51								
	27.2		4.29								
	28.1		3.57								
	28.3		3.34								
	28.9		3.04								
S BOP	29.4		2.92								
	29.4		2.82								
			5.20								
TOTALS											

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

PEBBLE COUNT DATA SHEET
Stream: Little Sand Creek Date: 7/14/16 Sampler: Seebach
Reach: XS2 Notes: Porter
mments:

Size Range (mm)	Habitat (r = riffle, p = pool, g = glide)	Count	
<2		𝍸 𝍸 𝍸 𝍸 𝍸 ||	(27)
2.8		||	(2)
4		|	(1)
5.6		||||	(4)
8		||	(2)
11		||||	(4)
16		||	(2)
22.6		|	(1)
32		𝍸	(5)
45		𝍸 𝍸	(10)
64		𝍸 𝍸 ||	(12)
90		𝍸 𝍸 𝍸 |	(16)
128		𝍸 𝍸 |	(11)
180		𝍸	(5)
260		||	(2)
>260		||	(2)
Bedrock			
TOTAL D50		Total: 106	

KAP Entered 8/5

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

COLORADO WATER CONSERVATION BOARD

COLORADO DIVISION OF WILDLIFE

LOCATION INFORMATION

STREAM NAME: Little Sand Creek					CROSS-SECTION NO.: XS3
CROSS-SECTION LOCATION: Upstream of XS2					
DATE: 7/14/16	OBSERVERS: Seebach, Porter, Cadiente, Kampf				
LEGAL DESCRIPTION	¼ SECTION: SE	SECTION: 13	TOWNSHIP: 37 (N)/S	RANGE: 4W E/(W)	PM: NMPM
COUNTY: Hinsdale	WATERSHED: San Juan		WATER DIVISION: 7		DOW WATER CODE: 38108
MAP(S)	USGS: OAKBRUSH RIDGE				
	USFS: SJNF - Visitors Map				

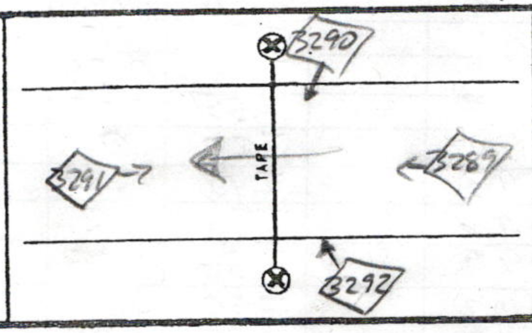
SUPPLEMENTAL DATA

SAG TAPE SECTION SAME AS DISCHARGE SECTION: YES / NO	METER TYPE: Marsh McBirney			
METER NUMBER:	DATE RATED:	CALIB/SPIN: ___ sec	TAPE WEIGHT ___ lbs/foot	TAPE TENSION ___ lbs
CHANNEL BED MATERIAL SIZE RANGE		PHOTOGRAPHS TAKEN: (YES)/NO	NUMBER OF PHOTOGRAPHS: 4	

CHANNEL PROFILE DATA

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	7.14 / 7.15
② WS Upstream	21.65ft	7.14 ft
③ WS Downstream	21.65ft	7.24 ft
SLOPE	0.1 / 21.65 = 0.00462 = 0.462%	

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

Sunny, high 70's, 0-5mph wind

UTM: 13S 0301536 4145653

benchmark: 7.01

Cadiente: stadia rod

Kampf: rod - discharge

Porter: notes

Seebach: auto-level

FORM #ISF FD 1-85

DISCHARGE/CROSS SECTION NOTES

STREAM NAME	CROSS-SECTION NO	DATE	SHEET
Little Sand Creek	XS3	7/14/16	1 OF 2

BEGINNING OF MEASUREMENT	EDGE OF WATER LOOKING DOWNSTREAM (0.0 AT STAKE)	(S) LEFT / RIGHT	Gage Reading. ____ ft	TIME
				13:00 - 13:45

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)
LBTOP	2.4		5.73								
(S) LBBOP	2.4		5.78								
	3.5		6.00								
	4.2		6.30								
(G) LBF	4.6		6.32								
	5.3		6.58								
	5.7		7.00								
	6.3		7.12								
top-rock	6.8		7.03								
(W) LEW	7.2		7.24								
	7.5		7.47	0.3				0.5			
	7.8		7.46	0.3				0.57			
rock	8.1		7.33	0.2				0.73			
rock	8.4		7.45	0.35				0.43			
	8.7		7.55	0.25				0.29			
top-rock	9.0		7.20	0				0			
	9.3		7.40	0.25				0.14			
	9.6		7.35	0.2				0.12			
	9.9		7.56	0.25				0.11			
	10.2		7.50	0.35				0.67			
	10.5		7.52	0.35				0.53			
	10.8		7.33	0.2				1.45			
	11.1		7.29	0.1				0.51			
	11.4		7.42	0.1				0.76			
	11.7		7.44	0.2				1.20			
	12.0		7.47	0.3				0.30			
	12.3		7.48	0.15				0.10			
	12.6		7.29	0.1				0.49			
	12.9		7.39	0.1				0.15			
	13.2		7.40	0.2				0.39			
	13.5		7.28	0.1				0.48			
rock	13.8		7.21	0.2				0.36			
	14.1		7.25	0.2				0.47			
	14.4		7.40	0.2				0.10			
	14.7		7.46	0.25				0.16			
	15.0		7.43	0.3				0.15			
	15.3		7.38	0.2				0.12			
	15.6		7.38	0				0			
	15.9		7.19	0				0			
(W) REW	16.0		7.15								

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

KBF 23.5 6.31

COLORADO WATER CONSERVATION BOARD

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

COLORADO DIVISION OF WATER

LOCATION INFORMATION

STREAM NAME: Little Sand Creek						CROSS-SECTION NO.: XS3	
CROSS-SECTION LOCATION: upstream of XS2							
DATE: 7/14/16	OBSERVERS: Seebach, Porter, Cadiente, Kampf						
LEGAL DESCRIPTION	% SECTION: SE	SECTION: 13	TOWNSHIP: 37 (N)/S	RANGE: 4 E/(W)	PM: NM		
COUNTY: Hinsdale	WATERSHED: San Juan	WATER DIVISION: 7	DOW WATER CODE: 38108				
MAP(S) USGS: Oakbrush Ridge							
MAP(S) USFS: SJNF							

