APPENDIX C
CROSS-SECTION SURVEY, PEBBLE COUNT, AND HABITAT FIELD DATA

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BF 1870
CFS

Rio Grande @ Cerro (above Red River)

* DATE * TIME *	WIDTH *	DISCHARGE * CFS
10/4/1988	52	79.6
11/16/1988	113	478
12/21/1988	114	429
1/25/1989	102	375
3/9/1989	110	643
4/26/1989	116	707
6/6/1989	97	282
7/19/1989	97	102
10/12/1989	104	111
11/16/1989	94	128
2/14/1990	99	273
3/14/1990	120	436
4/12/1990	92	129
6/7/1990	118	405
7/19/1990	100	289
8/9/1990	93	163
9/20/1990	88	83.5
10/17/1990	96	323
12/19/1990	90.6	276
1/23/1991	90	372
2/13/1991	112	352
7/17/1991	94	309
8/21/1991	90	231
10/3/1991	88	152
10/16/1991	85	131
1/6/1992	95	376
5/19/1992	107	272
7/14/1992	94	168
8/11/1992	96	195
9/15/1992	94	135
10/14/1992	101	122
11/12/1992	110	281
1/6/1993	111	331
2/24/1993	114	414
7/20/1993	103	302
8/18/1993	102	170
9/28/1993	106	205
11/2/1993	122	297
12/6/1993	110	280
7/19/1994	93	93.3
8/23/1994	99	77.8
11/29/1995	96	231
3/29/1996	100	305
6/19/1996	89	114
10/17/1996	60	76.9
11/12/1996	86	138
12/18/1996	52	111
2/5/1997	98	403
3/5/1997	91	427

- 97

5/5/1997	99	368
7/11/1997	98	465
8/7/1997	96	462
1/12/1998	94	380
2/24/1998	96	494
4/20/1998	96	329
5/4/1998	94	663
5/19/1998	95	558
6/25/1998	92	267
7/29/1998	69	192
9/3/1998	62	88.6
10/28/1998	96	177
1/5/1999	93	380
2/3/1999	91	345
3/9/1999	93	472
1/12/2000	93	343
2/16/2000	95	454
4/5/2000	94	329
7/5/2000	60	91.6
8/17/2000	45	55.7
8/17/2000	44	52.8
10/13/2000	48	65.6
10/13/2000	48	67.2
2/21/2001	94	333
4/27/2001	95	275
8/1/2001	93	156
10/4/2001	54	80.9
11/15/2001	95	157
4/23/2002	61	108
6/1/2002	54	67.5
7/10/2002	32	48
7/10/2002	50	50.6
8/23/2002	45	45.7
10/2/2002	50	65.9
11/13/2002	53	83.4
12/5/2002	98	225
2/12/2003	91	238
3/11/2003	96	215
4/16/2003	51	81.6
5/15/2003	62	106
6/5/2003	67	197
7/10/2003	60	90.2
8/12/2003	61.5	55.1

Rio Grande @ Colorado Border

Width	Discharge
100	272
87	320
156	437
184	737
77	187
97	173
101	246
48	37
46	54
46	36
72	139
99	309
85	309
94	318
102	422
210	1010
265	1760
271	963
187	897
191	519
177	512
66	92
40	46
45	36
38	39
124	66
68	119
122	187
82	213
166	314
77	100
87	176
242	1030
232	1830
87	192
130	191
115	169
110	91
105	88
107	71
139	242
130	168
113	264
104	283
139	430
157	487
168	1050
153	459
272	1390
277	1540
177	1210

175	1240
140	229
110	55
123	90
110	94
158	268
81	258
168	1050
270	1440
160	528
117	158
122	91
134	127
118	86
123	119
135	242
130	245
142	289
125	335
160	738
175	1170
272	1500
275	1400
262	1160
129	104
268	1240
130	118
142	236
160	483
141	380
129	302
143	484
132	304
141	342
275	1590
152	290
66	48
44	35.2
42	31
119	110
154	433
150	417
148	427
158	581
147	399
158	832
162	876
273	1680
110	278
98	166
130	174
136	188

119	195
123	374
129	385
152	508
130	230
139	223
108	65
110	55
32	15
39	37
42	38
115	114
115	162
124	331
116	343
104	383
164	745
142	461
169	1070
139	233
108	65
110	55
32	15
39	37
42	39
115	114
115	162
124	331
116	343
104	383
156	386
164	745
142	461
168	1150
149	495
152	502
168	1040
169	1020
160	654
150	445
158	441
152	372
158	624
143	479
166	1010
52	95
60	114
49	62
43	55
125	168
144	274
144	335

135	378
148	417
126	136
155	560
273	1500
186	1010
157	765
204	1010
170	646
144	442
142	502
150	346
140	318
151	408
134	230
140	334
142	259
55	51
61	15
28	9
80	17
122	84
132	165
108	209
85	215
144	340
164	577
159	582
235	2040
232	1910
81	117
82	109
64	43
64	53
134	291
64	43
64	53
134	291
118	273
90	252
96	260
136	300
64	27
62	23
62	18
24	4.63
24	7.81
90	21
61	21
128	129
60	110
127	197

126	177
112	85
80	75
139	246
119	93
43	14
31	11
58	11
58	16
88	34

**********WinXSPRO**********
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Input File: C:\WXSPRO20\TEMPLET.DAT
Run Date: 11/06/03
Analysis Procedure: Hydraulics
Cross Section Number: 1
Survey Date: 11/04/03

Rio Pueblo de Taos
(Rio Grande To
Arroyo de Alamo

Subsections/Dividing stations
A

Resistance Method: Manning's n

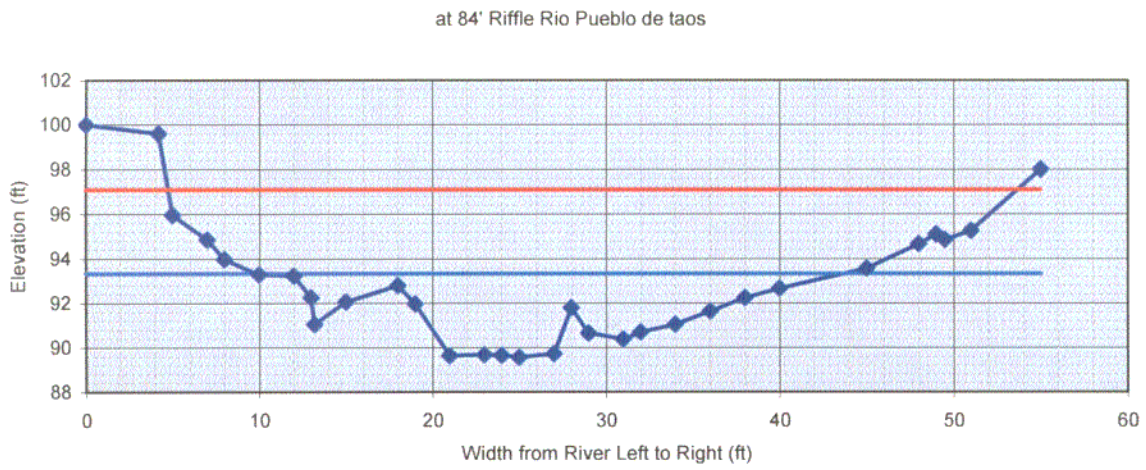
SECTION	A
Low Stage n	0.206
High Stage n	0.062

use this

STAGE (ft)	#SEC	AREA (sq ft)	PERIM (ft)	WIDTH (ft)	R (ft)	DHYD (ft)	SLOPE (ft/ft)	n	VAVG (ft/s)	Q (cfs)
0.10	T	0.16	4.55	4.52	0.03	0.03	0.043	0.206	0.16	0.02
0.20	T	0.74	6.23	6.13	0.12	0.12	0.043	0.202	0.37	0.27
0.30	T	1.36	6.48	6.27	0.21	0.22	0.043	0.198	0.55	0.75
0.40	T	2.00	6.72	6.40	0.30	0.31	0.043	0.194	0.71	1.41
0.50	T	2.64	6.96	6.54	0.38	0.40	0.043	0.190	0.85	2.25
0.60	T	3.30	7.21	6.67	0.46	0.50	0.043	0.187	0.98	3.25
0.70	T	3.98	7.45	6.80	0.53	0.58	0.043	0.183	1.11	4.43
0.80	T	4.66	7.69	6.94	0.61	0.67	0.043	0.179	1.24	5.78
0.90	T	5.41	8.90	8.02	0.61	0.67	0.043	0.175	1.27	6.85
1.00	T	6.27	10.22	9.21	0.61	0.68	0.043	0.171	1.30	8.18
1.10	T	7.25	11.41	10.26	0.63	0.71	0.043	0.167	1.37	9.90
1.20	T	8.31	12.29	10.98	0.68	0.76	0.043	0.163	1.46	12.11
1.30	T	9.44	13.25	11.77	0.71	0.80	0.043	0.159	1.55	14.62
1.40	T	10.66	14.21	12.56	0.75	0.85	0.043	0.155	1.64	17.50
1.50	T	11.96	15.18	13.35	0.79	0.90	0.043	0.152	1.74	20.80
1.60	T	13.33	16.21	14.11	0.82	0.94	0.043	0.148	1.84	24.48
1.70	T	14.78	17.25	14.86	0.86	0.99	0.043	0.144	1.94	28.66
1.80	T	16.30	18.28	15.62	0.89	1.04	0.043	0.140	2.05	33.37
1.90	T	17.90	19.32	16.37	0.93	1.09	0.043	0.136	2.16	38.67
2.00	T	19.58	20.35	17.13	0.96	1.14	0.043	0.132	2.28	44.63
2.10	T	21.33	21.38	17.88	1.00	1.19	0.043	0.128	2.41	51.32
2.20	T	23.15	22.41	18.62	1.03	1.24	0.043	0.124	2.54	58.83
2.30	T	25.05	23.24	19.26	1.08	1.30	0.043	0.120	2.70	67.58
2.40	T	27.00	24.02	19.87	1.12	1.36	0.043	0.116	2.87	77.44
2.50	T	29.02	24.84	20.53	1.17	1.41	0.043	0.113	3.04	88.34
2.60	T	31.12	25.86	21.40	1.20	1.45	0.043	0.109	3.22	100.06
2.70	T	33.30	26.92	22.32	1.24	1.49	0.043	0.105	3.40	113.14
2.80	T	35.59	28.13	23.44	1.27	1.52	0.043	0.101	3.58	127.46
2.90	T	37.99	29.35	24.55	1.29	1.55	0.043	0.097	3.78	143.69
3.00	T	40.50	30.56	25.67	1.33	1.58	0.043	0.093	4.00	162.10
3.10	T	43.12	31.78	26.79	1.36	1.61	0.043	0.089	4.24	182.98
3.20	T	45.86	33.06	27.97	1.39	1.64	0.043	0.085	4.50	206.51
3.30	T	48.70	33.93	28.78	1.44	1.69	0.043	0.081	4.83	235.06
3.40	T	51.61	34.63	29.43	1.49	1.75	0.043	0.078	5.20	268.24
3.50	T	54.59	35.33	30.08	1.54	1.81	0.043	0.074	5.60	305.95
3.60	T	57.63	36.03	30.73	1.60	1.88	0.043	0.070	6.05	348.94
3.70	T	60.76	38.01	32.67	1.60	1.86	0.043	0.066	6.41	389.51
3.80	T	64.12	39.48	34.12	1.62	1.88	0.043	0.062	6.89	441.51

STAGE	ALPHA	FROUDE
0.10	1.00	0.15
0.20	1.00	0.19
0.30	1.00	0.21
0.40	1.00	0.22
0.50	1.00	0.24
0.60	1.00	0.25
0.70	1.00	0.26
0.80	1.00	0.27
0.90	1.00	0.27
1.00	1.00	0.28
1.10	1.00	0.29
1.20	1.00	0.30
1.30	1.00	0.30
1.40	1.00	0.31
1.50	1.00	0.32
1.60	1.00	0.33
1.70	1.00	0.34
1.80	1.00	0.35
1.90	1.00	0.36
2.00	1.00	0.38

Cross Section



section:	at 84'
	Riffle
stream:	Rio Pueblo de taos
location:	above the Rio Grande (Rio Grande to Arroyo del Alamo)
description:	B2a Canopy 28%
height of instrument (ft):	100.20

notes	omit pt.	distance (ft)	FS (ft)	elevation
LBP	☐	0	0-Jan	100
boulder	☐	4.2	0.6	99.6
LFPW	☐	5	4.24	95.96
	☐	7	5.34	94.86
	☐	8	6.23	93.97
LBF	☐	10	6.91	93.29
	☐	12	6.97	93.23
	☐	13	7.95	92.25
LWE	☐	13.2	9.15	91.05
boulder	☐	15	8.14	92.06
	☐	18	7.4	92.8
	☐	19	8.23	91.97
TW	☐	21	10.56	89.64
	☐	23	10.52	89.68
	☐	24	10.55	89.65
	☐	25	10.63	89.57
	☐	27	10.48	89.72
	☐	28	8.41	91.79
	☐	29	9.55	90.65
	☐	31	9.82	90.38
	☐	32	9.5	90.7
REW	☐	34	9.15	91.05
	☐	36	8.56	91.64
	☐	38	7.95	92.25
	☐	40	7.54	92.66
RBF	☐	45	6.63	93.57
	☐	48	5.53	94.67
	☐	49	5.1	95.1
	☐	49.5	5.34	94.86
	☐	51	4.94	95.26
RBP and	☐	55	2.2	98
RFPW	☐			
	☐			

FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
6.87	6.87	50.0	4.25	0.062
93.33	93.33			

dimensions			
62.8	x-section area	1.9	d mean
33.8	width	39.1	wet P
3.8	d max	1.6	hyd radi
3.8	bank ht	18.2	w/d ratio
50.0	W flood prone area	1.5	ent ratio

hydraulics	
6.8	velocity (ft/sec)
425.1	discharge rate, Q (cfs)
4.25	shear stress ((lbs/ft sq)
1.48	shear velocity (ft/sec)
33.357	unit stream power (lbs/ft/sec)
0.77	Froude number
4.6	friction factor u/u*
~~1220.1~~	threshold grain size (mm)

check from channel material			
1024	measured D84 (mm)		
0.6	relative roughness	1.4	fric. factor
0.208	Manning's n from channel material		

