

12-4-2009

Ex. 277-US-461

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9/03 - 9/04 1997

LOW FLOW

"Rite in the Rain"®



ALL-WEATHER
LINE RULE
Spiral Notebook

Spring Creek
WM-17

No. 393
32 Sheets
4 5/8" x 7"

9/23/97

WM-17

Spring Cr.

Site Location / Directions:

FROM CHILQUIN, TAKE ON NORTH TO
COLLIER STATE PARK. TURN LEFT
INTO MUSEUM PICNIC AREA. ~~AND~~
FOLLOW SIGNS TO PICNIC AREA
PARKING. SITE IS LOCATED IN
PICNIC AREA. BOUNDARIES ARE FROM
CYCLONE FENCE AT DOWNSTREAM
END OF PICNIC AREA SEPARATING THE
PICNIC AREA FROM MUSEUM TO
FENCE AT UPSTREAM END OF PICNIC
AREA SEPARATING PICNIC AREA
FROM PRIVATE BOAT RENTAL.

ALL HEADPINS AND BMS ARE IN
THE PICNIC AREA ON THE RIVER
RIGHT (LOOKING DOWNSTREAM) BANK.

WIM-17 9/23/97
 SPRING CREEK

crew: M. Gagner
 W. Sweeney

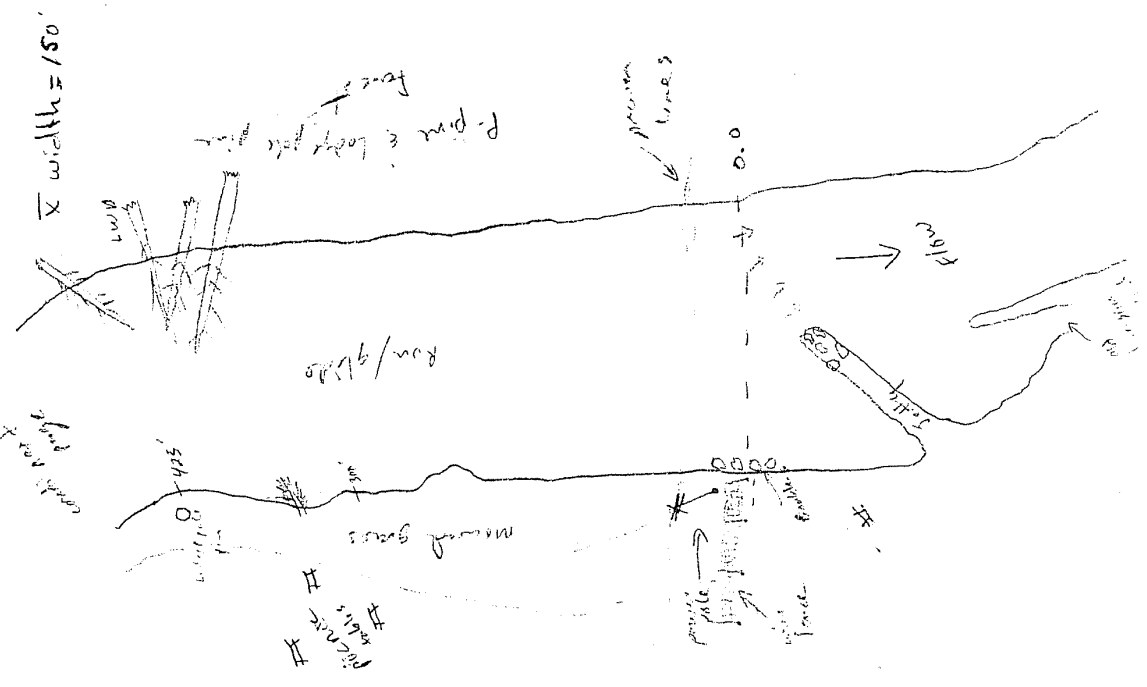
	In	Out
Time	10:00	3:45
S.G	0.0	0.0
H ₂ O Temp		49.5°F

weather: clear and warm ~65°F
 no precip. in past 24 hrs

Equipment used: Pentax
 AL-38 936157

Comments: sample reach is confined to 1500' section of stream due to private ownership and channel alteration. The selected reach represents the dominant channel type & fish habitat found throughout all of Spring Creek. The lower ~2000' of Spring Cr were eliminated from consideration due to channel manipulations and confined in-stream channels.