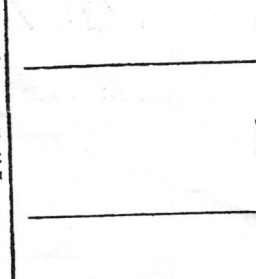
SUPPLEMENTAL DATA

SAG TAPE SECTION SAME AS DISCHARGE SECTION: YES / NO	METER TYPE: Marsh McBirney			
METER NUMBER	DATE RATED	CALIB/SHIFT: ____ sec	TAPE WEIGHT: ____ lbs/foot	TAPE TENSION: ____ lbs
CHANNEL BED MATERIAL SIZE RANGE	PHOTOGRAPHS TAKEN YES/NO	NUMBER OF PHOTOGRAPHS:		

CHANNEL PROFILE DATA

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	
② WS Upstream		
③ WS Downstream		
SLOPE		

SKETCH



LEGEND:

Stake

Station

Photo ①

Direction of Flow

AQUATIC SAMPLING SUMMARY

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

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

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

AQUATIC INSECTS IN STREAM SECTION BY COMMON OR SCIENTIFIC ORDER NAME

COMMENTS

FORM #ISF FD 1-85

DISCHARGE/CROSS SECTION NOTES

NAME: Little sand creek | CROSS-SECTION NO: x53 | DATE: 7/14/16 | SHEET 2 OF 2

BEGINNING OF MEASUREMENT: EDGE OF WATER LOOKING DOWNSTREAM (0.0 AT STAKE) | LEFT / RIGHT | Gage Reading: _____ ft | TIME: 13:00-13:45

Stake (S) Greenline (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)
REW	16.0		7.15								
	16.7		6.94								
	18.0		7.08								
	18.5		7.11								
	19.6		7.00								
	20.2		6.76								
	22.3		6.56								
	23.0		6.43								
RBF	23.5		6.31								
	24.3		6.16								
RBBOP	24.9		6.00								
RBTOP	24.9		5.95								
TOTALS											

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

PEBBLE COUNT DATA SHEET
Stream: Little Sand Creek Date: 7/14/16 Sampler: Seebach
Reach: XS3 Notes: Porter
Comments:

Size Range (mm)	Habitat (r = riffle, p = pool, g = glide)	Count
<2		𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 I (31)
2.8		III (3)
4		III (3)
5.6		II (2)
8		III (3)
11		III (3)
16		IIII (4)
22.6		III (3)
32		III (3)
45		𝍸 (5)
64		𝍸 II (7)
90		𝍸 𝍸 II (12)
128		𝍸 𝍸 III (13)
180		𝍸 𝍸 (10)
260		II (2)
>260		IIII (4)
Bedrock		
TOTAL D50		Total: 108

COLORADO WATER CONSERVATION BOARD

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

COLORADO DIVISION OF WILDLIFE

LOCATION INFORMATION

STREAM NAME: Little Sands Cr							CROSS-SECTION NO.: RI XS4
CROSS-SECTION LOCATION: Furthest up stream, Right Bank has Root wads above XS. Left Bank has large Spruce.							
DATE: 8/31/16	OBSERVERS: M. Porter, T. Cadicute, J. Vanderbilt, H. McIntyre, D. Anderson, R. Sutton						
LEGAL DESCRIPTION	¼ SECTION: SE	SECTION: 13	TOWNSHIP: 37 (N)/S	RANGE: 4 E/(W)	PM: NM		
COUNTY: Hinsdale	WATERSHED: San Juan	WATER DIVISION: 7	DOW WATER CODE: 38108				
MAP(S): USGS: Oakbrush Ridge	USFS: SJNF						

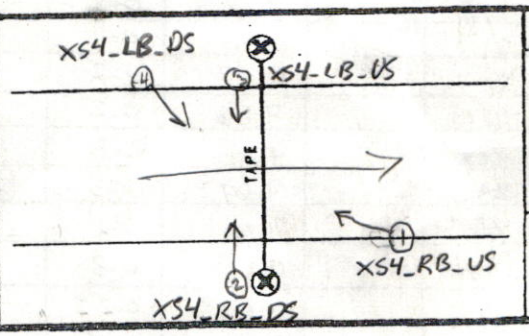
SUPPLEMENTAL DATA

SAG TAPE SECTION SAME AS DISCHARGE SECTION: YES / NO	METER TYPE: Marsh McBirney			
METER NUMBER:	DATE RATED:	CALIB/SPIN ____ sec	TAPE WEIGHT ____ lbs/foot	TAPE TENSION ____ lbs
CHANNEL BED MATERIAL SIZE RANGE	PHOTOGRAPHS TAKEN (YES)/NO	NUMBER OF PHOTOGRAPHS: 4		

CHANNEL PROFILE DATA

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	
② WS Upstream	25.0' total	9.32
③ WS Downstream	X	9.52
SLOPE	0.2 / 25.0 = 0.008	

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

Clear Blue Skys & Sunny. about 70°F

UTM - s 0301085 - 4147228

FORM #ISF FO 1-85

30.1, 18.8

DISCHARGE/CROSS SECTION NOTES

STREAM NAME: Little Sand	CROSS-SECTION NO: XS 4	DATE: 8/31/2016	SHEET 1 OF 1
BEGINNING OF MEASUREMENT	EDGE OF WATER LOOKING DOWNSTREAM (0.0 AT STAKE) LEFT / RIGHT (LEFT circled)	Gage Reading: — ft	TIME St. 1045 End 1110