**********WinXSPRO**********
templet.out
Input File: C:\WXSPRO20\TEMPLET.DAT
Run Date: 11/10/03
Analysis Procedure: Hydraulics
Cross Section Number: 1
Survey Date: 11/04/03

Rio Pueblo de Taos @ Los Cordovas Gage - Above WWTP (@ Arroyo del Alamo To RG del Rancho)

Subsections/Dividing stations
A

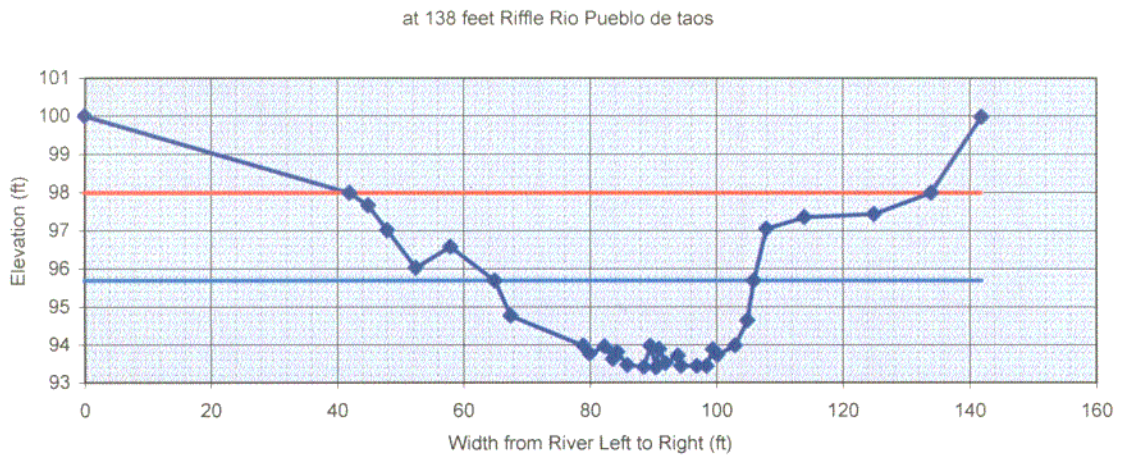
Resistance Method: Manning's n

SECTION	A
Low Stage n	0.018
High Stage n	0.018

STAGE (ft)	#SEC	AREA (sq ft)	PERIM (ft)	WIDTH (ft)	R (ft)	DHYD (ft)	SLOPE (ft/ft)	n	VAVG (ft/s)	Q (cfs)
0.10	T	0.37	7.46	7.34	0.05	0.05	0.004	0.018	0.71	0.26
0.20	T	1.21	9.94	9.65	0.12	0.13	0.004	0.018	1.28	1.55
0.30	T	2.32	13.23	12.74	0.18	0.18	0.004	0.018	1.64	3.81
0.40	T	3.76	17.24	16.56	0.22	0.23	0.004	0.018	1.90	7.13
0.50	T	5.66	22.07	21.20	0.26	0.27	0.004	0.018	2.11	11.95
0.60	T	7.94	25.10	24.17	0.32	0.33	0.004	0.018	2.43	19.31
0.70	T	10.45	26.88	25.93	0.39	0.40	0.004	0.018	2.79	29.14
0.80	T	13.13	28.66	27.69	0.46	0.47	0.004	0.018	3.11	40.85
0.90	T	15.99	30.44	29.45	0.53	0.54	0.004	0.018	3.41	54.48
1.00	T	19.02	32.22	31.20	0.59	0.61	0.004	0.018	3.68	70.07
1.10	T	22.23	33.99	32.96	0.65	0.67	0.004	0.018	3.94	87.67
1.20	T	25.61	35.77	34.72	0.72	0.74	0.004	0.018	4.19	107.31
1.30	T	29.17	37.46	36.38	0.78	0.80	0.004	0.018	4.43	129.25
1.40	T	32.88	38.82	37.69	0.85	0.87	0.004	0.018	4.69	154.11
1.50	T	36.67	39.25	38.06	0.93	0.96	0.004	0.018	5.00	183.47
1.60	T	40.49	39.68	38.42	1.02	1.05	0.004	0.018	5.31	214.89
1.70	T	44.35	40.10	38.79	1.11	1.14	0.004	0.018	5.60	248.33
1.80	T	48.25	40.53	39.16	1.19	1.23	0.004	0.018	5.88	283.74
1.90	T	52.19	40.96	39.52	1.27	1.32	0.004	0.018	6.15	321.08
2.00	T	56.16	41.39	39.89	1.36	1.41	0.004	0.018	6.42	360.32
2.10	T	60.16	41.82	40.26	1.44	1.49	0.004	0.018	6.67	401.43
2.20	T	64.21	42.24	40.62	1.52	1.58	0.004	0.018	6.92	444.38
2.30	T	68.29	42.67	40.99	1.60	1.67	0.004	0.018	7.16	489.15

STAGE	ALPHA	FROUDE
0.10	1.00	0.55
0.20	1.00	0.64
0.30	1.00	0.68
0.40	1.00	0.70
0.50	1.00	0.72
0.60	1.00	0.75
0.70	1.00	0.77
0.80	1.00	0.80
0.90	1.00	0.82
1.00	1.00	0.83
1.10	1.00	0.85
1.20	1.00	0.86
1.30	1.00	0.87
1.40	1.00	0.88
1.50	1.00	0.90
1.60	1.00	0.91
1.70	1.00	0.92
1.80	1.00	0.93
1.90	1.00	0.94
2.00	1.00	0.95
2.10	1.00	0.96
2.20	1.00	0.97
2.30	1.00	0.98

Cross Section



section:	at 138 feet
	Riffle
stream:	Rio Pueblo de taos
location:	at USGS Gage near Los Cordovas (Arroyo del Alamo to Rio Grande del Rancho_
description:	Smolka/Scaeffer/Davis 24-Aug-00 Canopy cover 4.3%
height of instrument (ft):	103.04

notes	omit pt.	distance (ft)	FS (ft)	elevation
LBP	☐	0	3-Jan	100
LFPW	☐	42	5.05	97.99
	☐	45	5.38	97.66
	☐	48	6.02	97.02
	☐	52.5	7.01	96.03
	☐	58	6.46	96.58
LBF	☐	65	7.35	95.69
	☐	67.5	8.27	94.77
LWE	☐	79	9.06	93.98
	☐	80	9.28	93.76
	☐	82.4	9.08	93.96
	☐	83.7	9.42	93.62
	☐	84.4	9.23	93.81
	☐	86	9.58	93.46
	☐	88.6	9.63	93.41
Rock	☐	89.6	9.07	93.97
TW	☐	90.5	9.65	93.39
	☐	91	9.15	93.89
	☐	92	9.53	93.51
	☐	94	9.33	93.71
	☐	94.5	9.6	93.44
	☐	97	9.6	93.44
	☐	98.5	9.6	93.44
	☐	99.5	9.16	93.88
	☐	100.2	9.31	93.73
RWE	☐	103	9.06	93.98
	☐	105	8.4	94.64
RBF	☐	106	7.35	95.69
	☐	108	5.99	97.05
	☐	114	5.69	97.35
Chamisa edc	☐	125	5.6	97.44
RFPW	☐	134	5.05	97.99
RBP	☐	142	3.06	99.98

FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
7.35		92.0	0.4	0.018
95.69	---			

dimensions			
68.3	x-section area	1.7	d mean
41.0	width	42.7	wet P
2.3	d max	1.6	hyd radi
0.0	bank ht	24.6	w/d ratio
92.0	W flood prone area	2.2	ent ratio

hydraulics	
7.1	velocity (ft/sec)
487.9	discharge rate, Q (cfs)
0.40	shear stress ((lbs/ft sq)
0.45	shear velocity (ft/sec)
2.971	unit stream power (lbs/ft/sec)
0.95	Froude number
15.7	friction factor u/u*
23.9	threshold grain size (mm)

check from channel material			
1	measured D84 (mm)		
1015.5	relative roughness	20.0	fric. factor
0.014	Manning's n from channel material		

Pebble Count

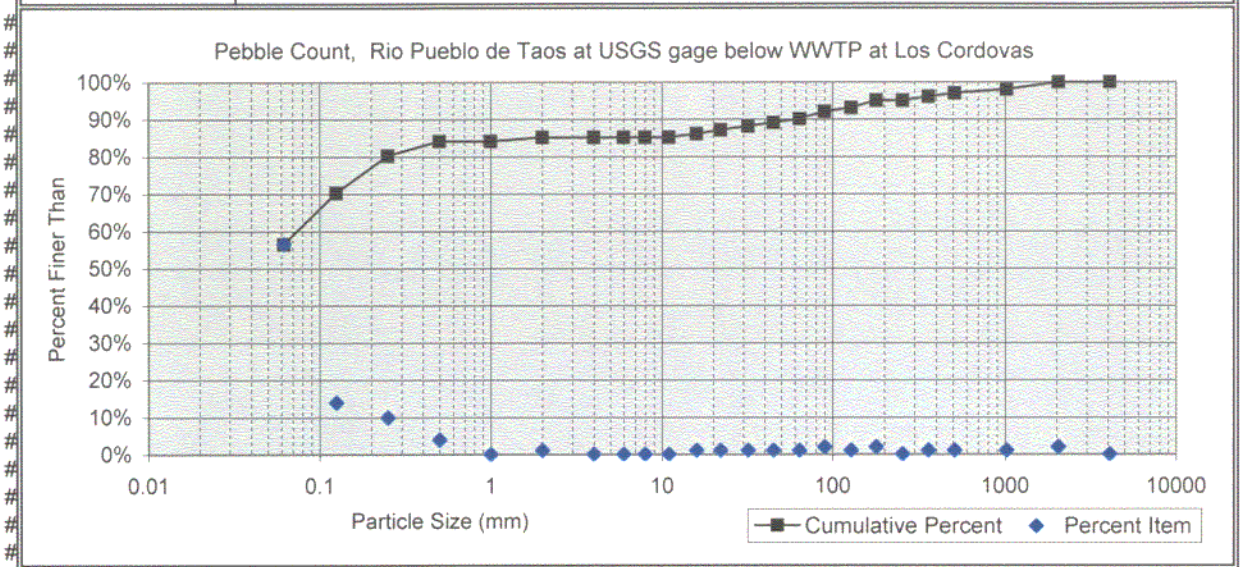
Pebble Count,

Material	Size Range (mm)		Count
silt/clay	0	0.062	**57**
very fine sand	0.062	0.13	**14**
fine sand	0.13	0.25	**10**
medium sand	0.25	0.5	**4**
coarse sand	0.5	1	
very coarse sand	1	2	**1**
very fine gravel	2	4	
fine gravel	4	6	
fine gravel	6	8	
medium gravel	8	11	
medium gravel	11	16	**1**
coarse gravel	16	22	**1**
coarse gravel	22	32	**1**
very coarse gravel	32	45	**1**
very coarse gravel	45	64	**1**
small cobble	64	90	**2**
medium cobble	90	128	**1**
large cobble	128	180	**2**
very large cobble	180	256	
small boulder	256	362	**1**
small boulder	362	512	**1**
medium boulder	512	1024	**1**
large boulder	1024	2048	**2**
very large boulder	2048	4096	
bedrock			
Total Particle Count:			101

stream: **Rio Pueblo de Taos at USGS gage below WWTP at Los Cordovas**

August 24 2000

Note:



Size percent less than (mm)					Percent by substrate type					
D16	D35	D50	D84	D95	silt/clay	sand	gravel	cobble	boulder	bedrock
#N/A	#N/A	#N/A	0	178	56%	29%	5%	5%	5%	0%

Rio Pueblo de Taos
@ USGS Gage blw WWTP
8-24-00

DRAFT REVISION—July 19, 1999

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (FRONT)

STREAM NAME	LOCATION	
STATION # _____ RIVERMILE _____	STREAM CLASS	
LAT _____ LONG _____	RIVER BASIN	
STORET #	AGENCY	
INVESTIGATORS		
FORM COMPLETED BY	DATE _____ TIME _____ AM PM	REASON FOR SURVEY

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status 58	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

T	XS	B
0	0	0
4-0's	4-0's	4 0's
0	0	13

DRAFT REVISION—July 19, 1999

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (BACK)

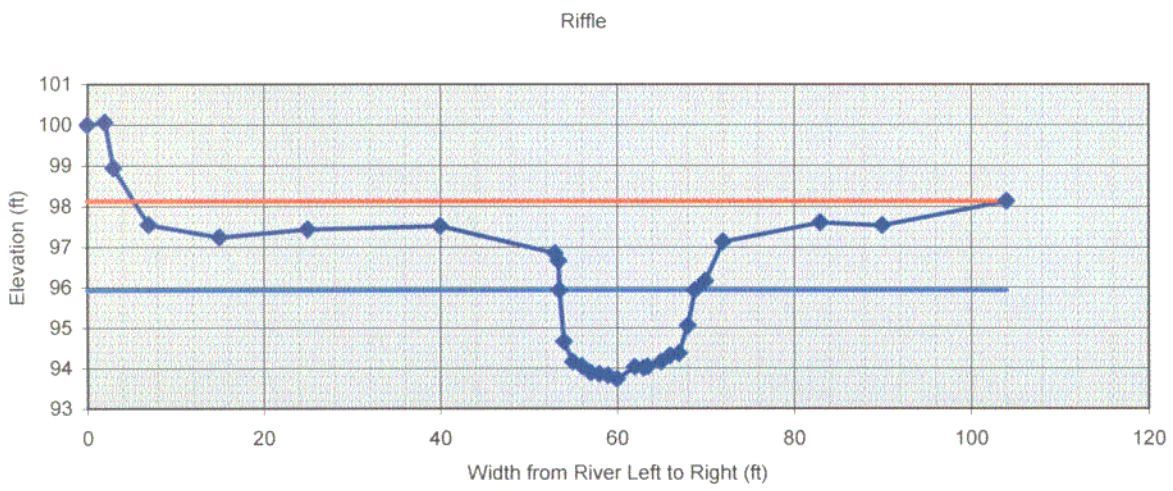
Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7; variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 107