WIM-17 Habitat Map 9/23/97



WM-17
7/23/97

Habitat Compos. Data

Total	% of Total
Run/slide: 1500	100%

* no other habitat types present

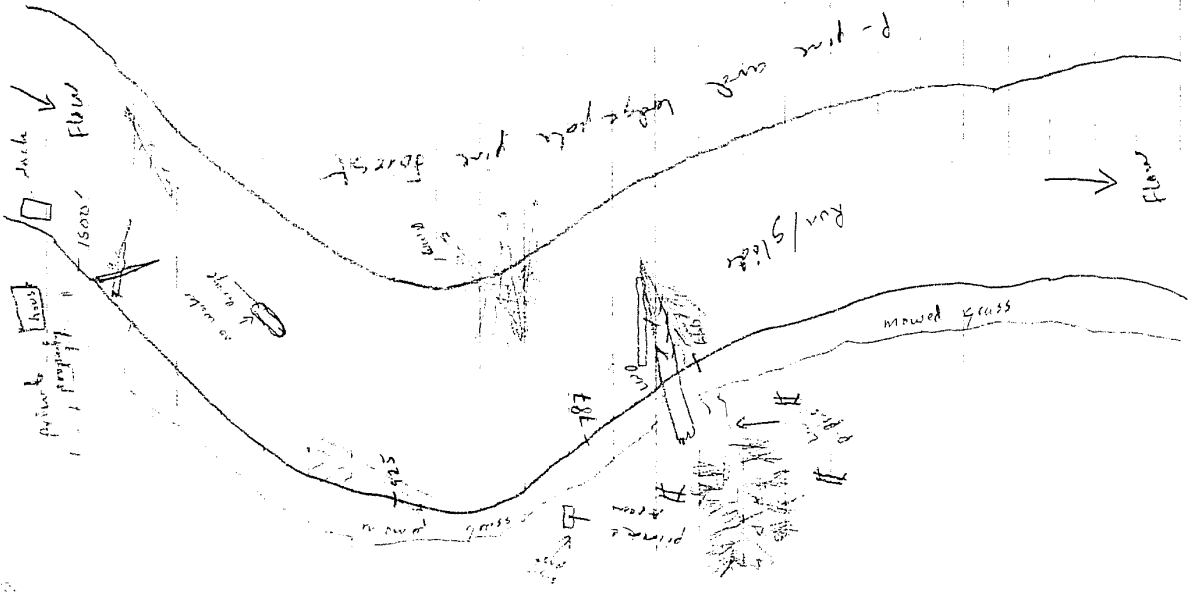
Transect selection

Random #s 2, 4, 6

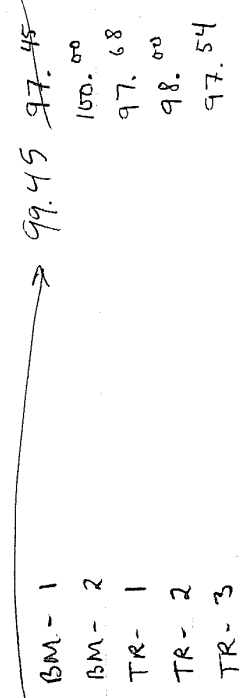
- TR-1 - 150 x 2 = 300'
- TR-2 - 150 x 4 = 600'
- TR-3 - 150 x 6 = 900'

transect placement will be measured upstream from D.O location.

WM-17
9/23



STA	BS	HI	FS	Elev	WMM-17 9/23/97	Level Loop cont.	HT	FS	Elev	WMM-17 9/23/97
BM-2	1.66	101.66		100.00		Level Loop	BS		97.99	
TR-3			4.12	97.54				4.07	97.54	
TR-2			3.66	98.00				1.61	100.00	
TR-2	3.78	101.78		98.00						OK MRG
BM-1			2.33	99.45					99.45	
BM-1	3.27			99.45						100.00
TR-1		102.72	5.04	97.68						97.68
TR-1	5.00	102.68		97.68						98.00
BM-1			3.23	99.45						97.54
BM-1	2.12	101.57								
TR-2			3.58	97.99						



WMM-17
9/23/97
Valley Profile
@ TR-2

STA	BS	HI	FS	Road Elev	WMM-17 9/23/97 Elev	Substrate
BM-2	.87	100.87			100.00	
+200	6.92	1.45			95.40	
(upstream from TR-2)						
+100	8.90	3.41			95.38	
0.0 (TR-2)	8.71	3.20			95.36	
-100	8.10	2.59			95.36	
-200	8.62	3.11			95.36	
-200	9.25	3.74			95.36	
-300	6.53	1.0			95.34	