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 (ft²)	Discharge (cfs)
BM			9.08								
LBP	3.0	3	5.45								
	5.5		6.63								
LBF	7.0		7.02								
	8.2		7.38								
	12.3		7.70								
	12.6		8.09								
	15.1		8.26								
	16.1		8.31								
	17.0		8.73								
LEW	18.8		9.30	0				0			
	19.3		9.45	0.1				0			
	19.8		9.44	0.15				0.36			
	20.3		9.52	0.2				0.50			
	20.8		9.56	0.2				0.12			
	21.3		9.56	0.1				0.53			
	21.8		9.57	0.2				0.24			
	22.3		9.56	0.2				0.12			
	22.8		9.65	0.3				0.32			
	23.3		9.67	0.3				0.43			
	23.8		9.61	0.1				0.39			
	24.3		9.56	0.3				1.02			
	24.8		9.57	0.25				0.95			
	25.3		9.59	0.15				1.03			
Rock	25.8		9.50	0.25				0.96			
	26.3		9.55	0.3				0.93			
	26.8		9.51	0.2				0.84			
	27.3		9.55	0.2				0.82			
	27.8		9.59	0.3				0.75			
	28.3		9.64	0.3				0.3			
	28.8		9.49	0.2				0.41			
	29.3		9.42	0.1				0.24			
	29.8		9.35	0.1				0			
REW	30.1		9.30	0				0			
	31.4		8.93								
	32.1		8.14								
	32.6		7.80								
	33.2		7.29								
	33.5		7.07								
RBF	33.7		7.02								
	34.3		6.46								
	36.6		6.14								
TOTALS											

Stypr	Stat.	Total V Depth
	37.1	5.68
	39.4	5.46
	40.9	5.12
RBP	46.9	4.13

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

PEBBLE COUNT DATA SHEET

Stream: Little Sands

Date: 8/31/16

Sampler: D. Anderson, H. McIntyre

Notes: R. Sutton

Reach: XS 4

Comments:

Size Range (mm)	Habitat (r = riffle, p = pool, g = glide)	Count
<2		(36)
2.8		
4		
5.6		(2)
8		(6)
11		(18)
16		(18)
22.6		(15)
32		(9)
45		(15)
64		(12)
90		(11)
128		(5)
180		(1)
260		
>260		(3)
Bedrock		
TOTAL D50		151

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

COLORADO WATER CONSERVATION BOARD

LOCATION INFORMATION

STREAM NAME: Little Sands						CROSS-SECTION NO.: RI XS5
CROSS-SECTION LOCATION: Just Below XS 4 ≈ 10 meters, XS is in an area with Some 25'-30' trees. Left Bank BOP is next to an Alder						
DATE: 8/31/16	OBSERVERS: D. Anderson, F. Cadiente, M. Porter, H. McIntyre, R. Sutton, J. Vanderbuilt					
LEGAL DESCRIPTION	¼ SECTION: SE	SECTION: 13	TOWNSHIP: 37 (N)/S	RANGE: 4 E/(W)	PM: NM	
COUNTY: Hinsdale	WATERSHED: San Juan	WATER DIVISION: 7	DOW WATER CODE: 38108			
MAP(S) USGS: Oakbrush Ridge						
MAP(S) USFS: SJNF						

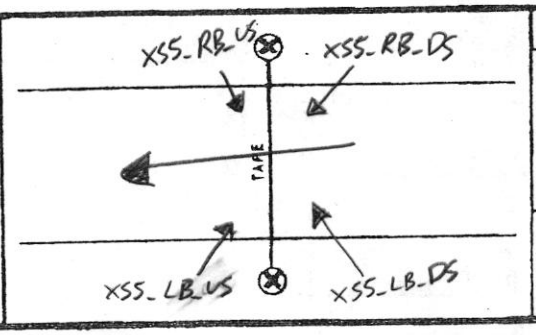
SUPPLEMENTAL DATA

SAG TAPE SECTION SAME AS DISCHARGE SECTION: YES / NO	METER TYPE: Marsh McBirney			
METER NUMBER:	DATE RATED:	CALIB/SPIN ____ sec	TAPE WEIGHT ____ lbs/foot	TAPE TENSION ____ lbs
CHANNEL BED MATERIAL SIZE RANGE	PHOTOGRAPHS TAKEN (YES)/NO	NUMBER OF PHOTOGRAPHS: 4		

CHANNEL PROFILE DATA

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	
② WS Upstream	~~8.5~~ 18 total	8.49
③ WS Downstream	X	8.65
SLOPE	.16 / 18 = .008	

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

Clear & Sunny Skys. ≈ 75°F

UTM - 0301084 4147213

FORM #ISF FD 1-85

DISCHARGE/CROSS SECTION NOTES

STREAM NAME: Little Sands | CROSS-SECTION NO: XS5 | DATE: 8/31/16 | SHEET 1 OF 1

BEGINNING OF MEASUREMENT | EDGE OF WATER LOOKING DOWNSTREAM (0.0 AT STAKE) | LEFT / RIGHT | Gage Reading: _____ ft | TIME: 11:35 → 12:00

Stake (S) Gaugeline (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	Notes	Area (ft²)	Discharge (cfs)
										Type	Station	Depth
LBP	3.2	5	5.07								20.7	8.30
	4.2		5.45								21.4	8.42
	6.3		5.41								22.5	8.33
	7.3		5.94								23.0	8.11
	8.5		6.20								23.7	8.05
	9.0		6.37								24.0	7.75
RBBF	9.3		6.58								24.4	7.61
	9.6		6.76								24.8	7.28
	10.0		7.04							RBF	25.0	7.06
	10.3		7.85								25.3	6.59
	10.7		8.18								26.1	6.47
	11.3		8.19								26.7	6.03
	11.5		8.05								28.1	5.52
	11.8		8.25								29.0	5.22
LEW	12.3		8.59							RBOP	29.8	5.05
	12.6		9.23	0.6				0.48				
	12.9		9.33	0.6				0.63				
	13.2		9.46	0.7				0.42				
on rock	13.5		9.03	0.15				0.48				
on rock behind rock	13.8		8.84	0.15				0.34				
	14.1		9.00	0.35				0.61				
	14.4		9.05	0.35				0.54				
behind rock	14.7		8.93	0.35				0.09				
	15.0		8.96	0.30				0.78				
	15.3		8.94	0.30				0.88				
on rock	15.6		8.89	0.20				0.92				
"	15.9		8.72	0.20				0.78				
"	16.2		8.72	0.15				1.13				
"	16.5		8.65	0.10				0.91				
"	16.8		8.64	0.05				—				
	17.1		8.96	0.30				0.95				
	17.4		8.82	0.25				0.64				
behind rock	17.7		8.65	0.20				—				
"	18.0		8.83	0.25				—				
"	18.3		8.91	0.25				0.46				
"	18.6		8.90	0.15				0.33				
REW	19.0		8.58									
	19.5		8.51									
"	19.8		8.65									
	20.5		8.57									
TOTALS												