4.3%

Cross Section



section:	at 474 feet
	Riffle
stream:	Rio Grande del Rancho
location:	At fort Bergwin above Pot Creek
description:	E5 August 23 2000 Smolka/Davis/Schaeaffer
height of instrument (ft):	105.05

notes	omit pt.	distance (ft)	FS (ft)	elevation
LBP	☐	0	5-Jan	100
	☐	2	4.99	100.06
	☐	3	6.11	98.94
	☐	7	7.5	97.55
	☐	15	7.81	97.24
	☐	25	7.61	97.44
	☐	40	7.53	97.52
	☐	53	8.2	96.85
top bnk	☐	53.4	8.39	96.66
LBP	☐	53.5	9.12	95.93
Bnk bottom	☐	54	10.39	94.66
LWE	☐	55	10.89	94.16
	☐	56	10.99	94.06
	☐	57	11.16	93.89
	☐	58	11.19	93.86
	☐	59	11.23	93.82
TW	☐	60	11.32	93.73
	☐	62	11.02	94.03
	☐	63	11.04	94.01
	☐	63.5	11.01	94.04
RWE	☐	65	10.89	94.16
	☐	66	10.73	94.32
	☐	67	10.68	94.37
	☐	68	9.99	95.06
RBF	☐	68.8	9.12	95.93
	☐	70	8.89	96.16
	☐	72	7.92	97.13
	☐	83	7.45	97.6
	☐	90	7.52	97.53
RFPW	☐	104	6.92	98.13

FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
9.12	8.39	99.0	0.07	0.035
95.93	96.66			

dimensions			
26.5	x-section area	1.7	d mean
15.3	width	16.9	wet P
2.2	d max	1.6	hyd radi
2.9	bank ht	8.8	w/d ratio
99.0	W flood prone area	6.5	ent ratio

hydraulics	
1.5	velocity (ft/sec)
40.0	discharge rate, Q (cfs)
0.07	shear stress ((lbs/ft sq)
0.19	shear velocity (ft/sec)
0.114	unit stream power (lbs/ft/sec)
0.04	Froude number
8.1	friction factor u/u*
4.7	threshold grain size (mm)

check from channel material			
80	measured D84 (mm)		
6.6	relative roughness	7.5	fric. factor
0.038	Manning's n from channel material		

**********WinXSPRO**********
templet.out
Input File: C:\WXSPRO20\TEMPLET.DAT
Run Date: 11/24/03
Analysis Procedure: Hydraulics
Cross Section Number: 1
Survey Date: 11/04/03

Subsections/Dividing stations
A

Resistance Method: Manning's n

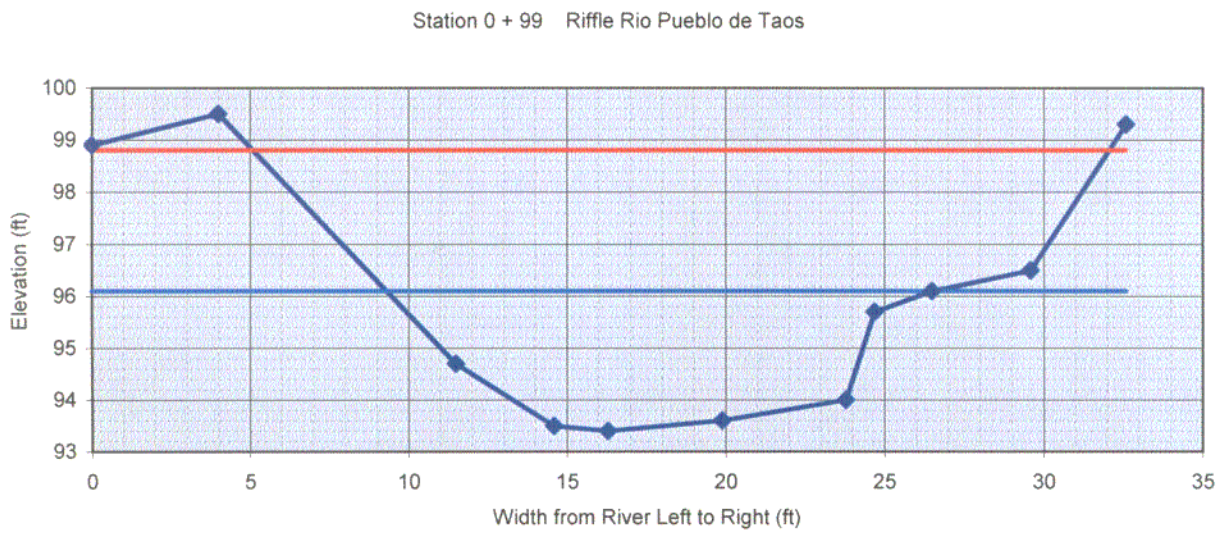
SECTION	A
Low Stage n	0.080
High Stage n	0.078

STAGE (ft)	#SEC	AREA (sq ft)	PERIM (ft)	WIDTH (ft)	R (ft)	DHYD (ft)	SLOPE (ft/ft)	n	VAVG (ft/s)	Q (cfs)
0.10	T	0.17	3.50	3.50	0.05	0.05	0.007	0.080	0.21	0.04
0.20	T	0.63	5.58	5.56	0.11	0.11	0.007	0.080	0.36	0.23
0.30	T	1.24	6.84	6.79	0.18	0.18	0.007	0.080	0.50	0.62
0.40	T	1.99	8.10	8.02	0.25	0.25	0.007	0.080	0.61	1.22
0.50	T	2.85	9.35	9.25	0.30	0.31	0.007	0.080	0.71	2.02
0.60	T	3.84	10.61	10.49	0.36	0.37	0.007	0.080	0.79	3.05
0.70	T	4.90	11.00	10.80	0.45	0.45	0.007	0.080	0.91	4.48
0.80	T	6.00	11.39	11.11	0.53	0.54	0.007	0.079	1.02	6.13
0.90	T	7.12	11.78	11.42	0.60	0.62	0.007	0.079	1.12	8.00
1.00	T	8.28	12.17	11.73	0.68	0.71	0.007	0.079	1.22	10.07
1.10	T	9.47	12.56	12.04	0.75	0.79	0.007	0.079	1.30	12.34
1.20	T	10.69	12.95	12.35	0.83	0.87	0.007	0.079	1.39	14.81
1.30	T	11.94	13.34	12.66	0.90	0.94	0.007	0.079	1.46	17.48
1.40	T	13.22	13.64	12.87	0.97	1.03	0.007	0.079	1.55	20.42
1.50	T	14.51	13.94	13.08	1.04	1.11	0.007	0.079	1.62	23.55
1.60	T	15.83	14.24	13.29	1.11	1.19	0.007	0.079	1.70	26.87
1.70	T	17.17	14.53	13.50	1.18	1.27	0.007	0.079	1.77	30.37
1.80	T	18.53	14.83	13.71	1.25	1.35	0.007	0.079	1.84	34.06
1.90	T	19.91	15.13	13.92	1.32	1.43	0.007	0.079	1.90	37.92
2.00	T	21.32	15.43	14.13	1.38	1.51	0.007	0.079	1.97	41.97
2.10	T	22.74	15.73	14.34	1.45	1.59	0.007	0.078	2.03	46.20
2.20	T	24.18	16.03	14.55	1.51	1.66	0.007	0.078	2.09	50.60
2.30	T	25.65	16.33	14.76	1.57	1.74	0.007	0.078	2.15	55.18
2.40	T	27.15	16.97	15.36	1.60	1.77	0.007	0.078	2.18	59.19
2.50	T	28.72	17.62	15.97	1.63	1.80	0.007	0.078	2.21	63.46
2.60	T	30.35	18.26	16.57	1.66	1.83	0.007	0.078	2.24	67.98
2.70	T	32.04	18.91	17.18	1.69	1.86	0.007	0.078	2.27	72.76

STAGE	ALPHA	FROUDE
0.10	1.00	0.17
0.20	1.00	0.19
0.30	1.00	0.21
0.40	1.00	0.22
0.50	1.00	0.22
0.60	1.00	0.23
0.70	1.00	0.24
0.80	1.00	0.25
0.90	1.00	0.25
1.00	1.00	0.26
1.10	1.00	0.26
1.20	1.00	0.26
1.30	1.00	0.27
1.40	1.00	0.27
1.50	1.00	0.27
1.60	1.00	0.27
1.70	1.00	0.28
1.80	1.00	0.28
1.90	1.00	0.28
2.00	1.00	0.28
2.10	1.00	0.28
2.20	1.00	0.29
2.30	1.00	0.29
2.40	1.00	0.29
2.50	1.00	0.29
2.60	1.00	0.29
2.70	1.00	0.29

Rio Pueblo de Taos @ USGS Gage
at Pueblo (Rio Grande del Rancho To HWY)
≅ 1/2 Way

Cross Section



section:	Station 0 + 99 — 56-57 feet upstream of gage
	Riffle
stream:	Rio Pueblo de Taos — Moody et al August 12, 1998
location:	at USGS gage at Pueblo — 66.6 square mile ws
description:	B4
height of instrument (ft):	103.90

notes	omit pt.	distance (ft)	FS (ft)	elevation
LBP	☐	0	5	98.9
	☐	4	4.4	99.5
	☐	11.5	9.2	94.7
	☐	14.6	10.4	93.5
Thalweg	☐	16.3	10.5	93.4
	☐	19.9	10.3	93.6
	☐	23.8	9.9	94
	☐	24.7	8.2	95.7
RBF	☐	26.5	7.8	96.1
	☐	29.6	7.4	96.5
RBP	☐	32.6	4.6	99.3
	☐			
	☐			
	☐			
	☐			
	☐			
	☐			
	☐			
	☐			
	☐			
	☐			
	☐			
	☐			
	☐			
	☐			

FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
7.8	4.6	27.5	0.75	0.078
96.1	99.3			

dimensions			
32.1	x-section area	1.9	d mean
17.2	width	18.9	wet P
2.7	d max	1.7	hyd radi
5.9	bank ht	9.2	w/d ratio
27.5	W flood prone area	1.6	ent ratio

hydraulics	
2.3	velocity (ft/sec)
75.2	discharge rate, Q (cfs)
0.79	shear stress ((lbs/ft sq)
0.64	shear velocity (ft/sec)
2.046	unit stream power (lbs/ft/sec)
0.09	Froude number
3.7	friction factor u/u*
51.2	threshold grain size (mm)

check from channel material			
200	measured D84 (mm)		
2.8	relative roughness	5.4	fric. factor
0.053	Manning's n from channel material		

**********WinXSPRO**********

templet.out
Input File: C:\WXSPRO20\TEMPLET.DAT
Run Date: 11/13/03
Analysis Procedure: Hydraulics
Cross Section Number: 1
Survey Date: 11/04/03

Subsections/Dividing stations
A / 34.86/ @

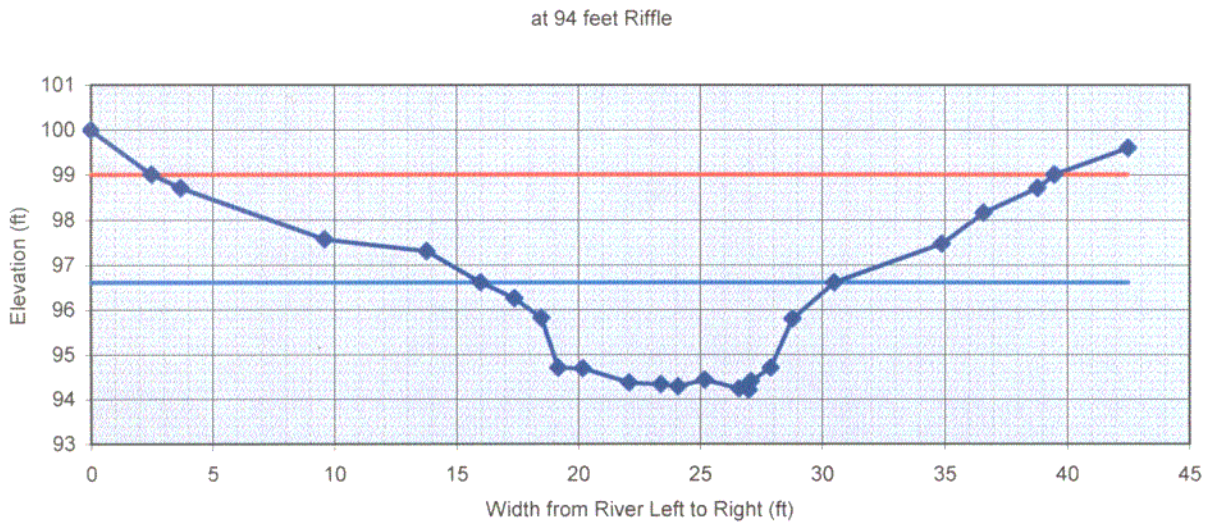
Resistance Method: Thorne and Zevenbergen
D84: 64.000 mm

STAGE (ft)	#SEC	AREA (sq ft)	PERIM (ft)	WIDTH (ft)	R (ft)	DHYD (ft)	SLOPE (ft/ft)	n	VAVG (ft/s)	Q (cfs)
0.10	T	0.06	1.44	1.37	0.04	0.04	0.012	0.166	0.12	0.01
0.20	T	0.38	4.95	4.80	0.08	0.08	0.012	0.097	0.31	0.12
0.30	T	0.94	6.27	6.09	0.15	0.15	0.012	0.068	0.68	0.64
0.40	T	1.59	7.16	6.95	0.22	0.23	0.012	0.060	1.00	1.59
0.50	T	2.34	8.92	8.69	0.26	0.27	0.012	0.055	1.23	2.87
0.60	T	3.22	9.17	8.84	0.35	0.36	0.012	0.049	1.65	5.30
0.70	T	4.11	9.42	8.98	0.44	0.46	0.012	0.046	2.04	8.36
0.80	T	5.01	9.67	9.13	0.52	0.55	0.012	0.044	2.40	12.01
0.90	T	5.93	9.91	9.27	0.60	0.64	0.012	0.042	2.73	16.21
1.00	T	6.87	10.16	9.42	0.68	0.73	0.012	0.041	3.05	20.93
1.10	T	7.81	10.41	9.56	0.75	0.82	0.012	0.040	3.35	26.16
1.20	T	8.78	10.66	9.71	0.82	0.90	0.012	0.039	3.63	31.88
1.30	T	9.76	10.91	9.85	0.89	0.99	0.012	0.039	3.90	38.08
1.40	T	10.75	11.15	10.00	0.96	1.07	0.012	0.038	4.16	44.73
1.50	T	11.76	11.40	10.14	1.03	1.16	0.012	0.038	4.41	51.84
1.60	T	12.78	11.66	10.30	1.10	1.24	0.012	0.037	4.64	59.34
1.70	T	13.83	12.15	10.74	1.14	1.29	0.012	0.037	4.81	66.48
1.80	T	14.93	12.65	11.20	1.18	1.33	0.012	0.037	4.96	74.10
1.90	T	16.07	13.15	11.66	1.22	1.38	0.012	0.036	5.12	82.29
2.00	T	17.26	13.65	12.12	1.26	1.42	0.012	0.036	5.28	91.05
2.10	T	18.50	14.22	12.66	1.30	1.46	0.012	0.036	5.41	100.06
2.20	T	19.79	14.87	13.27	1.33	1.49	0.012	0.036	5.53	109.40
2.30	T	21.15	15.51	13.87	1.36	1.52	0.012	0.036	5.65	119.44
2.40	T	22.57	16.15	14.48	1.40	1.56	0.012	0.035	5.77	130.21