STA	BS	HI	FS	Elev	WMM-17 9/23/97 Elev	Substrate
BM-2	1.77	101.77			100.00	
-30					2.40	Large Pine Root Grass 2.5ft
-20					3.14	"
-5.0					4.19	"
0.0 LWP					4.94	"
3.0					5.39	Gross 2.0ft
5.0					5.84	"
8.0					6.30	"
11.0 LWE					6.34	"
168.6 RWE					6.25	Lawn 0.2
170					6.01	"
180					5.57	"
195					4.72	"
210					4.41	"
213 RWE					4.10	conifer trees shrubs 4.0
225					3.81	"
245					3.90	"
260					3.43	"

* valley profile extends on each side for ~500+ feet at last given elevation

WM-17
SPRING CREEK

WM-17
Spring Cr.
9/24/97

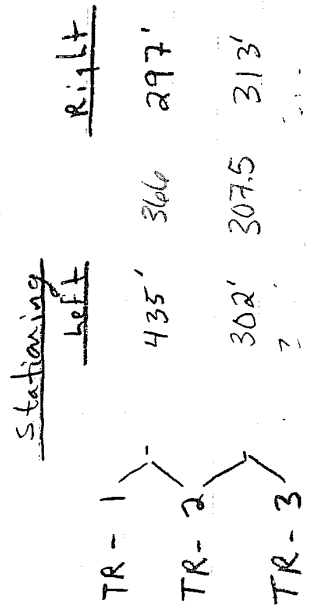
CREW: M. GAGNER
W. SWANEY

	IN	OUT
TIME	0930	-
SO	-	-
WATER TEMP	42°F	-
AIR TEMP	62°F	-

WEATHER: CLEAR and WARM
NO PRECIPITATION in PAST
24 HRS.

EQUIPMENT USED: PENTAX
AL-38 936157

MARSH-McBIENEY
MODEL: 2000 # 2000118



WM-17	TR-2	9/24/97	WM-17	TR-2	9/24/97
WS Elevations	Measurements				
STA	BS	HI	FS	Rod	Eleva
BM-2	1.69	101.69			100.00
	1.77	101.77			98.00
TR-2 HP			3.69		98.03
				6.33	
RWS			9.40	3.07	95.36
				6.33	
LWS			9.13	2.80	95.36

STA	Depth	Vel	Sub	%	E	Cover/Notes
168.6	0	0	VEG	100	-	RWE
168.4	0.35	0	VEG/SILT	75	-	OBJECT COVER
160	1.5	0.21	SILT/VEG	60	-	OBJECT COVER
153	2.1	0.18	SILT	100	-	
144	2.4	0.37	SILT/SAND	75	-	
137	2.9	.51	SILT/SAND	70	-	T/B
130	3.0	.60	GR/SAND	60	0	
123	2.3	.93	GR/SAND	80	0	
116	2.9	.90/.59	GR/SAND	70	0	
109	4.2	.88/.69	SAND/GR	70	10	
102	4.0	.67/.63	NR VEG/SAND	60	0	
93	3.9	.78/.69	SAND/GR	70	0	
86	3.75	.66/.56	SAND/GR	80	0	
79	3.4	.81/.72	SAND	100	-	
72	3.6	.97/.72	SAND/GR	90	0	
65	3.5	.90/.67	SAND/GR	95	0	
58	3.2	.77/.65	SAND/GR	95	0	
51	2.9	.69/.53	SAND	100	-	
44	2.7	.60/.49	SAND	100	-	
37	2.4	.25	SAND	100	-	
30	2.1	.25	SILT	100	-	
23	1.75	.12	SILT	100	-	
16	1.20	.25	SILT	100	-	OBJECT COVER/LOG
11	.85	.09	SILT	100	-	OBJ/LOG
7.3	0	0	GRASS	100	-	LWE

* See valley profile elevations for TR-2 bank survey *

WM-17	TR-1	WS Elevn./Bank profile	TR-1	D/V	TR-1	D/V	TR-1	9/24/97
9/24/97	STA	BS	HS	FS	Red/Sub Elevn.	Depth	sub	%E
	13.4	WUE	0.0	0.0	grass			
BM-1	13.8		101.64	3.96	99.45	0.5	sand/gravel	80
TR-1 HP	22			4.52	97.68	1.45	silt/sand	60
RWE=198.1	30			5.05		1.70	sand/gravel	60
192	38	grass/trees		5.42		1.65	bed/sand	80
182	46	"		5.82		1.60	bed/sand	70
176	54	"		6.22		2.35	bed/gravel	60
174.3 RWE	62			7.43		3.50	gravel/sand	60
RWE	70	1.13				4.0	"	80
	78	6.30			95.94	4.3	cobble/sand	70
LWSE	86	7.58	1.27			4.4	"	70
	98	6.31			95.33	4.6	sand/cobble	60
13.4 LWE	106	6.26				3.5	sand/gravel	80
12	114	5.70				2.8	sand/gravel	60
9	122	5.29				2.9	"	80
6	130	4.83				2.9	sand/gravel	"
3	138	4.47				2.8	"	"
0.0 LWP (base)	146	3.72				2.6	sand	100
	154					2.4	sand/silt	60
	162					2.0	silt/sand	80
	170					1.2	silt	100
	174					0.7	silt/sand	90
	RWE=174.2					0.0	grass	100