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

LBF = 9.3, 25 REW - 19.0 LEW - 12.3 interval = .335

PEBBLE COUNT DATA SHEET
Stream: Little Sands
Reach: XSS
Comments:

Date: 8/31/16

Sampler: H. McIntyre M. Parker
Notes: R. Sutton

Size Range (mm)	Habitat (r = riffle, p = pool, g = glide)	Count
<2		𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 (35)
2.8		
4		
5.6		II (2)
8		I (1)
11		I (1)
16		𝍸 𝍸 (10)
22.6		𝍸 𝍸 III (9)
32		𝍸 𝍸 𝍸 III (13)
45		𝍸 𝍸 (10)
64		𝍸 𝍸 II (12)
90		𝍸 III (8)
128		𝍸 𝍸 II (12)
180		𝍸 II (7)
260		
>260		IIII (4)
Bedrock		I (1)
TOTAL D50		125

COLORADO WATER CONSERVATION BOARD

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

COLORADO DIVISION OF WILDLIFE

LOCATION INFORMATION

STREAM NAME: Little Sands					CROSS-SECTION NO.: R1 XS6
CROSS-SECTION LOCATION: Lowest XS, Just below XS 5 ≈ 8 meters, Steeper Slope on Left Bank also in 25'-30' trees. large Alder on Right Bank Just above XS6					
DATE: 8/31/16	OBSERVERS: R. Sutton, H. McIntyre, M. Porter, F. Cardicute, J. Vanderbilt				
LEGAL DESCRIPTION	¼ SECTION: SE	SECTION: 13	TOWNSHIP: 37 N/S (N circled)	RANGE: 4 E/W (W circled)	PM: NM
COUNTY: Hinsdale	WATERSHED: San Juan		WATER DIVISION: 7		DOW WATER CODE: 38108
MAP(S)	USGS: Oakbrush Ridge				
	USFS: SJNF				

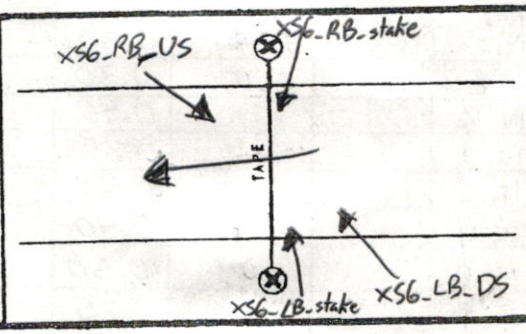
SUPPLEMENTAL DATA

SAG TAPE SECTION SAME AS DISCHARGE SECTION: YES / NO	METER TYPE: Marsh McBirney		
METER NUMBER:	DATE RATED:	CALIB/SPIN: ____ sec	TAPE WEIGHT ____ lbs/foot / TAPE TENSION ____ lbs
CHANNEL BED MATERIAL SIZE RANGE:		PHOTOGRAPHS TAKEN: YES/NO (YES circled)	NUMBER OF PHOTOGRAPHS: 4

CHANNEL PROFILE DATA

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	
② WS Upstream	10.80	7.62
③ WS Downstream	4.0	7.81
SLOPE	(7.81-7.62) / 14.80 = 0.013	

SKETCH



LEGEND: Stake ⊗ Station ① Photo

Direction of Flow

AQUATIC SAMPLING SUMMARY

STREAM ELECTROFISHED YES/NO (NO circled)	DISTANCE ELECTROFISHED ____ ft	FISH CAUGHT YES/NO (NO circled)	WATER CHEMISTRY SAMPLED YES/NO (NO circled)

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

Some Clouds over head, ≈ 75°F, clouds moved out and became sunny

UTM 0301089 4147197

FORM #ISF FD 1-85

22.4 - 11.47 RGW
1.44

LEW 21.1
REW 11.1 .4

DISCHARGE/CROSS SECTION NOTES

STREAM NAME: Little Sands | CROSS-SECTION NO: XS6 | DATE: 8/31/16 | SHEET 1 OF 1

BEGINNING OF MEASUREMENT: EDGE OF WATER LOOKING DOWNSTREAM (0.0 AT STAKE) | (LEFT) / RIGHT | Gage Reading. _____ ft | TIME 12:35 → 13:05

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)
BM			6.305								
LBP	3.3		4.10								
	4.6		4.71								
	6.0		5.59								
LBF	7.0		6.11								
	7.8		6.81								
	8.5		7.24								
	9.0		7.46								
	10.0		7.52								
LEW	11.1		7.72								
	11.5		7.75	0.05				—			
rock	11.9		7.94	0.10				0.13			
	12.3		7.86	0.20				0.19			
rock	12.7		7.93	0.05				—			
behind rock	13.1		7.92	0.20				0.17			
	13.5		8.04	0.30				0.57			
	13.9		8.15	0.30				0.42			
	14.3		8.20	0.40				0.15			
	14.7		8.0	0.35				0.63			
	15.1		8.07	0.30				0.60			
	15.5		8.20	0.40				0.91			
	15.9		8.21	0.50				0.67			
on rock	16.3		8.14	0.25				0.26			
Rock	16.7		7.90	0.25				0.16			
	17.1		8.01	0.40				0.27			
	17.5		8.14	0.30				0.13			
rock	17.9		7.96	0.15				0.30			
	18.3		7.95	0.15				0.18			
	18.7		7.98	0.20				0.52			
rock	19.1		8.03	0.10				0.01			
behind rock	19.5		8.06	0.30				—			
	19.9		8.0	0.20				0.03			
	20.3		8.03	0.25				0.21			
	20.7		7.95	0.10				0.02			
REW	21.1		7.73								
	22.1		7.53								
	23.1		7.06								
	24.0		6.79								
R BF	24.9		6.34								
R BF	25.0		6.13								
	25.3		5.15								
TOTALS											