STAGE	ALPHA	FROUDE
0.10	1.00	0.10
0.20	1.00	0.19
0.30	1.00	0.31
0.40	1.00	0.37
0.50	1.00	0.42
0.60	1.00	0.48
0.70	1.00	0.53
0.80	1.00	0.57
0.90	1.00	0.60
1.00	1.00	0.63
1.10	1.00	0.65
1.20	1.00	0.67
1.30	1.00	0.69
1.40	1.00	0.71
1.50	1.00	0.72
1.60	1.00	0.73
1.70	1.00	0.75
1.80	1.00	0.76
1.90	1.00	0.77
2.00	1.00	0.78
2.10	1.00	0.79
2.20	1.00	0.80
2.30	1.00	0.81
2.40	1.00	0.81

Rio Fernando de Taos @
El Nogal CG
Lower –

Cross Section



section:	at 94 feet — 71 square mile WS
	Riffle
stream:	Rio Fernando de Taos
location:	at El Nogel — July 11 200 Smolka/Schaeffer/
description:	E5b — Canopy 100%
height of instrument (ft):	100.50

notes	omit pt.	distance (ft)	FS (ft)	elevation
LBP	☐	0	0.5	100
LFPW	☐	2.5	1.49	99.01
	☐	3.7	1.79	98.71
	☐	9.6	2.93	97.57
	☐	13.8	3.19	97.31
LBF	☐	16	3.89	96.61
	☐	17.4	4.24	96.26
1/2 bank	☐	18.5	4.68	95.82
LWE	☐	19.2	5.79	94.71
	☐	20.2	5.81	94.69
	☐	22.1	6.13	94.37
	☐	23.4	6.16	94.34
	☐	24.1	6.21	94.29
	☐	25.2	6.06	94.44
	☐	26.6	6.26	94.24
TW	☐	27	6.29	94.21
	☐	27.1	6.09	94.41
RWE	☐	27.9	5.79	94.71
	☐	28.8	4.7	95.8
RBF	☐	30.5	3.89	96.61
	☐	34.9	3.03	97.47
	☐	36.6	2.34	98.16
	☐	38.8	1.79	98.71
RFPW	☐	39.5	1.49	99.01
RBP	☐	42.5	0.9	99.6
	☐			
	☐			

FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
3.89		37.0	1.2	0.036
96.61	---			

dimensions			
22.6	x-section area	1.6	d mean
14.5	width	16.2	wet P
2.4	d max	1.4	hyd radi
0.0	bank ht	9.3	w/d ratio
37.0	W flood prone area	2.6	ent ratio

hydraulics	
5.7	velocity (ft/sec)
127.7	discharge rate, Q (cfs)
1.05	shear stress ((lbs/ft sq)
0.73	shear velocity (ft/sec)
6.594	unit stream power (lbs/ft/sec)
0.64	Froude number
7.7	friction factor u/u*
79.2	threshold grain size (mm)

check from channel material			
64	measured D84 (mm)		
7.4	relative roughness	7.8	fric. factor
0.036	Manning's n from channel material		

**********WinXSPRO**********

templet.out
Input File: C:\WXSPRO20\TEMPLET.DAT
Run Date: 11/13/03
Analysis Procedure: Hydraulics
Cross Section Number: 1
Survey Date: 11/04/03

Subsections/Dividing stations
A / 38.76/ @

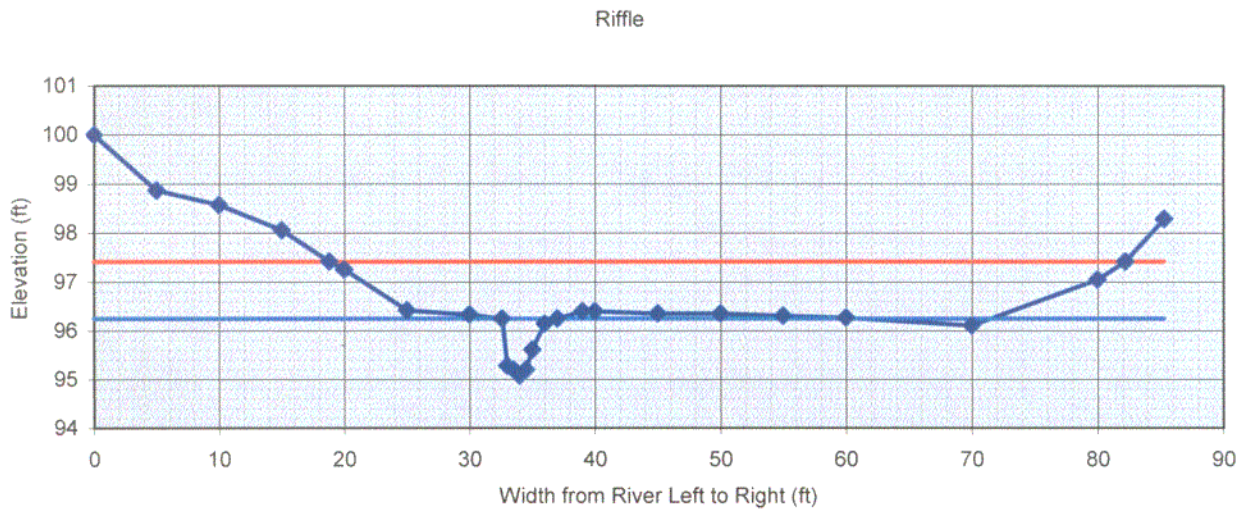
Resistance Method: Thorne and Zevenbergen
D84: 0.500 mm

STAGE (ft)	#SEC	AREA (sq ft)	PERIM (ft)	WIDTH (ft)	R (ft)	DHYD (ft)	SLOPE (ft/ft)	n	VAVG (ft/s)	Q (cfs)
0.10	T	0.04	0.85	0.83	0.05	0.05	0.006	0.014	1.13	0.05
0.20	T	0.16	1.65	1.59	0.10	0.10	0.006	0.013	1.84	0.30
0.30	T	0.33	1.92	1.75	0.17	0.19	0.006	0.013	2.66	0.88
0.40	T	0.51	2.18	1.91	0.24	0.27	0.006	0.013	3.27	1.68
0.50	T	0.71	2.45	2.07	0.29	0.34	0.006	0.013	3.76	2.68
0.60	T	0.93	2.75	2.28	0.34	0.41	0.006	0.013	4.15	3.86
0.70	T	1.17	3.07	2.51	0.38	0.47	0.006	0.013	4.50	5.25
0.80	T	1.43	3.38	2.73	0.42	0.52	0.006	0.014	4.81	6.89
0.90	T	1.71	3.70	2.96	0.46	0.58	0.006	0.014	5.11	8.77
1.00	T	2.02	4.02	3.18	0.50	0.64	0.006	0.014	5.40	10.91
1.10	T	2.35	4.57	3.65	0.51	0.65	0.006	0.013	5.49	12.94
1.20	T	2.79	6.61	5.63	0.42	0.49	0.006	0.013	4.90	13.63

STAGE	ALPHA	FROUDE
0.10	1.00	0.89
0.20	1.00	1.01
0.30	1.00	1.08
0.40	1.00	1.11
0.50	1.00	1.13
0.60	1.00	1.15
0.70	1.00	1.16
0.80	1.00	1.17
0.90	1.00	1.18
1.00	1.00	1.19
1.10	1.00	1.21
1.20	1.00	1.23

Upper Rio Fernando de Taos
@ 64

Cross Section



section:	at 70 feet < 10 square mile ws
	Riffle
stream:	Rio Fernando de Taos
location:	at Hwy 64 at first switchback to Angel fire August 6,2000 Smolka/Davi
description:	E6 canopy 60%
height of instrument (ft):	104.00

notes	omit pt.	distance (ft)	FS (ft)	elevation
LBP	☐	0	4-Jan	100
	☐	5	5.13	98.87
	☐	10	5.42	98.58
	☐	15	5.94	98.06
LFPW	☐	18.8	6.58	97.42
	☐	20	6.74	97.26
	☐	25	7.58	96.42
	☐	30	7.66	96.34
LBF/top bnk	☐	32.6	7.75	96.25
bank base	☐	33	8.72	95.28
LWE	☐	33.5	8.8	95.2
TW	☐	34	8.92	95.08
RWE	☐	34.5	8.8	95.2
1/2 Rt. Bank	☐	35	8.39	95.61
3/4 Rt. Bank	☐	36	7.85	96.15
RBF/top bnk	☐	37	7.75	96.25
	☐	39	7.6	96.4
	☐	40	7.6	96.4
	☐	45	7.64	96.36
	☐	50	7.64	96.36
	☐	55	7.69	96.31
	✓	60	7.73	96.27
	✓	70	7.89	96.11
	☐	80	6.95	97.05
RFPW	☐	82.2	6.58	97.42
RBP	☐	85.3	5.71	98.29
	☐			

FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
7.75	7.75	63.4	0.56	0.012
96.25	96.25			

dimensions			
2.7	x-section area	0.6	d mean
4.4	width	5.4	wet P
1.2	d max	0.5	hyd radi
1.2	bank ht	7.3	w/d ratio
63.4	W flood prone area	14.4	ent ratio

hydraulics	
5.8	velocity (ft/sec)
15.4	discharge rate, Q (cfs)
0.17	shear stress ((lbs/ft sq)
0.30	shear velocity (ft/sec)
1.220	unit stream power (lbs/ft/sec)
1.73	Froude number
19.4	friction factor u/u*
10.2	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
765.3	relative roughness	19.3	fric. factor
0.012	Manning's n from channel material		

**********WinXSPRO**********

templet.out
Input File: C:\WXSPRO20\TEMPLET.DAT
Run Date: 02/09/04
Analysis Procedure: Hydraulics
Cross Section Number: 1
Survey Date: 11/04/03

Subsections/Dividing stations
A

Resistance Method: Manning's n

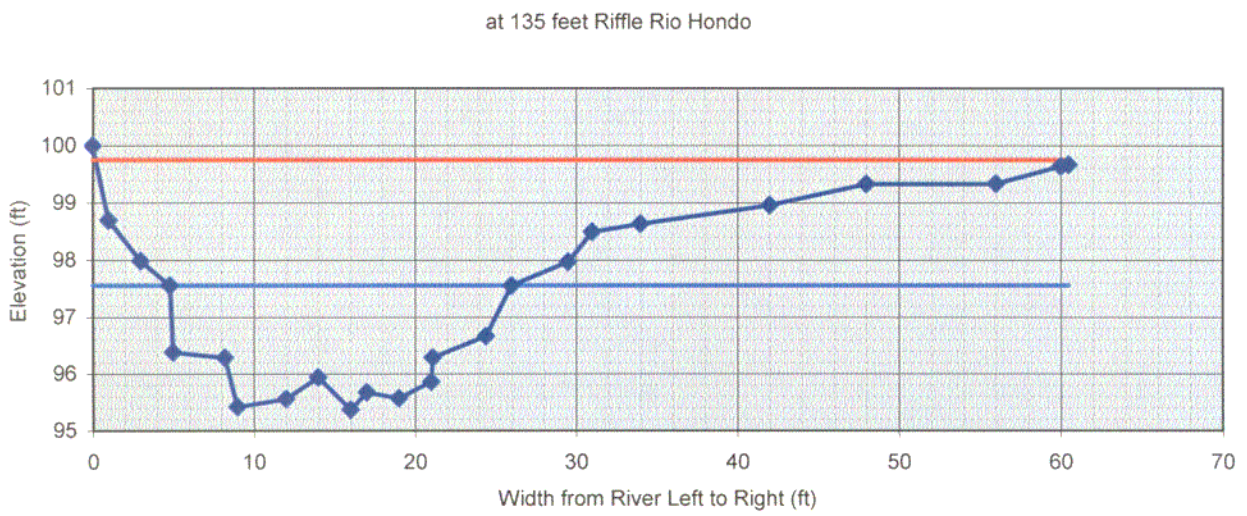
SECTION	A
Low Stage n	0.074
High Stage n	0.036

STAGE (ft)	#SEC	AREA (sq ft)	PERIM (ft)	WIDTH (ft)	R (ft)	DHYD (ft)	SLOPE (ft/ft)	n	VAVG (ft/s)	Q (cfs)
0.10	T	0.06	1.84	1.79	0.03	0.03	0.023	0.074	0.32	0.02
0.20	T	0.39	4.67	4.54	0.08	0.08	0.023	0.072	0.59	0.23
0.30	T	1.03	8.56	8.34	0.12	0.12	0.023	0.070	0.78	0.80
0.40	T	1.97	10.51	10.21	0.19	0.19	0.023	0.069	1.08	2.12
0.50	T	3.07	12.18	11.80	0.25	0.26	0.023	0.067	1.35	4.15
0.60	T	4.29	13.05	12.53	0.33	0.34	0.023	0.065	1.66	7.13
0.70	T	5.55	13.29	12.64	0.42	0.44	0.023	0.063	2.00	11.12
0.80	T	6.82	13.53	12.76	0.50	0.53	0.023	0.061	2.34	15.95
0.90	T	8.11	13.76	12.88	0.59	0.63	0.023	0.059	2.67	21.64
1.00	T	9.54	17.36	16.44	0.55	0.58	0.023	0.058	2.63	25.08
1.10	T	11.26	18.68	17.68	0.60	0.64	0.023	0.056	2.89	32.52
1.20	T	13.07	19.65	18.56	0.67	0.70	0.023	0.054	3.19	41.67
1.30	T	14.97	20.63	19.45	0.73	0.77	0.023	0.052	3.50	52.36
1.40	T	16.93	20.93	19.64	0.81	0.86	0.023	0.050	3.89	65.90
1.50	T	18.90	21.24	19.84	0.89	0.95	0.023	0.049	4.31	81.38
1.60	T	20.89	21.55	20.04	0.97	1.04	0.023	0.047	4.74	98.98
1.70	T	22.91	21.86	20.23	1.05	1.13	0.023	0.045	5.19	118.92
1.80	T	24.94	22.16	20.43	1.13	1.22	0.023	0.043	5.67	141.49
1.90	T	26.99	22.47	20.63	1.20	1.31	0.023	0.041	6.19	167.00
2.00	T	29.06	22.78	20.82	1.28	1.40	0.023	0.039	6.74	195.84
2.10	T	31.16	23.08	21.02	1.35	1.48	0.023	0.038	7.33	228.47
2.19	T	33.06	23.36	21.20	1.42	1.56	0.023	0.036	7.91	261.53