WM-17 SPRING CREEK 9-29-97

HABITAT DESCRIPTION

SITE IS COMPRISED OF 100% RUN HABITAT. AVERAGE DEPTH ~ 3.0 FT. CENTER OF CHANNEL IS DEEP, WITH ESTIMATED DEPTHS UP TO 6-8 FT. SUBSTRATE IS MAINLY SAND WITH SMALL GRAVEL. SOME AQUATIC VEGETATION IN CENTER OF CHANNEL AND SILT NEAR BANKS. APPROXIMATELY 25% OF THE SITE IS COMPILED OF AREAS OF SPAWNING SIZED GRAVELS (1-4 INCH DIAM). THESE AREAS FORM DUNES ACROSS CHANNEL AVERAGING ~ 750 SQ FT. FALLEN TREES AND SLIGHTLY UNDERCUT BANKS PROVIDE COVER. RIPARIAN IS PINE FOREST WITH GRASS AND SHOUB UNDERSTORY UP TO THE CHANNEL (EXCEPT IN PICNIC AREA WHERE MOWED LAWN EXTENDS UP TO 50 FT FROM CHANNEL.) CREEK IS SPRING FED IN A SMALL WATERSHED WITH LITTLE VARIABILITY IN FLOWS THROUGHOUT YEAR. PARK SUPERVISOR STATED THAT FLOWS REMAINED CONSTANT DURING THE FLOOD EVENT IN JAN '97. 5-6 DECAYED TROUT CARCASSES WERE FOUND THROUGHOUT SITE (APPROX 10-12", UNKNOWN SPECIES) AND WERE THOUGHT TO BE RESULT OF FISH THAT WERE RELEASED AFTER BEING CAUGHT BY FISHERMEN.

9/24/97

WM-17 Spring Cr.
Spanning Riffle

	In	Out
Time	3:44 pm	
S.G.	1.28	
H2O TEMP	RL	49.0 F

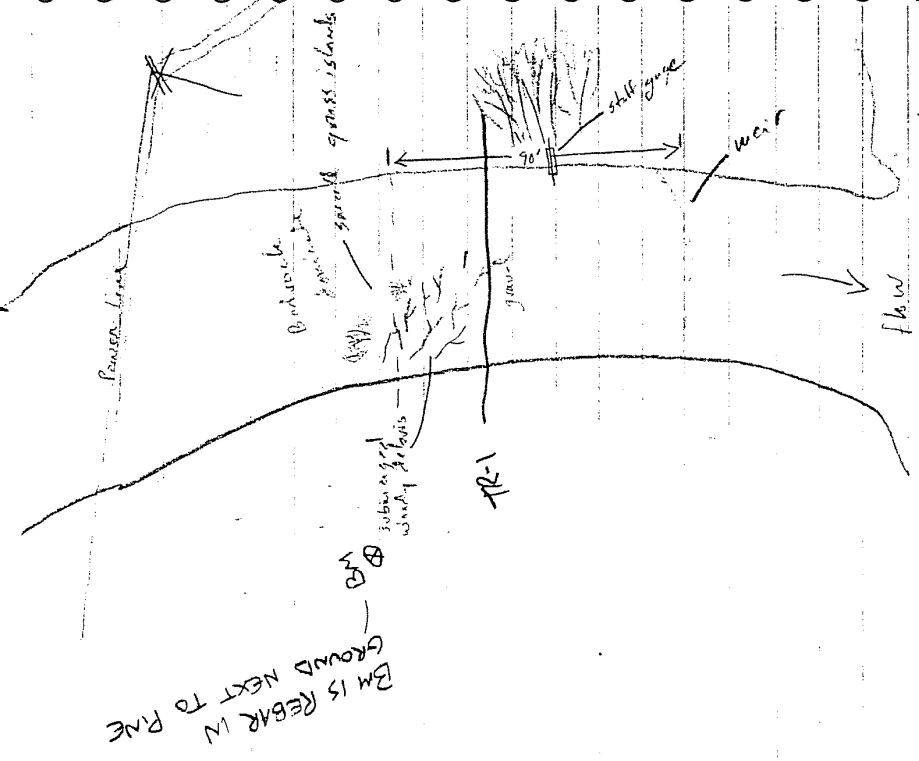
STAFF GAGE WAS ON RR BANK, UNKNOWN OWNER.