TYP	Station	Depth
	26.0	4.89
	26.9	4.72
	28.0	4.65
	29.0	4.60
RBP	29.8	4.63
BM	—	6.305

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

PEBBLE COUNT DATA SHEET

Stream: Little Sand

Reach: XS 6

Comments:

Date: 8/31/2016

Sampler: Porter, McIntyre

Notes: I. Cadiente

Size Range (mm)	Habitat (r = riffle, p = pool, g = glide)	Count
		𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 || (37)
<2		
2.8		
4		|| (2)
5.6		𝍸 || (7)
8		𝍸 ||| (8)
11		𝍸 𝍸 |||| (14)
16		𝍸 ||| (8)
22.6		𝍸 𝍸 || (12)
32		𝍸 𝍸 ||| (13)
45		𝍸 𝍸 (10)
64		𝍸 ||| (8)
90		𝍸 || (7)
128		||| (3)
180		𝍸 (5)
260		
>260		𝍸 | (6)
Bedrock		
TOTAL D50		140

Note:Enter Total Count and Stream Description (Name, Date, etc.)
Check Cell Notes (Alt.+R ,N (under FORMULA)) for specific information.

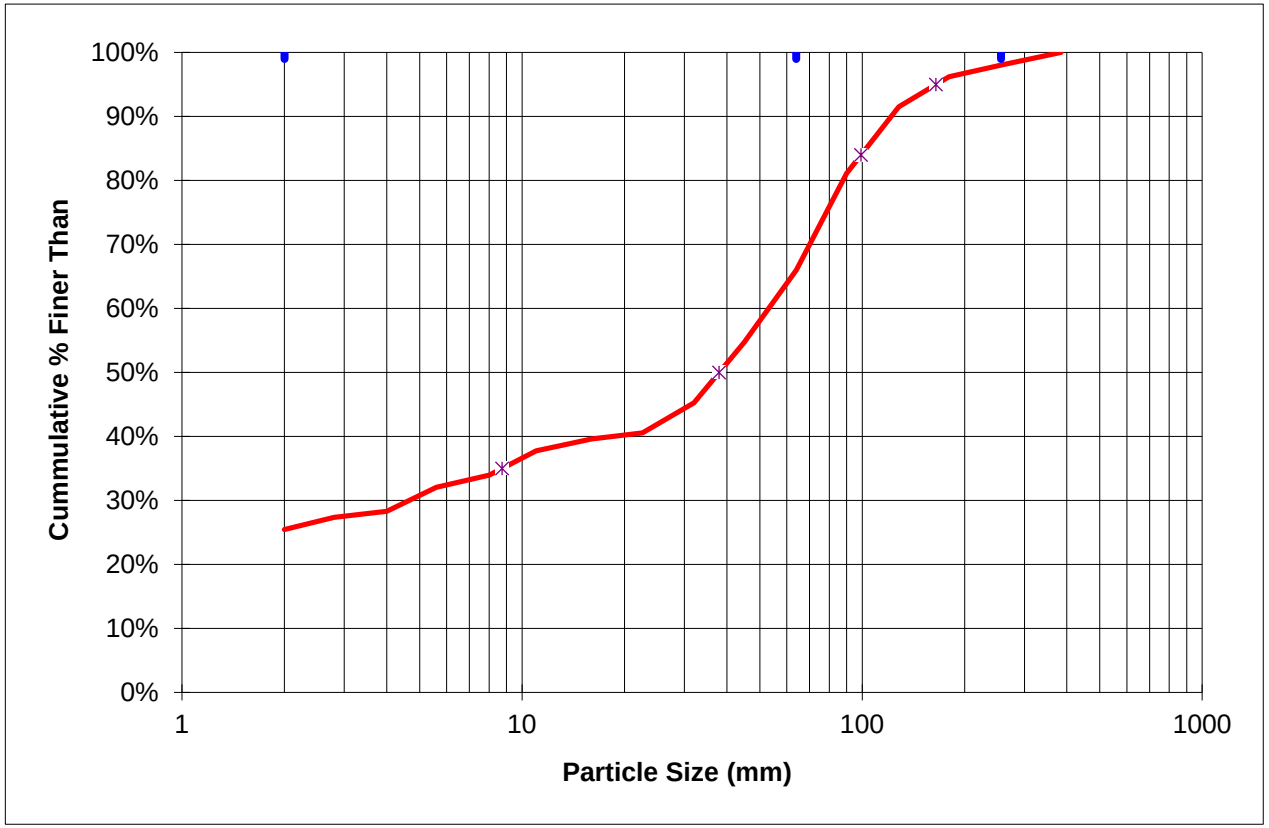
Pebble Count Worksheet and Summary **COMMENTS:**

Particle Size (mm)	% finer than	Total Count
<2	25%	27
2 - 2.8	27%	2
2.8 - 4	28%	1
4 - 5.6	32%	4
5.6 - 8	34%	2
8 - 11	38%	4
11 - 16	40%	2
16 - 22.6	41%	1
22.6 - 32	45%	5
32 - 45	55%	10
45 - 64	66%	12
64 - 90	81%	16
90 - 128	92%	11
128 - 180	96%	5
180 - 260	98%	2
>260	100%	2

D84 in Ft for R2Cross	0.3254634

STREAM NAME: Little Sand Creek
ID NUMBER: R1XS2
DATE: 7/11/2016
CREW: Seebach/Porter

Particle Size Distribution (mm)	D15	D35	D50	D84	D95
	#N/A	8.7	37.9	99.2	164.7



FILENAME: Little_Sand_Pebble_Count_R2Cross.xls ENTERED: 3/10/2017

Note:Enter Total Count and Stream Description (Name, Date, etc.)
Check Cell Notes (Alt.+R ,N (under FORMULA)) for specific information.