STAGE	ALPHA	FROUDE
0.10	1.00	0.30
0.20	1.00	0.36
0.30	1.00	0.39
0.40	1.00	0.43
0.50	1.00	0.47
0.60	1.00	0.50
0.70	1.00	0.53
0.80	1.00	0.56
0.90	1.00	0.59
1.00	1.00	0.61
1.10	1.00	0.64
1.20	1.00	0.67
1.30	1.00	0.70
1.40	1.00	0.74
1.50	1.00	0.78
1.60	1.00	0.82
1.70	1.00	0.86
1.80	1.00	0.90
1.90	1.00	0.95
2.00	1.00	1.01
2.10	1.00	1.06
2.19	1.00	1.12

Rio Hondo
Above The
Rio Grande

Cross Section



section:	at 135 feet
	Riffle
stream:	Rio Hondo September 7 2000 Smoka/Davis
location:	above the Rio Grande 65 square miles
description:	C4b or B4 Canopy 30%
height of instrument (ft):	102.88

notes	omit pt.	distance (ft)	FS (ft)	elevation
LBP	☐	0	2-Jan	100
LFPW	☐	1	4.18	98.7
	☐	3	4.89	97.99
LBF	☐	4.8	5.32	97.56
	☐	5	6.5	96.38
	☐	8.2	6.59	96.29
LWE	☐	9	7.46	95.42
	☐	12	7.32	95.56
	☐	14	6.94	95.94
TW	☐	16	7.51	95.37
	☐	17	7.2	95.68
	☐	19	7.31	95.57
	☐	21	7.02	95.86
	☐	21.1	6.59	96.29
RWE	☐	24.4	6.21	96.67
RBF	☐	26	5.32	97.56
	☐	29.5	4.91	97.97
	☐	31	4.38	98.5
	☐	34	4.24	98.64
	☐	42	3.92	98.96
	☐	48	3.55	99.33
	☐	56	3.54	99.34
	☐	60	3.24	99.64
RFPW	☐	60.5	3.21	99.67
	☐			

FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
5.32	4.89	59.5	2.3	0.036
97.56	97.99			

dimensions			
33.1	x-section area	1.6	d mean
21.2	width	23.4	wet P
2.2	d max	1.4	hyd radi
2.6	bank ht	13.6	w/d ratio
59.5	W flood prone area	2.8	ent ratio

hydraulics	
7.9	velocity (ft/sec)
260.9	discharge rate, Q (cfs)
2.03	shear stress ((lbs/ft sq)
1.02	shear velocity (ft/sec)
17.662	unit stream power (lbs/ft/sec)
1.24	Froude number
7.7	friction factor u/u*
~~288.6~~	threshold grain size (mm)

check from channel material			
325	measured D84 (mm)		
1.5	relative roughness	3.8	fric. factor
0.074	Manning's n from channel material		

**********WinXSPRO**********

templet.out
Input File: C:\WXSPRO20\TEMPLET.DAT
Run Date: 11/24/03
Analysis Procedure: Hydraulics
Cross Section Number: 1
Survey Date: 11/04/03

Subsections/Dividing stations
A

Resistance Method: Manning's n

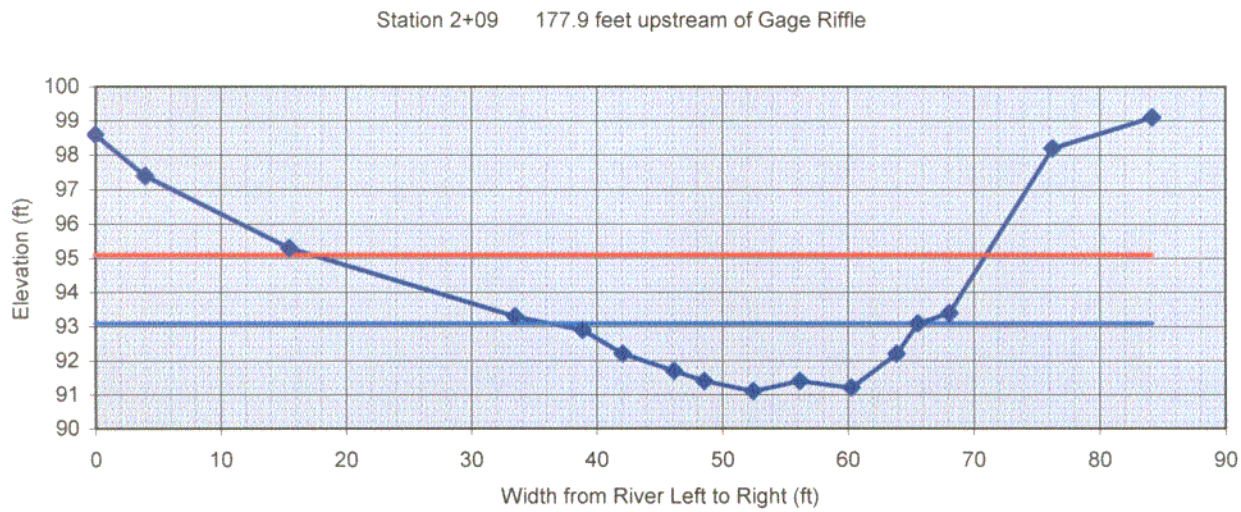
SECTION	A
Low Stage n	0.221
High Stage n	0.060

STAGE (ft)	#SEC	AREA (sq ft)	PERIM (ft)	WIDTH (ft)	R (ft)	DHYD (ft)	SLOPE (ft/ft)	n	VAVG (ft/s)	Q (cfs)
0.10	T	0.13	2.54	2.53	0.05	0.05	0.019	0.221	0.13	0.02
0.20	T	0.63	7.51	7.48	0.08	0.08	0.019	0.213	0.18	0.12
0.30	T	1.62	12.47	12.42	0.13	0.13	0.019	0.204	0.26	0.42
0.40	T	2.92	13.65	13.58	0.21	0.22	0.019	0.196	0.38	1.10
0.50	T	4.34	14.83	14.74	0.29	0.29	0.019	0.187	0.48	2.10
0.60	T	5.87	16.01	15.90	0.37	0.37	0.019	0.179	0.59	3.46
0.70	T	7.52	17.21	17.08	0.44	0.44	0.019	0.170	0.69	5.22
0.80	T	9.29	18.41	18.26	0.50	0.51	0.019	0.162	0.80	7.47
0.90	T	11.17	19.61	19.44	0.57	0.57	0.019	0.153	0.92	10.29
1.00	T	13.17	20.81	20.62	0.63	0.64	0.019	0.145	1.05	13.78
1.10	T	15.29	22.01	21.80	0.69	0.70	0.019	0.136	1.18	18.08
1.20	T	17.51	22.69	22.44	0.77	0.78	0.019	0.128	1.35	23.66
1.30	T	19.78	23.38	23.09	0.85	0.86	0.019	0.119	1.54	30.47
1.40	T	22.12	24.06	23.74	0.92	0.93	0.019	0.111	1.75	38.77
1.50	T	24.53	24.74	24.38	0.99	1.01	0.019	0.102	1.99	48.93
1.60	T	27.00	25.42	25.03	1.06	1.08	0.019	0.094	2.28	61.48
1.70	T	29.54	26.10	25.67	1.13	1.15	0.019	0.085	2.61	77.11
1.80	T	32.13	26.78	26.32	1.20	1.22	0.019	0.077	3.01	96.84
1.90	T	34.84	28.35	27.86	1.23	1.25	0.019	0.068	3.44	119.91
2.00	T	37.71	29.92	29.40	1.26	1.28	0.019	0.060	3.99	150.59

STAGE	ALPHA	FROUDE
0.10	1.00	0.10
0.20	1.00	0.11
0.30	1.00	0.13
0.40	1.00	0.14
0.50	1.00	0.16
0.60	1.00	0.17
0.70	1.00	0.18
0.80	1.00	0.20
0.90	1.00	0.21
1.00	1.00	0.23
1.10	1.00	0.25
1.20	1.00	0.27
1.30	1.00	0.29
1.40	1.00	0.32
1.50	1.00	0.35
1.60	1.00	0.39
1.70	1.00	0.43
1.80	1.00	0.48
1.90	1.00	0.54
2.00	1.00	0.62

Rio Hondo @ Valdez Gage @ USFS Boundary

Cross Section



section:	Station 2+09 177.9 feet upstream of Gage
	Riffle
stream:	Rio Hondo Moody et al 8/13/1998
location:	at USGS gage near Valdez near USFS Boundary Canopy 80%
description:	B4 152 cfs @ bf 36.2 square mile ws
height of instrument (ft):	103.60

notes	omit pt.	distance (ft)	FS (ft)	elevation
LBP	☐	0	5-Jan	98.6
	☐	4	6.2	97.4
LFPW	☐	15.5	8.3	95.3
	☐	33.5	10.3	93.3
	☐	38.9	10.7	92.9
LWE	☐	42.1	11.4	92.2
	☐	46.2	11.9	91.7
	☐	48.6	12.2	91.4
Thalweg	☐	52.5	12.5	91.1
	☐	56.2	12.2	91.4
	☐	60.3	12.4	91.2
RWE	☐	63.9	11.4	92.2
RBF	☐	65.6	10.5	93.1
	☐	68.1	10.2	93.4
	☐	76.3	5.4	98.2
RBP	☐	84.2	4.5	99.1
	☐			
	☐			
	☐			
	☐			
	☐			
	☑			
	☑			
	☐			
	☐			

FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
10.5	5.4	53.5	1.94	0.06
93.1	98.2			

dimensions			
37.7	x-section area	1.3	d mean
29.4	width	29.9	wet P
2.0	d max	1.3	hyd radi
7.1	bank ht	22.9	w/d ratio
53.5	W flood prone area	1.8	ent ratio

hydraulics	
4.0	velocity (ft/sec)
151.8	discharge rate, Q (cfs)
1.53	shear stress ((lbs/ft sq)
0.89	shear velocity (ft/sec)
6.251	unit stream power (lbs/ft/sec)
0.39	Froude number
4.5	friction factor u/u*
~~165.2~~	threshold grain size (mm)

check from channel material			
150	measured D84 (mm)		
2.6	relative roughness	5.2	fric. factor
0.052	Manning's n from channel material		

**********WinXSPRO**********

templet.out
Input File: C:\WXSPRO20\TEMPLET.DAT
Run Date: 11/05/03
Analysis Procedure: Hydraulics
Cross Section Number: 1
Survey Date: 11/04/03

Upper Costilla

Subsections/Dividing stations
A / 153.91/ @

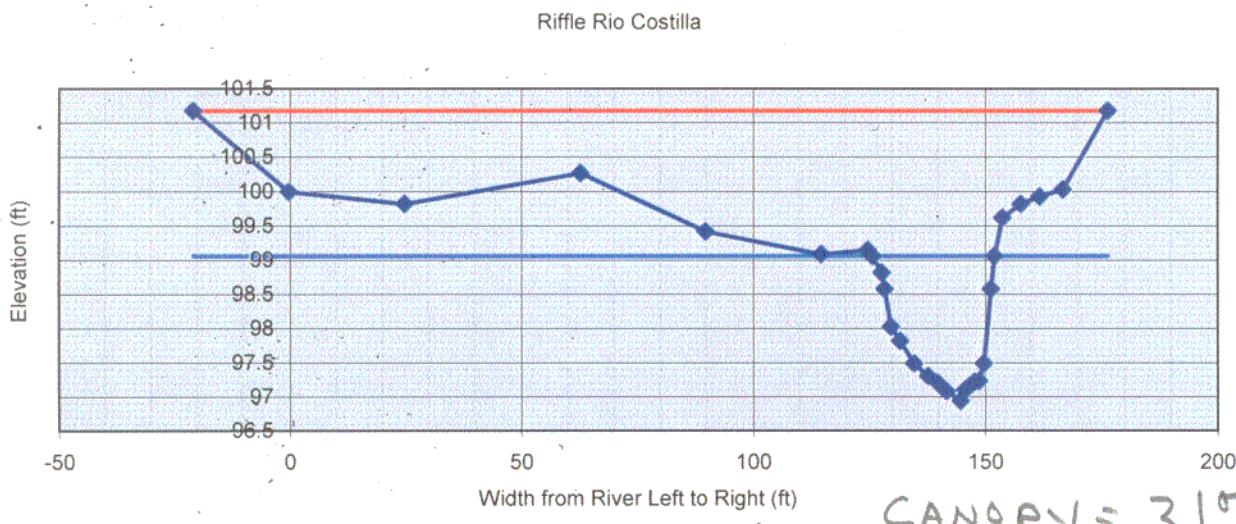
Costilla Cr. below Commanche Cr.