Crew: M. Gagner
W. Swaney

equipment:

Notes/comments: A single transect will be placed across a man-made spanning riffle located just upstream of the confluence of Spring Creek and the Williamson R. A weir has been placed within the channel to trap gravel and create spanning conditions. The transect will be placed $\approx 1/2$ way between the weir and the end of the spanning gravel distribution.

WM-17 Spawning Riffle 9/24/97
 Site Map
 Spawning Riffle
 WS Elevations / Bench points
 9/24/97



STA	BS	HI	FS	Road	Elev
BM	2.81	102.81			100.00
TR-1 (HP)			2.50		
139.11 (RWP BASE)			2.72	SHRUB	3.0'
129.0			5.78	GRASS	1.0'
127.0			6.38	GRASS	2.0'
125.0			7.83	GRASS	2.0'
124.8 (REW)			7.30	GRASS	2.0'
RWS			9.23		1.90 7.33
LWS			8.35		1.08 7.27
121.6 (LEW)			7.29		
10.0			6.47	GRASS / SHRUB	3.5'
6.5			5.80	"	"
D.P (LWP BASE) -10.0			4.71	"	"
			3.44	"	"

* River right working pin is head pin and rebar located on river side of large P-pine.
 Head pin is located ~ 0.2 behind working pin

Sta	Depth	Vel	Sub	%V	%E	Cover/Notes	Spanning Rifle	W/V	9/24/97	mm-17	spanning Rifle	9/24/97
12.6	LEW 0	0								spring ca	Photo Log	
15.0	0.45	0.35	GR/SAND	75	20						TR-1	LOOKING RR → RL
20.0	1.15	1.10	GRAVEL	100	0						TR-1	LOOKING RL → RR
25.0	1.80	0.94	GRAVEL	100	0							
30	2.1	1.35	GRAVEL	100	0							
35	2.3	0.94	GR/SAND	70	20							
40	2.4	1.31	GR/SAND	75	20							
45	2.7	1.46/1.78	GR/SAND	80	10	T/B						
50	2.7	1.0/1.04	GR/SAND	90	10	NO REASON FOR NEG FLG COULD BE SEEN						
47.5	2.7	1.08/1.12	GR/SAND	90	10							
52.5	3.0	1.12/1.14	GR/SAND	90	10							
55.0	3.2	1.14/1.09	GR/COBBLE	75	20							
60	3.1	1.34/0.76	GR/COBBLE	80	20							
65	3.0	2.07/1.57	GR/SAND	90	0							
70	2.7	1.14/0.45	GR/SAND	90	0							
75	3.0	2.14/1.72	GR/BEDROCK	75	0							
80	2.45	1.77	GR/SAND	75	20							
85	2.3	0.70	GR/SAND	70	0	OB COVER						
90	1.6	0.63	GR/SAND	60	10	VEL COVER						
95	2.6	0.67/0.51	SAND/GR	60	10							
100	2.8	0.72/0.82	GR/BED	70	0							
105	2.4	0.87	GR/SAND	80	0							
110	1.4	1.28	GR/SAND	70	0							
115	2.15	0.83	GR/VEG	60	0							

TR-1 CONT.

STA	DEPTH	VEL	SUB	%D	%E	COVER/NOTES
120	2.05	1.31	GR/VEG	60	0	
124.7	1.10	0.74	SAND/BED	80	0	EDGE COVER
124.8	0	0	GLASS			

⊗ NOTE ON NEGATIVE VELOCITIES:

NO APPARENT CAUSE FOR NEGATIVE VELOCITIES AT 0.8 (BOTTOM) MEASUREMENTS COULD BE DISTURBED WHEN SUBSTRATE WAS DISTURBED WITH BOOT, SAND and SMALL GRAVELS WERE OBSERVED MOVING UPSTREAM

SPRINGS CREEK 5/14/98
SPAWNING RIFFLE

SPRINGS CREEK - SPAWNING RIFFLE

5/14/98
LEVEL LOOP

IN 0845
OUT 1045

STA BS HI FS ELEVATION

BM-1 2.97 107.97 100.00

TR-1 (HP) 2.67 100.30

TR-1 2.18 100.30
(TP) 102.48

BM-1 2.48 100.00

EQUIPMENT:
MARSH McBERNEY # 2000118
PENTAX AL-M4 # 811909

OK
wms

WEATHER: OVERCAST, ~50°F AIR TEMP

CREW: W. SWANEY
A. POOL

STAFF GAUGE: 1.33

NOTE ON DEPTH / VELOCITY MEASUREMENTS

- VEL₁ IS TOP VELOCITY WHEN

DEPTH IS ≥ 2.5 FT, OR

MID-VELOCITY WHEN DEPTH IS < 2.5'

- VEL₂ IS BOTTOM VELOCITY WHEN

DEPTH IS ≥ 2.5 FT.