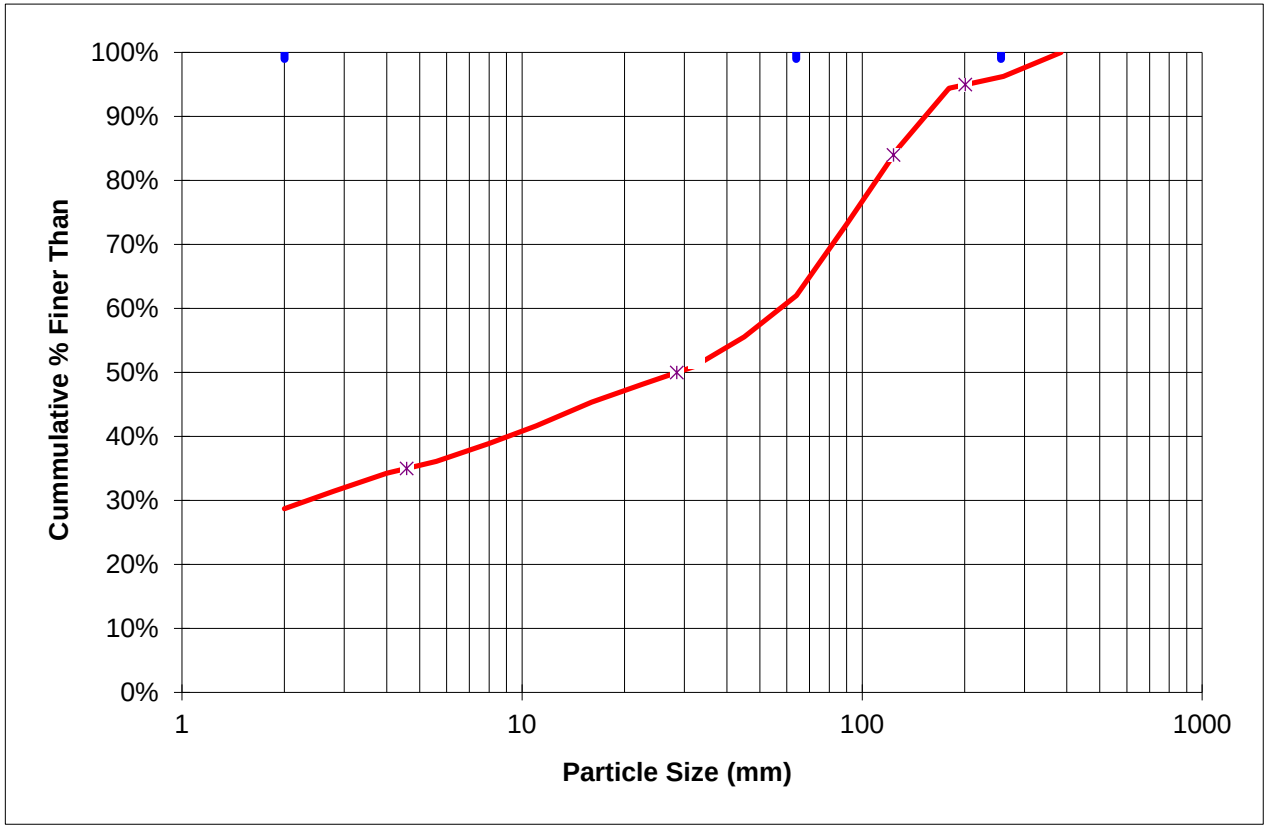
Pebble Count Worksheet and Summary **COMMENTS:**

Particle Size (mm)	% finer than	Total Count
<2	29%	31
2 - 2.8	31%	3
2.8 - 4	34%	3
4 - 5.6	36%	2
5.6 - 8	39%	3
8 - 11	42%	3
11 - 16	45%	4
16 - 22.6	48%	3
22.6 - 32	51%	3
32 - 45	56%	5
45 - 64	62%	7
64 - 90	73%	12
90 - 128	85%	13
128 - 180	94%	10
180 - 260	96%	2
>260	100%	4

D84 in Ft for R2Cross	0.4056333

STREAM NAME: Little Sand Creek
ID NUMBER: R1XS3
DATE: 7/11/2095
CREW: Seebach/Porter

Particle Size Distribution (mm)	D15	D35	D50	D84	D95
	#N/A	4.6	28.5	123.6	201.0



FILENAME: Little_Sand_Pebble_Count_R2Cross.xls ENTERED: 3/10/2017

Note:Enter Total Count and Stream Description (Name, Date, etc.)
Check Cell Notes (Alt.+R ,N (under FORMULA)) for specific information.