Resistance Method: Thorne and Zevenbergen
D84: 71.000 mm

STAGE (ft)	#SEC	AREA (sq ft)	PERIM (ft)	WIDTH (ft)	R (ft)	DHYD (ft)	SLOPE (ft/ft)	n	VAVG (ft/s)	Q (cfs)
0.10	T	0.14	2.78	2.77	0.05	0.05	0.007	0.129	0.13	0.02
0.20	T	0.55	5.61	5.59	0.10	0.10	0.007	0.093	0.29	0.16
0.30	T	1.28	9.73	9.70	0.13	0.13	0.007	0.082	0.40	0.51
0.40	T	2.38	12.09	12.05	0.20	0.20	0.007	0.068	0.62	1.47
0.50	T	3.68	14.07	14.01	0.26	0.26	0.007	0.058	0.87	3.22
0.60	T	5.17	15.60	15.51	0.33	0.33	0.007	0.053	1.13	5.84
0.70	T	6.77	16.68	16.56	0.41	0.41	0.007	0.049	1.39	9.40
0.80	T	8.48	17.77	17.61	0.48	0.48	0.007	0.047	1.63	13.81
0.90	T	10.29	18.86	18.66	0.55	0.55	0.007	0.045	1.85	19.05
1.00	T	12.22	19.99	19.75	0.61	0.62	0.007	0.044	2.06	25.15
1.10	T	14.24	21.04	20.77	0.68	0.69	0.007	0.042	2.26	32.21
1.20	T	16.34	21.49	21.16	0.76	0.77	0.007	0.041	2.51	40.94
1.30	T	18.48	21.93	21.55	0.84	0.86	0.007	0.041	2.74	50.60
1.40	T	20.65	22.38	21.95	0.92	0.94	0.007	0.040	2.96	61.17
1.50	T	22.87	22.82	22.34	1.00	1.02	0.007	0.039	3.18	72.64
1.60	T	25.12	23.26	22.73	1.08	1.11	0.007	0.039	3.38	85.00
1.70	T	27.41	23.72	23.14	1.16	1.18	0.007	0.038	3.58	98.20
1.80	T	29.75	24.18	23.55	1.23	1.26	0.007	0.038	3.77	112.26
1.90	T	32.12	24.76	24.09	1.30	1.33	0.007	0.038	3.95	126.78
2.00	T	34.58	25.79	25.08	1.34	1.38	0.007	0.037	4.06	140.54
2.10	T	37.14	26.82	26.08	1.38	1.42	0.007	0.037	4.18	155.26

STAGE	ALPHA	FROUDE
0.10	1.00	0.10
0.20	1.00	0.16
0.30	1.00	0.19
0.40	1.00	0.25
0.50	1.00	0.30
0.60	1.00	0.34
0.70	1.00	0.38
0.80	1.00	0.41
0.90	1.00	0.44
1.00	1.00	0.46
1.10	1.00	0.48
1.20	1.00	0.50
1.30	1.00	0.52
1.40	1.00	0.54
1.50	1.00	0.55
1.60	1.00	0.57
1.70	1.00	0.58
1.80	1.00	0.59
1.90	1.00	0.60
2.00	1.00	0.61
2.10	1.00	0.62

Cross Section



CANOPY = 31%

section:	at 68.5'
	Riffle
stream:	Rio Costilla Sept. 19 2000 Smolka/D.Davis
location:	0.5 miles downstream of Commanche Cr ek , 1 mile upstream of USFS/RCLA bndry
description:	C4
height of instrument (ft):	105.33

notes	omit pt.	distance (ft)	FS (ft)	elevation
LFPW	☐	-20.7	4-Jan	101.18
LBP	☐	0	5.33	100
	☐	25	5.51	99.82
big pondoros	☐	63	5.06	100.27
	☐	90	5.91	99.42
	☐	115	6.24	99.09
	☐	125	6.18	99.15
LBF	☐	126	6.27	99.06
LWE	☐	128	6.51	98.82
	☐	128.6	6.75	98.58
	☐	130	7.3	98.03
	☐	132	7.51	97.82
	☐	135	7.84	97.49
	☐	138	8.03	97.3
	☐	140	8.12	97.21
	☐	142	8.25	97.08
TW	☐	145	8.39	96.94
	☐	146	8.23	97.1
	☐	147	8.17	97.16
	☐	148	8.11	97.22
	☐	149	8.1	97.23
	☐	150	7.84	97.49
RWE	☐	151.5	6.75	98.58
RBF	☐	152.3	6.27	99.06
	☐	154	5.71	99.62
	☐	158	5.51	99.82
	☐			

FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
6.27	6.27	197.4	0.66	0.037
99.06	99.06			

dimensions			
37.7	x-section area	1.4	d mean
26.3	width	27.0	wet P
2.1	d max	1.4	hyd radi
2.1	bank ht	18.4	w/d ratio
197.4	W flood prone area	7.5	ent ratio

hydraulics	
4.1	velocity (ft/sec)
153.4	discharge rate, Q (cfs)
0.57	shear stress ((lbs/ft sq)
0.54	shear velocity (ft/sec)
2.403	unit stream power (lbs/ft/sec)
0.36	Froude number
7.5	friction factor u/u*
35.7	threshold grain size (mm)

check from channel material			
71	measured D84 (mm)		
6.2	relative roughness	7.3	fric. factor
0.038	Manning's n from channel material		

**********WinXSPRO**********

templet.out
Input File: C:\WXSPRO20\TEMPLET.DAT
Run Date: 11/05/03
Analysis Procedure: Hydraulics
Cross Section Number: 1
Survey Date: 11/04/03

Lower Costilla

Costilla @ USGS Gage @ Hwy 196 Above Costilla

Subsections/Dividing stations
A

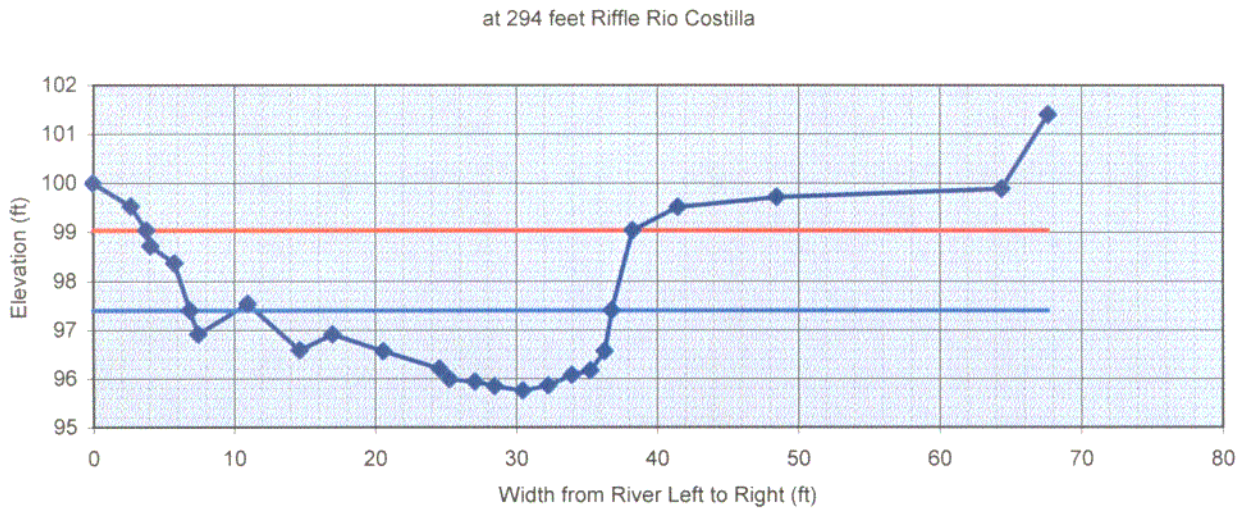
Resistance Method: Manning's n

SECTION	A
Low Stage n	0.147
High Stage n	0.025

STAGE (ft)	#SEC	AREA (sq ft)	PERIM (ft)	WIDTH (ft)	R (ft)	DHYD (ft)	SLOPE (ft/ft)	n	VAVG (ft/s)	Q (cfs)
0.10	T	0.20	3.96	3.95	0.05	0.05	0.011	0.147	0.15	0.03
0.20	T	0.72	6.70	6.69	0.11	0.11	0.011	0.139	0.25	0.18
0.30	T	1.52	8.80	8.76	0.17	0.17	0.011	0.131	0.37	0.57
0.40	T	2.48	10.44	10.39	0.24	0.24	0.011	0.123	0.49	1.21
0.50	T	3.56	11.55	11.48	0.31	0.31	0.011	0.114	0.62	2.22
0.60	T	4.78	12.94	12.84	0.37	0.37	0.011	0.106	0.76	3.62
0.70	T	6.13	14.32	14.20	0.43	0.43	0.011	0.098	0.90	5.54
0.80	T	7.62	15.71	15.56	0.49	0.49	0.011	0.090	1.07	8.16
0.90	T	9.26	17.70	17.47	0.52	0.53	0.011	0.082	1.24	11.47
1.00	T	11.12	20.00	19.70	0.56	0.56	0.011	0.074	1.43	15.92
1.10	T	13.20	22.31	21.93	0.59	0.60	0.011	0.066	1.68	22.14
1.20	T	15.49	24.08	23.60	0.64	0.66	0.011	0.058	2.02	31.35
1.30	T	17.91	25.33	24.73	0.71	0.72	0.011	0.049	2.51	44.96
1.40	T	20.44	26.57	25.86	0.77	0.79	0.011	0.041	3.18	64.98
1.50	T	23.08	27.81	26.99	0.83	0.86	0.011	0.033	4.17	96.14
1.60	T	25.83	29.05	28.11	0.89	0.92	0.011	0.025	5.78	149.35

STAGE	ALPHA	FROUDE
0.10	1.00	0.11
0.20	1.00	0.14
0.30	1.00	0.16
0.40	1.00	0.18
0.50	1.00	0.20
0.60	1.00	0.22
0.70	1.00	0.24
0.80	1.00	0.27
0.90	1.00	0.30
1.00	1.00	0.34
1.10	1.00	0.38
1.20	1.00	0.44
1.30	1.00	0.52
1.40	1.00	0.63
1.50	1.00	0.79
1.60	1.00	1.06

Cross Section



section:	at 294 feet
	Riffle
stream:	Rio Costilla USGS gage above Costilla below HWY 196 bridge
location:	Smolka/Schaeffer BF discharge (RI 1.3 years) from gage =160 cfs
description:	F4 Canopy 44%
height of instrument (ft):	103.15

notes	omit pt.	distance (ft)	FS (ft)	elevation
LBP	☐	0	3-Jan	100
	☐	2.7	3.62	99.53
LFPW	☐	3.8	4.11	99.04
	☐	4.1	4.43	98.72
Top Bank	☐	5.8	4.78	98.37
LBF	☐	6.9	5.75	97.4
Bank bottom	☐	7.5	6.24	96.91
Rock	☐	11	5.61	97.54
	☐	14.7	6.56	96.59
	☐	17	6.24	96.91
LWE	☐	20.6	6.58	96.57
	☐	24.6	6.94	96.21
	☐	25.3	7.16	95.99
	☐	27.1	7.21	95.94
	☐	28.5	7.3	95.85
TW	☐	30.5	7.39	95.76
	☐	32.3	7.29	95.86
	☐	34	7.07	96.08
	☐	35.3	6.98	96.17
RWE	☐	36.3	6.58	96.57
RBF	☐	36.8	5.75	97.4
RFPW and	☐	38.3	4.11	99.04
Top bank	☐	41.5	3.63	99.52
	☐	48.5	3.43	99.72
	☐	64.4	3.26	99.89
	☐	67.7	1.75	101.4
	☐			

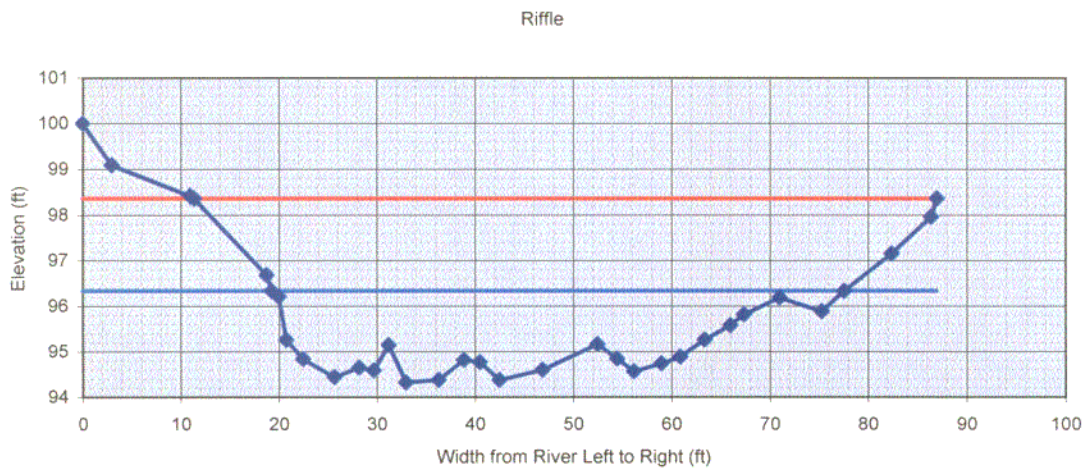
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
5.75	4.14	34.5	1.1	0.025
97.4	99.01			

dimensions			
27.0	x-section area	0.9	d mean
28.6	width	29.6	wet P
1.6	d max	0.9	hyd radi
3.3	bank ht	30.3	w/d ratio
34.5	W flood prone area	1.2	ent ratio

hydraulics	
5.9	velocity (ft/sec)
158.3	discharge rate, Q (cfs)
0.63	shear stress ((lbs/ft sq)
0.57	shear velocity (ft/sec)
3.803	unit stream power (lbs/ft/sec)
1.13	Froude number
10.3	friction factor u/u*
39.4	threshold grain size (mm)

check from channel material			
120	measured D84 (mm)		
2.4	relative roughness	5.0	fric. factor
0.052	Manning's n from channel material		

Cross Section



section:	at 253'
	Riffle
stream:	Rio Los Pinos at Forest Service Bndry 0.4 miles upstream of 87A Bric
location:	to xs pin
description:	B3c Canopy 27%
height of instrument (ft):	100.69

notes	omit pt.	distance (ft)	FS (ft)	elevation
LBP	☐	0	0.69	100
	☐	3	1.6	99.09
	☐	11	2.27	98.42
	☐	11.4	2.33	98.36
tp bnk	☐	18.8	4	96.69
LBF	☐	19.3	4.35	96.34
Break bnk	☐	20	4.48	96.21
LWE	☐	20.8	5.42	95.27
	☐	22.5	5.85	94.84
	☐	25.7	6.25	94.44
	☐	28.2	6.04	94.65
	☐	29.7	6.1	94.59
	☐	31.2	5.54	95.15
TW	☐	33	6.37	94.32
	☐	36.3	6.31	94.38
	☐	38.9	5.87	94.82
	☐	40.5	5.92	94.77
	☐	42.5	6.31	94.38
	☐	46.9	6.09	94.6
	☐	52.5	5.52	95.17
	☐	54.5	5.84	94.85
	☐	56.2	6.12	94.57
	☐	59	5.95	94.74
	☐	60.9	5.8	94.89
RWE	☐	63.4	5.42	95.27
	☐	66	5.11	95.58
	☐	67.4	4.87	95.82
	☐	71	4.5	96.19
	☐	75.3	4.8	95.89
RBF	☐	77.6	4.35	96.34
	☐	82.4	3.53	97.16
RBP	☐	86.4	2.73	97.96
RFPW	☐	87	2.33	98.36

FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
4.35	4	75.6	0.7	0.04
96.34	96.69			

dimensions			
76.2	x-section area	1.3	d mean
58.3	width	59.4	wet P
2.0	d max	1.3	hyd radi
2.4	bank ht	44.6	w/d ratio
75.6	W flood prone area	1.3	ent ratio

hydraulics	
3.7	velocity (ft/sec)
279.4	discharge rate, Q (cfs)
0.56	shear stress ((lbs/ft sq)
0.54	shear velocity (ft/sec)
2.094	unit stream power (lbs/ft/sec)
0.32	Froude number
6.8	friction factor u/u*
34.8	threshold grain size (mm)

check from channel material			
160	measured D84 (mm)		
2.5	relative roughness	5.1	fric. factor
0.054	Manning's n from channel material		

**********WinXSPRO**********

templet.out
Input File: C:\WXSPRO20\TEMPLET.DAT
Run Date: 11/12/03
Analysis Procedure: Hydraulics
Cross Section Number: 1
Survey Date: 11/04/03

1

Subsections/Dividing stations
A / 137.99/ @

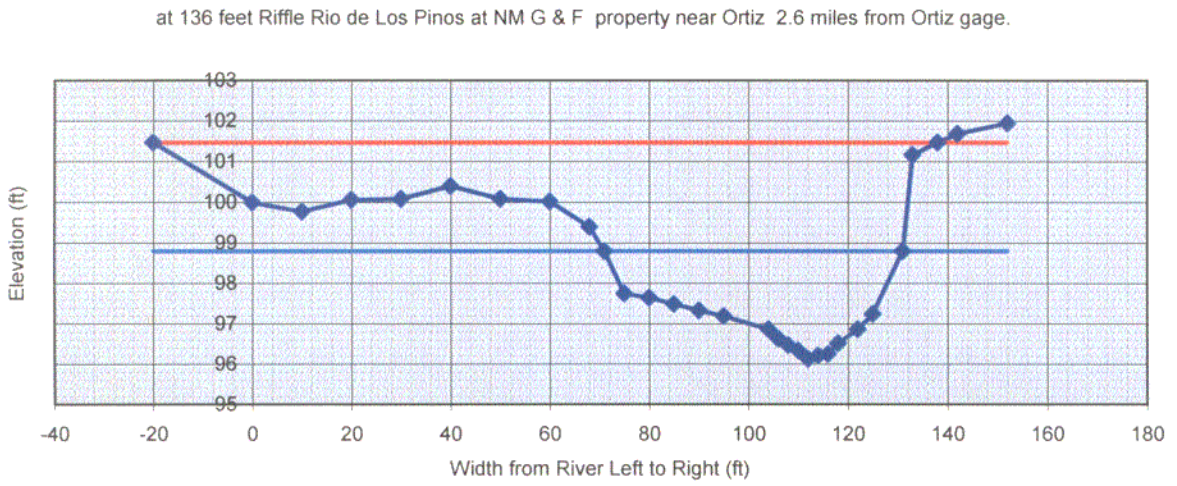
Resistance Method: Thorne and Zevenbergen
D84: 120.000 mm

STAGE (ft)	#SEC	AREA (sq ft)	PERIM (ft)	WIDTH (ft)	R (ft)	DHYD (ft)	SLOPE (ft/ft)	n	VAVG (ft/s)	Q (cfs)
0.10	T	0.18	3.96	3.95	0.04	0.04	0.009	0.141	0.13	0.02
0.20	T	0.73	6.51	6.50	0.11	0.11	0.009	0.121	0.27	0.20
0.30	T	1.49	8.74	8.72	0.17	0.17	0.009	0.101	0.43	0.64
0.40	T	2.47	10.90	10.86	0.23	0.23	0.009	0.087	0.61	1.50
0.50	T	3.68	13.30	13.26	0.28	0.28	0.009	0.078	0.77	2.83
0.60	T	5.10	15.29	15.23	0.33	0.34	0.009	0.070	0.98	4.98
0.70	T	6.72	17.27	17.21	0.39	0.39	0.009	0.063	1.19	8.00
0.80	T	8.57	20.23	20.16	0.42	0.43	0.009	0.065	1.22	10.46
0.90	T	10.77	23.84	23.76	0.45	0.45	0.009	0.063	1.33	14.33
1.00	T	13.33	27.45	27.36	0.49	0.49	0.009	0.060	1.46	19.39
1.10	T	16.25	31.37	31.27	0.52	0.52	0.009	0.058	1.57	25.57
1.20	T	19.58	35.42	35.31	0.55	0.55	0.009	0.056	1.70	33.21
1.30	T	23.29	38.94	38.82	0.60	0.60	0.009	0.054	1.84	42.94
1.40	T	27.34	42.47	42.33	0.64	0.65	0.009	0.053	1.99	54.45
1.50	T	31.75	46.00	45.84	0.69	0.69	0.009	0.052	2.14	67.88
1.60	T	36.57	51.02	50.85	0.72	0.72	0.009	0.051	2.23	81.55
1.70	T	41.78	52.74	52.54	0.79	0.80	0.009	0.049	2.45	102.22
1.80	T	47.07	53.53	53.31	0.88	0.88	0.009	0.048	2.69	126.52
1.90	T	52.44	54.32	54.08	0.97	0.97	0.009	0.047	2.92	153.17
2.00	T	57.89	55.12	54.85	1.05	1.06	0.009	0.046	3.15	182.12
2.10	T	63.41	55.91	55.62	1.13	1.14	0.009	0.046	3.36	213.34
2.20	T	69.01	56.71	56.38	1.22	1.22	0.009	0.045	3.58	246.81
2.30	T	74.69	57.50	57.15	1.30	1.31	0.009	0.044	3.78	282.52
2.40	T	80.44	58.29	57.92	1.38	1.39	0.009	0.044	3.98	320.44
2.50	T	86.27	59.09	58.69	1.46	1.47	0.009	0.044	4.18	360.56
2.60	T	92.18	59.88	59.46	1.54	1.55	0.009	0.043	4.37	402.87
2.70	T	98.16	60.68	60.23	1.62	1.63	0.009	0.043	4.56	447.32

STAGE	ALPHA	FROUDE
0.10	1.00	0.10
0.20	1.00	0.14
0.30	1.00	0.18
0.40	1.00	0.22
0.50	1.00	0.26
0.60	1.00	0.30
0.70	1.00	0.34
0.80	1.00	0.33
0.90	1.00	0.35
1.00	1.00	0.37
1.10	1.00	0.38
1.20	1.00	0.40
1.30	1.00	0.42
1.40	1.00	0.44
1.50	1.00	0.45
1.60	1.00	0.46
1.70	1.00	0.48
1.80	1.00	0.50
1.90	1.00	0.52
2.00	1.00	0.54
2.10	1.00	0.56
2.20	1.00	0.57
2.30	1.00	0.58
2.40	1.00	0.60
2.50	1.00	0.61
2.60	1.00	0.62
2.70	1.00	0.63

Rio Los Pinos near Colorado Border

Cross Section



section:	at 136 feet — 167 square mile ws
	Riffle
stream:	Rio de Los Pinos at NM G & F property near Ortiz 2 upstream of Ortiz gage
location:	
description:	C4 — Canopy 17%
height of instrument (ft):	105.50

notes	omit pt.	distance (ft)	FS (ft)	elevation
LFPW	☐	-20	4-Jan	101.47
LBP	☐	0	5.5	100
	☐	10	5.72	99.78
	☐	20	5.44	100.06
	☐	30	5.42	100.08
	☐	40	5.1	100.4
	☐	50	5.42	100.08
	☐	60	5.48	100.02
top bnk	☐	68	6.1	99.4
LBF	☐	71	6.7	98.8
bot bnk	☐	75	7.75	97.75
	☐	80	7.85	97.65
	☐	85	8.01	97.49
	☐	90	8.17	97.33
	☐	95	8.31	97.19
LWE	☐	104	8.63	96.87
	☐	106	8.87	96.63
	☐	108	9.03	96.47
	☐	110	9.16	96.34
TW	☐	112	9.37	96.13
	☐	114	9.29	96.21
	☐	116	9.25	96.25
	☐	118	8.98	96.52
RWE	☐	122	8.63	96.87
	☐	125	8.25	97.25
RBF	☐	131	6.7	98.8
	☐	133	4.34	101.16
RFPW	☐	138	4.03	101.47
	☐	142	3.82	101.68
RBP	☐	152	3.56	101.94

FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
6.7	6.1	158.0	0.95	0.045
98.8	99.4			

dimensions			
96.4	x-section area	1.6	d mean
60.0	width	60.4	wet P
2.7	d max	1.6	hyd radi
3.3	bank ht	37.4	w/d ratio
158.0	W flood prone area	2.6	ent ratio

hydraulics	
4.4	velocity (ft/sec)
423.3	discharge rate, Q (cfs)
0.95	shear stress ((lbs/ft sq)
0.70	shear velocity (ft/sec)
4.183	unit stream power (lbs/ft/sec)
0.37	Froude number
6.3	friction factor u/u*
65.0	threshold grain size (mm)

check from channel material			
120	measured D84 (mm)		
4.1	relative roughness	6.3	fric. factor
0.045	Manning's n from channel material		

**********WinXSPRO**********

templet.out
Input File: C:\WXSPRO20\TEMPLET.DAT
Run Date: 11/04/03
Analysis Procedure: Hydraulics
Cross Section Number: 1
Survey Date: 11/04/03

commanche @ upper exclosure

Upper WS

Subsections/Dividing stations
A

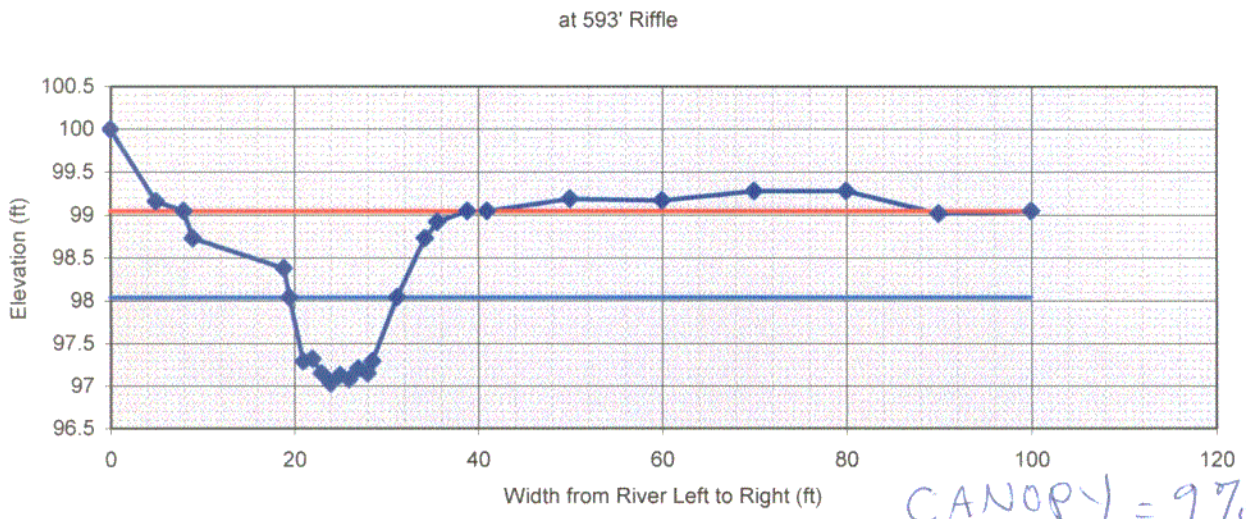
Resistance Method: Manning's n

SECTION	A
Low Stage n	0.114
High Stage n	0.031

STAGE (ft)	#SEC	AREA (sq ft)	PERIM (ft)	WIDTH (ft)	R (ft)	DHYD (ft)	SLOPE (ft/ft)	n	VAVG (ft/s)	Q (cfs)
0.10	T	0.13	3.23	3.21	0.04	0.04	0.006	0.114	0.12	0.01
0.20	T	0.58	5.79	5.74	0.10	0.10	0.006	0.105	0.24	0.14
0.30	T	1.23	7.78	7.71	0.16	0.16	0.006	0.096	0.35	0.43
0.40	T	2.03	8.38	8.27	0.24	0.25	0.006	0.086	0.52	1.05
0.50	T	2.88	8.97	8.83	0.32	0.33	0.006	0.077	0.70	2.02
0.60	T	3.79	9.57	9.38	0.40	0.40	0.006	0.068	0.92	3.48
0.70	T	4.76	10.16	9.94	0.47	0.48	0.006	0.059	1.19	5.64
0.80	T	5.78	10.76	10.50	0.54	0.55	0.006	0.049	1.54	8.91
0.90	T	6.86	11.36	11.06	0.60	0.62	0.006	0.040	2.05	14.06
1.00	T	7.99	11.95	11.62	0.67	0.69	0.006	0.031	2.85	22.75

STAGE	ALPHA	FROUDE
0.10	1.00	0.10
0.20	1.00	0.13
0.30	1.00	0.16
0.40	1.00	0.18
0.50	1.00	0.22
0.60	1.00	0.25
0.70	1.00	0.30
0.80	1.00	0.37
0.90	1.00	0.46
1.00	1.00	0.60

Cross Section



CANOPY = 9%

section:	at 593'
	Riffle
stream:	Commanche Creek at upper exclosure
location:	28-Jun-00
description:	C4 (destabalized E4) Smolka/McGraw/Tsatsaros
height of instrument (ft):	108.13

notes	omit pt.	distance (ft)	FS (ft)	elevation
LBP	☐	0	8-Jan	100
	☐	5	8.97	99.16
LFPW	☐	8	9.08	99.05
	☐	9	9.4	98.73
Top Bank	☐	18.9	9.75	98.38
LBF	☐	19.5	10.09	98.04
	☐	21	10.84	97.29
	☐	22	10.81	97.32
	☐	23	10.98	97.15
Thalweg	☐	24	11.1	97.03
	☐	25	11	97.13
	☐	26	11.05	97.08
	☐	27	10.92	97.21
	☐	28	10.98	97.15
	☐	28.5	10.84	97.29
RBF	☐	31.2	10.09	98.04
Top Bank	☐	34.25	9.4	98.73
	☐	35.6	9.21	98.92
RFPW	☐	38.85	9.08	99.05
	☐	41	9.08	99.05
	☐	50	8.94	99.19
	☐	60	8.96	99.17
Ant hill	☐	70	8.85	99.28
	☐	80	8.85	99.28
	☐	90	9.11	99.02
RBP	☐	100	9.08	99.05
	☐			

FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
10.09	9.75	30.9	0.6	0.031
98.04	98.38			

dimensions			
8.1	x-section area	0.7	d mean
11.7	width	12.0	wet P
1.0	d max	0.7	hyd radi
1.4	bank ht	16.8	w/d ratio
30.9	W flood prone area	2.6	ent ratio

hydraulics	
2.9	velocity (ft/sec)
23.2	discharge rate, Q (cfs)
0.25	shear stress ((lbs/ft sq)
0.36	shear velocity (ft/sec)
0.743	unit stream power (lbs/ft/sec)
0.37	Froude number
7.9	friction factor u/u*
14.1	threshold grain size (mm)

check from channel material			
64	measured D84 (mm)		
3.3	relative roughness	5.8	fric. factor
0.042	Manning's n from channel material		

**********WinXSPRO**********
templet.out
Input File: C:\WXSPRO20\TEMPLET.DAT
Run Date: 11/04/03
Analysis Procedure: Hydraulics
Cross Section Number: 1
Survey Date: 11/04/03

Commanche Cr above Costilla

Lowest part of WS

Bankfull To bankfull

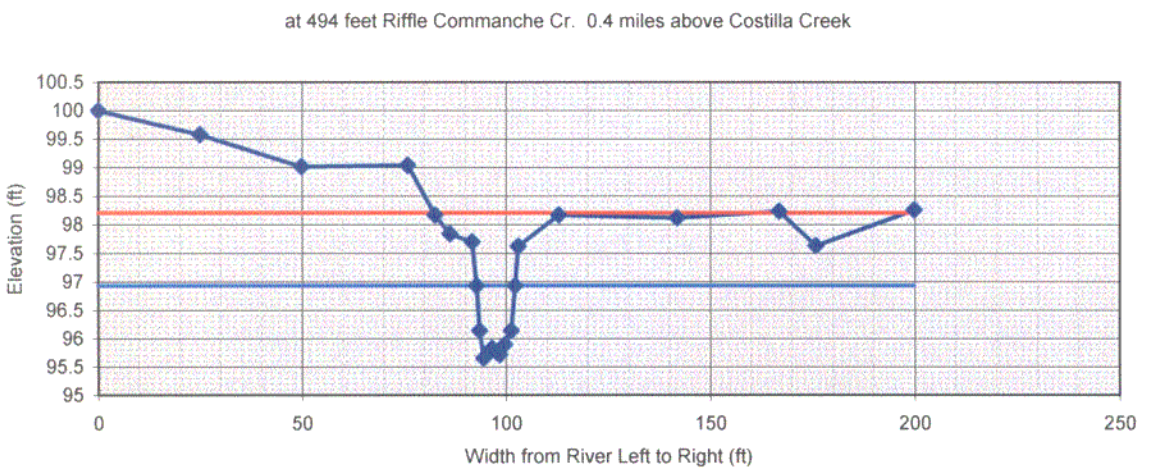
Subsections/Dividing stations
A / 102.70/ @

Resistance Method: Thorne and Zevenbergen
D84: 47.000 mm

STAGE (ft)	#SEC	AREA (sq ft)	PERIM (ft)	WIDTH (ft)	R (ft)	DHYD (ft)	SLOPE (ft/ft)	n	VAVG (ft/s)	Q (cfs)
0.10	T	0.09	2.34	2.31	0.04	0.04	0.010	0.109	0.16	0.01
0.20	T	0.49	5.31	5.24	0.09	0.09	0.010	0.074	0.41	0.20
0.30	T	1.05	6.20	6.10	0.17	0.17	0.010	0.056	0.82	0.86
0.40	T	1.71	7.11	6.98	0.24	0.24	0.010	0.048	1.19	2.04
0.50	T	2.45	7.96	7.79	0.31	0.31	0.010	0.044	1.53	3.76
0.60	T	3.24	8.24	7.99	0.39	0.41	0.010	0.041	1.93	6.25
0.70	T	4.05	8.53	8.19	0.47	0.49	0.010	0.040	2.29	9.27
0.80	T	4.88	8.81	8.39	0.55	0.58	0.010	0.038	2.62	12.80
0.90	T	5.73	9.10	8.60	0.63	0.67	0.010	0.037	2.94	16.82
1.00	T	6.60	9.38	8.80	0.70	0.75	0.010	0.036	3.23	21.31
1.10	T	7.49	9.66	9.00	0.77	0.83	0.010	0.036	3.51	26.26
1.20	T	8.40	9.95	9.20	0.84	0.91	0.010	0.035	3.77	31.66
1.30	T	9.33	10.24	9.41	0.91	0.99	0.010	0.035	4.02	37.48

STAGE	ALPHA	FROUDE
0.10	1.00	0.14
0.20	1.00	0.24
0.30	1.00	0.35
0.40	1.00	0.42
0.50	1.00	0.48
0.60	1.00	0.53
0.70	1.00	0.57
0.80	1.00	0.61
0.90	1.00	0.63
1.00	1.00	0.66
1.10	1.00	0.68
1.20	1.00	0.70
1.30	1.00	0.71

Cross Section



section:	at 494 feet
	Riffle
stream:	Commanche Cr. 0.4 miles above Costilla Creek
location:	27-Jun-00 Smolka/McGraw
description:	E4 Canopy cover 0%
height of instrument (ft):	107.22

notes	omit pt.	distance (ft)	FS (ft)	elevation
LBP	☐	0	7-Jan	100
	☐	25	7.64	99.58
	☐	50	8.2	99.02
slope brk	☐	76	8.18	99.04
LFPW	☐	82.7	9.05	98.17
	☐	86.4	9.38	97.84
top bnk	☐	91.8	9.52	97.7
LBF	☐	92.9	10.29	96.93
LWE	☐	93.6	11.08	96.14
TW	☐	94.6	11.57	95.65
	☐	95.6	11.49	95.73
	☐	96.6	11.39	95.83
	☐	97.6	11.45	95.77
	☐	98.6	11.51	95.71
	☐	99.7	11.33	95.89
RWE	☐	101.4	11.08	96.14
RBF	☐	102.3	10.29	96.93
	☐	103.1	9.6	97.62
RFPW	☐	113	9.05	98.17
	☐	142	9.1	98.12
	☐	167	8.98	98.24
	☐	176	9.59	97.63
RBP	☐	200	8.96	98.26
	☐			
	☐			

FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
10.29	9.52	30.3	1	0.032
96.93	97.7			

dimensions			
9.2	x-section area	1.0	d mean
9.4	width	10.2	wet P
1.3	d max	0.9	hyd radi
2.1	bank ht	9.6	w/d ratio
30.3	W flood prone area	3.2	ent ratio

hydraulics	
4.3	velocity (ft/sec)
39.7	discharge rate, Q (cfs)
0.56	shear stress ((lbs/ft sq)
0.54	shear velocity (ft/sec)
2.635	unit stream power (lbs/ft/sec)
0.60	Froude number
8.0	friction factor u/u*
34.8	threshold grain size (mm)

check from channel material			
47	measured D84 (mm)		
6.3	relative roughness	7.4	fric. factor
0.035	Manning's n from channel material		

**********WinXSPRO**********

templet.out
Input File: C:\WXSPRO20\TEMPLET.DAT
Run Date: 11/12/03
Analysis Procedure: Hydraulics
Cross Section Number: 1
Survey Date: 11/04/03

Subsections/Dividing stations
A / 44.48/ @

Resistance Method: Thorne and Zevenbergen
D84: 72.000 mm

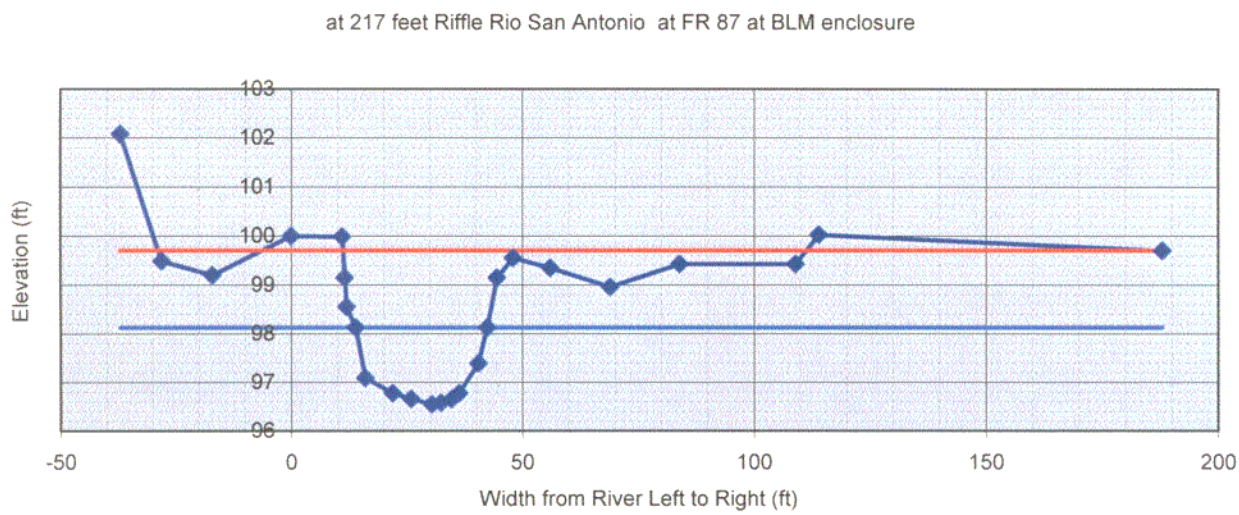
STAGE (ft)	#SEC	AREA (sq ft)	PERIM (ft)	WIDTH (ft)	R (ft)	DHYD (ft)	SLOPE (ft/ft)	n	VAVG (ft/s)	Q (cfs)
0.10	T	0.45	8.30	8.30	0.05	0.05	0.005	0.089	0.17	0.08
0.20	T	1.51	12.93	12.92	0.12	0.12	0.005	0.086	0.29	0.45
0.30	T	2.99	16.15	16.13	0.19	0.19	0.005	0.075	0.45	1.36
0.40	T	4.73	18.78	18.75	0.25	0.25	0.005	0.063	0.67	3.17
0.50	T	6.74	21.41	21.37	0.31	0.32	0.005	0.056	0.87	5.87
0.60	T	8.97	23.01	22.95	0.39	0.39	0.005	0.051	1.09	9.83
0.70	T	11.31	23.92	23.83	0.47	0.47	0.005	0.048	1.33	15.02
0.80	T	13.74	24.84	24.71	0.55	0.56	0.005	0.046	1.54	21.22
0.90	T	16.25	25.50	25.34	0.64	0.64	0.005	0.044	1.76	28.63
1.00	T	18.81	26.00	25.79	0.72	0.73	0.005	0.043	1.98	37.18
1.10	T	21.41	26.50	26.25	0.81	0.82	0.005	0.042	2.18	46.73
1.20	T	24.06	26.99	26.71	0.89	0.90	0.005	0.041	2.38	57.25
1.30	T	26.75	27.49	27.16	0.97	0.98	0.005	0.040	2.57	68.72
1.40	T	29.49	27.99	27.62	1.05	1.07	0.005	0.040	2.75	81.13
1.50	T	32.27	28.49	28.07	1.13	1.15	0.005	0.039	2.93	94.48
1.60	T	35.10	29.03	28.57	1.21	1.23	0.005	0.039	3.09	108.63

STAGE	ALPHA	FROUDE
0.10	1.00	0.13
0.20	1.00	0.15
0.30	1.00	0.19
0.40	1.00	0.24
0.50	1.00	0.27
0.60	1.00	0.31
0.70	1.00	0.34
0.80	1.00	0.36
0.90	1.00	0.39
1.00	1.00	0.41
1.10	1.00	0.43
1.20	1.00	0.44
1.30	1.00	0.46
1.40	1.00	0.47
1.50	1.00	0.48
1.60	1.00	0.49

* Please note - Attached Sheets show 0 Flow @ Border for 3 Consecutive Summers.
∴ To Model This is not applicable

Rio San Antonio 68 sq miles
Midpoint between Headwaters & Colorado Border *

Cross Section



section:	at 217 feet
	Riffle
stream:	Rio San Antonio at FR 87 at BLM enclosure
location:	De-stabilized E channel
description:	C4 Canopy 22%
height of instrument (ft):	103.68

notes	omit pt.	distance (ft)	FS (ft)	elevation
	☐	-37	1-Jan	102.08
	☐	-28	4.19	99.49
	☐	-17	4.48	99.2
LBP	☐	0	3.68	100
LFPW	☐	11	3.69	99.99
	☐	11.6	4.53	99.15
	☐	12	5.13	98.55
LBF	☐	14	5.55	98.13
	☐	16	6.59	97.09
	☐	22	6.9	96.78
	☐	26	7.02	96.66
	☐	30.4	7.13	96.55
	☐	32.4	7.1	96.58
	☐	34.7	7.03	96.65
	☐	36.3	6.9	96.78
	☐	40.5	6.29	97.39
RBF	☐	42.45	5.55	98.13
	☐	44.5	4.53	99.15
	☐	48	4.13	99.55
	☐	56	4.33	99.35
	☐	69	4.72	98.96
	☐	84	4.25	99.43
	☐	109	4.25	99.43
RFPW	☐	114	3.65	100.03
	☐	188	3.98	99.7
	☐			

FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
5.55	3.69	103.0	0.5	0.039
98.13	99.99			

dimensions			
34.5	x-section area	1.2	d mean
28.5	width	28.9	wet P
1.6	d max	1.2	hyd radi
3.4	bank ht	23.4	w/d ratio
103.0	W flood prone area	3.6	ent ratio

hydraulics	
3.0	velocity (ft/sec)
104.9	discharge rate, Q (cfs)
0.37	shear stress ((lbs/ft sq)
0.44	shear velocity (ft/sec)
1.150	unit stream power (lbs/ft/sec)
0.24	Froude number
6.9	friction factor u/u*
22.2	threshold grain size (mm)

check from channel material			
72	measured D84 (mm)		
5.1	relative roughness	6.9	fric. factor
0.039	Manning's n from channel material		