PHOTO LOGS

- # 2 RR → RL
- 3 RR look D/S
- 4 RL → RR
- 5 RL look D/S
- 6 RL look U/S

SPRING CR - SPAWNING RIFFLE

5/14/98

SPRING CREEK - SPAWNING RIFFLE

5/14/98

STA	DEPTH	VEL ¹⁰⁴	VELOCITY	COMMENT
149	0	0	-	-
148.5	1.3	0.41	-	-
143.0	2.0	1.18	-	-
137.5	2.0	1.14	-	-
132.0	1.5	1.57	-	-
126.5	1.9	1.14	-	-
121.0	2.25	0.57	-	-
115.5	2.1	0.60	-	-
110.0	1.8	0.84	-	-
104.5	2.85	2.29	1.90	BEYOND TREE IN WATER FRONT AREA SOME BOTTOM SCOUR
99.0	3.0	1.30	1.45	5000 GRAVEL DEPOSITS
93.5	2.8	0.45	0.26	-
88.0	2.8	0.59	0.91	-
82.5	2.40	1.60	1.23	-
77.0	2.7	1.19	0.88	-
71.5	3.0	0.23	0.01	-
66.0	3.0	0.73	0.62	-
60.5	2.8	0.93	0.79	-
55.0	2.6	1.68	1.49	-
49.5	2.0	0.96	-	-
44.0	1.6	0.74	-	-
41.5	1.0	0.48	-	-
39.0	0.5	1.01	-	-
37.0	0.75	0.95	-	-
35.0	0.6	0.95	-	LEW

NOTE: NO LWP WAS FOUND.

TRANSECT FOR D/V WAS SET UP

USING THE EXISTING RWP. A

SHRUB IN THE APPROXIMATE AREA

(ALONG THE TRANSECT), BUT FURTHER

UP THE BANK WAS USED AS THE

LWP. NO NEW LWP WAS

ESTABLISHED.

WM-17 SPRING CREEK 5-14-98 \$/14/98

IN / 11:00
OUT / 14:30

WEATHER: OVERCAST, ~50°F

CREW: W. SWANEY
A. POOL

NOTE: BM-2 WAS FOUND DRIVEN
DOWN INTO THE STUMP AND
CAN NO LONGER BE USED.
NO NEW BM WAS ESTABLISHED.

STA	BS	HI	ES	ELEVATION
Bm-1	2.19	101.64		99.45
TR-1			3.95	97.69
Bm-1	2.20			99.45
(TP)		101.65		
TR-2			3.65	99.00
TR-2	3.82			98.00
(TP)		101.82		
TR-3			4.27	97.55
TR-3	4.56			97.55
(TP)		102.11		
TR-2			4.11	98.00
TR-2	3.64			98.00
(TP)		101.64		
Bm-1			2.19	99.45
Bm-1	2.36			98.00
(TP)		101.81		
TR-1			4.13	97.68

SPRING CRK - WMA-17 CONTROLS PROFILE

SPRING CRK - WMA-17 TR-2 (CONT'D)
 COMM.
 LEN
 STA DEPTH VEL.
 17.2 0 0

STA	DEPTH	VEL.	TR-1	ES	HI	ES/ROD	ELEVATION
			3.09		100.77		97.68
			RWP 225.1		2.4		
			225 RWP TOP		2.14		
			220		1.7		
			210		2.96		
			195		3.94		
			180		4.27		
			170		4.69		
			164.3 REN		5.2		
			164		6.5		
			160 RWS	7.02	7.07 1.59		95.34
			150 RWS		7.8/2.39		95.36
			140		8.06		
			130		8.58		
			125		8.94		
			120		9.25		
			115		9.50		
			110		9.6		
			105		9.44		
			100		9.10		
			95		8.30		
			90		8.13		
			85		8.60		
			80		8.99		