Pebble Count Worksheet and Summary

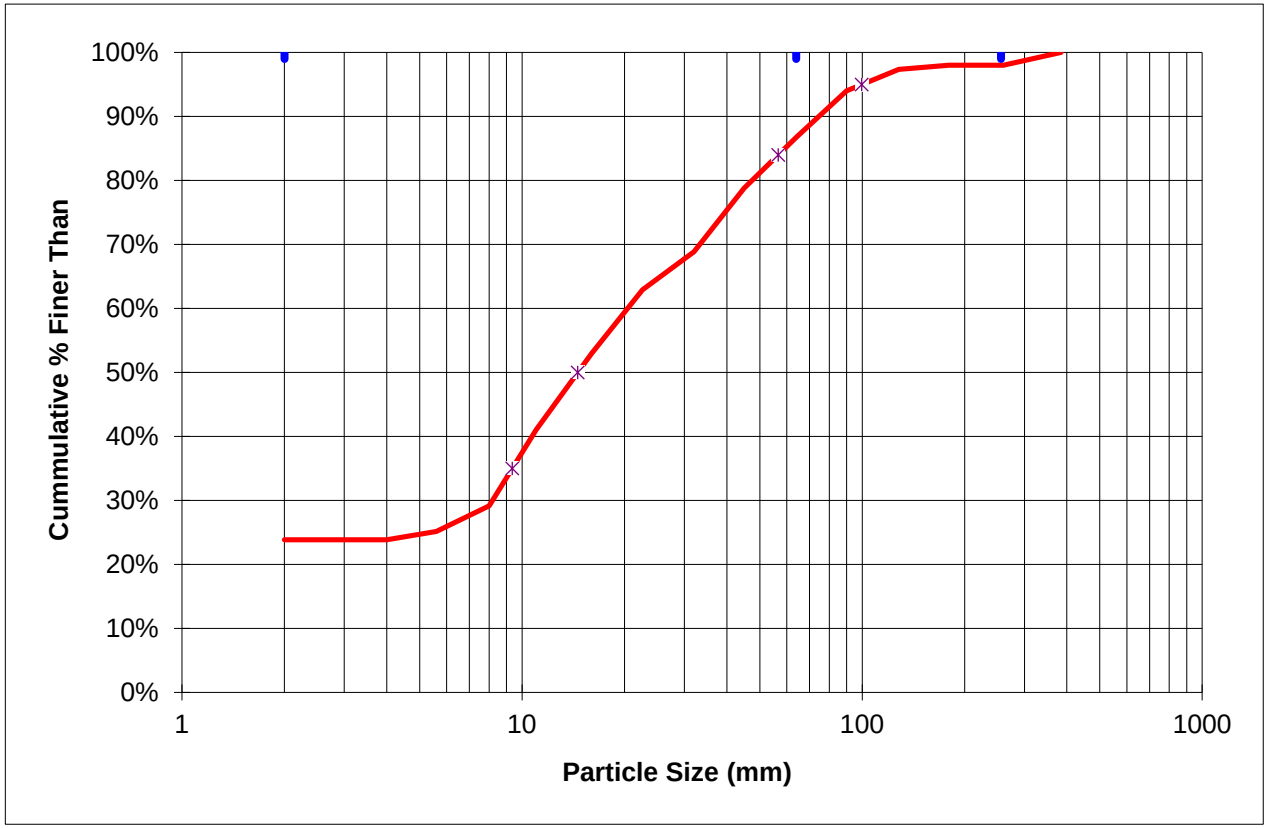
COMMENTS:

Particle Size (mm)	% finer than	Total Count
<2	24%	36
2 - 2.8	24%	0
2.8 - 4	24%	0
4 - 5.6	25%	2
5.6 - 8	29%	6
8 - 11	41%	18
11 - 16	53%	18
16 - 22.6	63%	15
22.6 - 32	69%	9
32 - 45	79%	15
45 - 64	87%	12
64 - 90	94%	11
90 - 128	97%	5
128 - 180	98%	1
180 - 260	98%	0
>260	100%	3

D84 in Ft for R2Cross	0.1858388

STREAM NAME: Little Sand Creek
ID NUMBER: R1XS4
DATE: 8/31/2016
CREW: Anderson&McIntyre/Sutton

Particle Size Distribution (mm)	D15	D35	D50	D84	D95
	#N/A	9.4	14.6	56.6	99.7



FILENAME: Little_Sand_Pebble_Count_R2Cross.xls ENTERED: 3/10/2017

Note:Enter Total Count and Stream Description (Name, Date, etc.)
Check Cell Notes (Alt.+R ,N (under FORMULA)) for specific information.

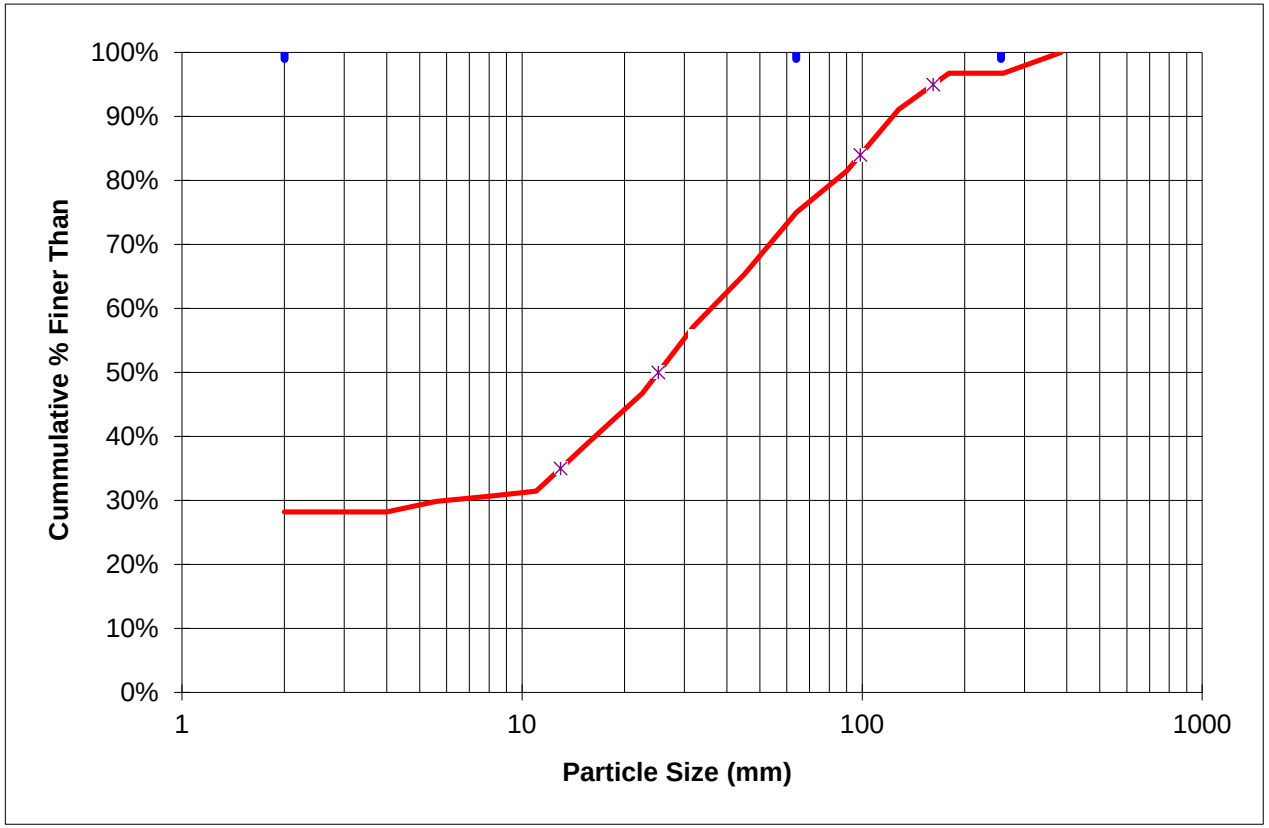
Pebble Count Worksheet and Summary **COMMENTS:**