SPRING CRK - WM 17 5-14-98

SPRING CRK - CONTROL PROFILE (CONT'D) 5-14-98

STA	FS/200	ELEV.
75	9.25	
70	9.4	
65	9.20	
60	8.95	
55	8.63	
50	8.12	
45 (LWS)	7.72 / 1.79	95.34
40 (LWS)	6.54 / 1.10	95.33
34	5.82	
33.5 (LEM)	5.70	
31.0	4.86	
25	3.70	
19	3.12	
10.6 (LWP)	2.1	
10.6 (LWP TOP)	1.8	

STATIONING

TR-1 (RWP) → CONTROL (RWP) 192 FT
CONTROL (LWP) → TR-1 (LWP) 162 FT

177

CONTROL PHOTO LOGS

- # 7 RR → RL
- # 8 RR → RL LOOK D/S

WM-17

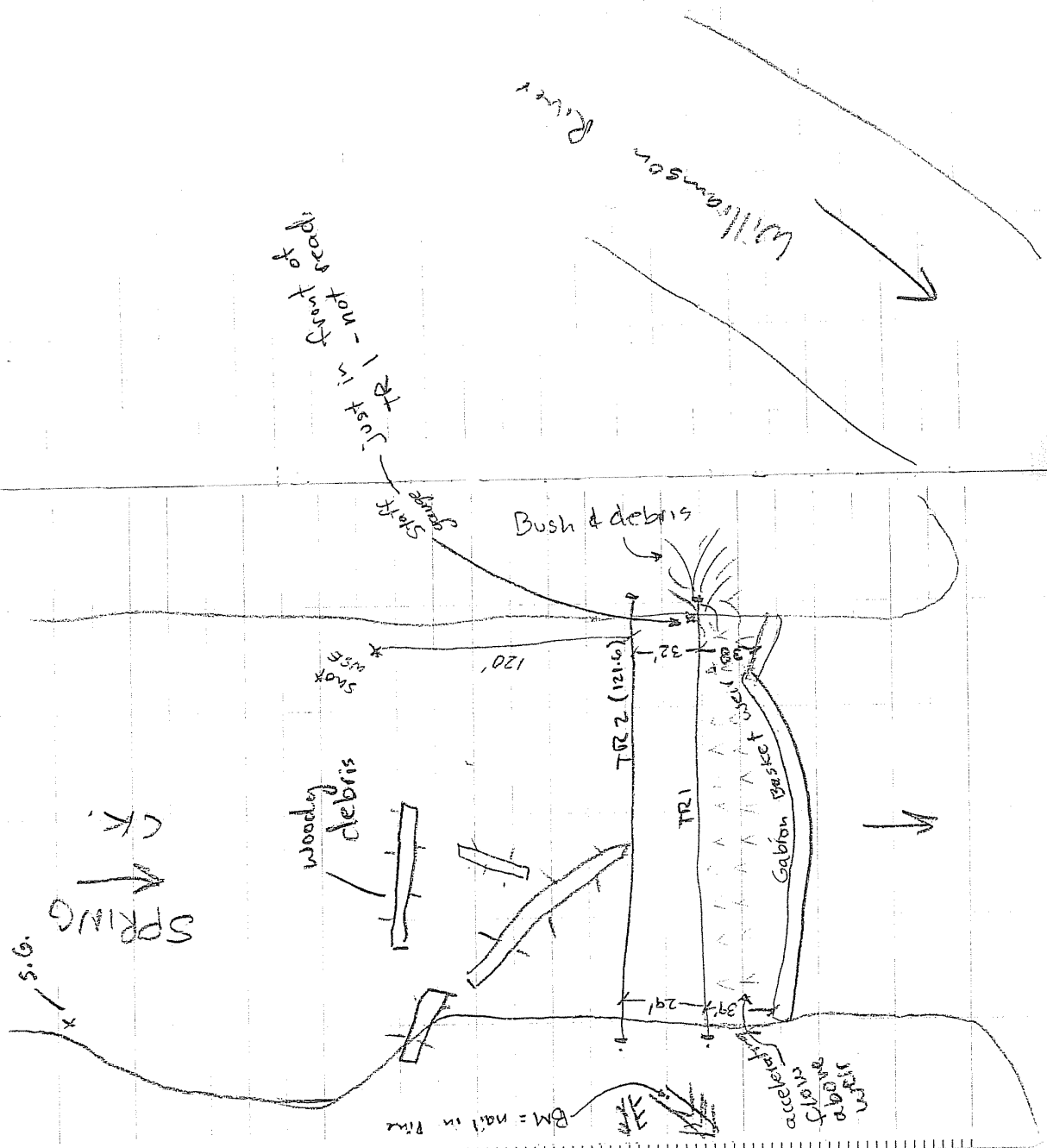


"Get in the Rain"
ALL-WEATHER
LEVEL BOOK
No. 310

Spring Creek

Spawning

06/27/04



WM-17 6/27/04 SPAWNING

LEVEL LOOP

Photo LOG 06/27/04

STA	BS	HI	FS	ELEV	Note
BM	1.94	101.94		100.00	
TR1			5.69	96.25	
TR2			6.09	95.85	
TR2	6.18			95.85	t.09
TR1			5.79	96.24	
BM			2.04	99.99	

120' w/s (of TR 2) 7.87 94.16 WSE

* Temporary HP - all pins were removed after completion of this sampling at request of Parks Dept.

Roll # 3

SPAWNING u/s

TR1 R-L

TR2 R-L

LAST SHOT SPAWNING D/S

WM-17 6/27/04

TR1 SPAWNING Bank Survey

STA	ES	ELEV	546 %	NOTES
1.0	7.00		100	RWP
4.0	7.45		100	top of bank
6.6	7.95		100	WSE-R
-	8.03	94.00	-	WSE-L
-	7.97	94.06	-	top of bank
124.8	7.23		100	LWP
125.7	6.99		100	

WP - placed in center of large bush on left bank

Bank

TR 2

HI = 102.03

STA	FS	ELEV	SUB	Notes
		1/3	100	
1.0	6.87		1	RWP
1.2	7.57		1	100
-	7.97	94.06	-	WSE-R
-	7.93	94.10	-	WSE-L
115	7.67		1	100
116	7.29		1	100
122.5	6.02		1	400 LWP

2' above weir C-side
 " " " R-side

1/5	8.22	93.81		WSE @
1/5	8.08	93.95		" "

WM-17
TR 1 SPAWNING Discharge

6/27/04

SIA	D	V	Sub %	Cover	Notes
124.4	0.81	0.1	2/1 60	2	L-Bank - Undercut 0.2'
124	1.20	0.1	2/4 70	2	
122	1.32	0.51	4/5 60	1	
117	1.40	0.47	5/4 80	4	
112	1.40	0.23	5/4 90		
107	1.90	0.79	5/4 70		
102	2.55	1.17	0.85 4/5 60		
97	2.30	1.21	5/4 60		
92	2.05	0.27	5/4 60		
87	2.30	0.19	5/4 60		
82	2.50	1.38	0.64 5/4 60		
77	2.05	0.85	5/4 70		
72	2.20	1.65	5/4 70		
67	2.25	1.49	5/4 70		
62	2.85	0.72	0.65 5/4 60		
57	2.75	2.07	1.71 5/4 60		
52	2.70	1.35	0.95 5/4 70		
47	2.65	2.17	1.40 5/4 70		
42	2.35	1.79	5/4 70		
37	1.45	1.54	5/4 70		
32	0.75	2.04	4/5 60		
27	0.80	2.46	5/4 60		
22	1.10	2.57	4/5 60		

SIA	D	V	Sub %	Cover	Notes
17	1.55	2.48	5/4 60	4	
12	1.40	2.35	5/4 70	4	
9	1.40	2.27	8/4 60	2	
7.7	0.50	0.10	9/1 60	3	
6.7	0.30	0	9/2 60	3	R-Bank undercut 0.1'

6/29/04

WM-17 TR 2 SPAWNING Discharge

STA	D	V	Sub p/s	%	Cover	Notes
2.3	0.82	0.19	2/1	80	2	R-Bank-Undercut 0.5'
3.0	1.34	0.48	3/4	70	4	
8.0	1.70	1.52	4/5	60	4	
13	1.40	1.06	4/5	80		
18	1.70	1.28	5/4	60		
23	2.35	0.94	5/3	70		
28	2.25	1.46	4/5	60		
33	2.20	0.98	4/5	60		
38	2.20	0.95	5/4	60		
43	1.20	2.09	5/4	70		
48	0.70	2.43	4/5	60		
53	2.00	2.30	5/4	60		
58	1.35	2.37	5/4	60		
63	1.60	2.19	5/4	60		
68	1.55	2.39	4/5	70		
73	1.25	2.79	4/5	70		
78	1.20	2.54	5/4	60		
83	1.45	1.75	5/4	60		
88	1.90	1.30	4/5	70		
93	2.10	1.52	5/4	80		
98	2.20	1.25	5/4	60		
103	1.75	0.53	5/4	60		

STA	D	V	Sub p/s	%	Cover	Notes
108	1.35	0.57	5/4	80	4	
113	0.9	0.60	5/3	60	4	
114.5	0.55	0.15	5/3	70	4	
114.8	0.30	0	1/2	60	2	L-Bank

Undercut
0.2'