Particle Size (mm)	% finer than	Total Count
<2	28%	35
2 - 2.8	28%	0
2.8 - 4	28%	0
4 - 5.6	30%	2
5.6 - 8	31%	1
8 - 11	31%	1
11 - 16	40%	10
16 - 22.6	47%	9
22.6 - 32	57%	13
32 - 45	65%	10
45 - 64	75%	12
64 - 90	81%	8
90 - 128	91%	12
128 - 180	97%	7
180 - 260	97%	0
>260	100%	4

D84 in Ft for R2Cross	0.3239731

STREAM NAME: Little Sand Creek
ID NUMBER: R1XS5
DATE: 8/31/2016
CREW: McIntyre&Porter/Sutton

Particle Size Distribution (mm)	D15	D35	D50	D84	D95
	#N/A	13.0	25.2	98.7	161.7



FILENAME: Little_Sand_Pebble_Count_R2Cross.xls ENTERED: 3/10/2017

Note:Enter Total Count and Stream Description (Name, Date, etc.)
Check Cell Notes (Alt.+R ,N (under FORMULA)) for specific information.

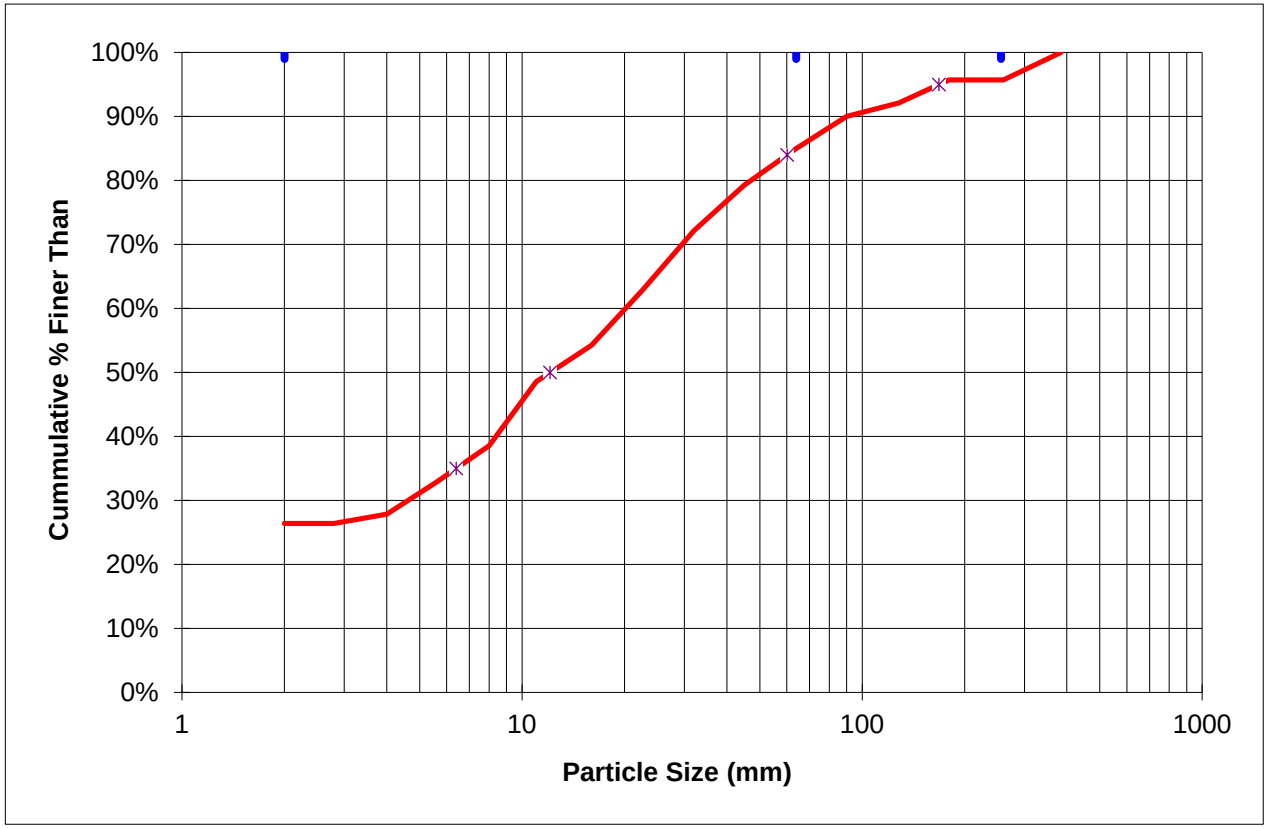
Pebble Count Worksheet and Summary **COMMENTS:**

Particle Size (mm)	% finer than	Total Count
<2	26%	37
2 - 2.8	26%	0
2.8 - 4	28%	2
4 - 5.6	33%	7
5.6 - 8	39%	8
8 - 11	49%	14
11 - 16	54%	8
16 - 22.6	63%	12
22.6 - 32	72%	13
32 - 45	79%	10
45 - 64	85%	8
64 - 90	90%	7
90 - 128	92%	3
128 - 180	96%	5
180 - 260	96%	0
>260	100%	6

D84 in Ft for R2Cross	0.1974221

STREAM NAME: Little Sand Creek
ID NUMBER: R1XS6
DATE: 8/31/2016
CREW: Porter&McIntyre/Cadiente

Particle Size Distribution (mm)	D15	D35	D50	D84	D95
	#N/A	6.4	12.1	60.2	168.1



FILENAME: Little_Sand_Pebble_Count_R2Cross.xls ENTERED: 3/10/2017