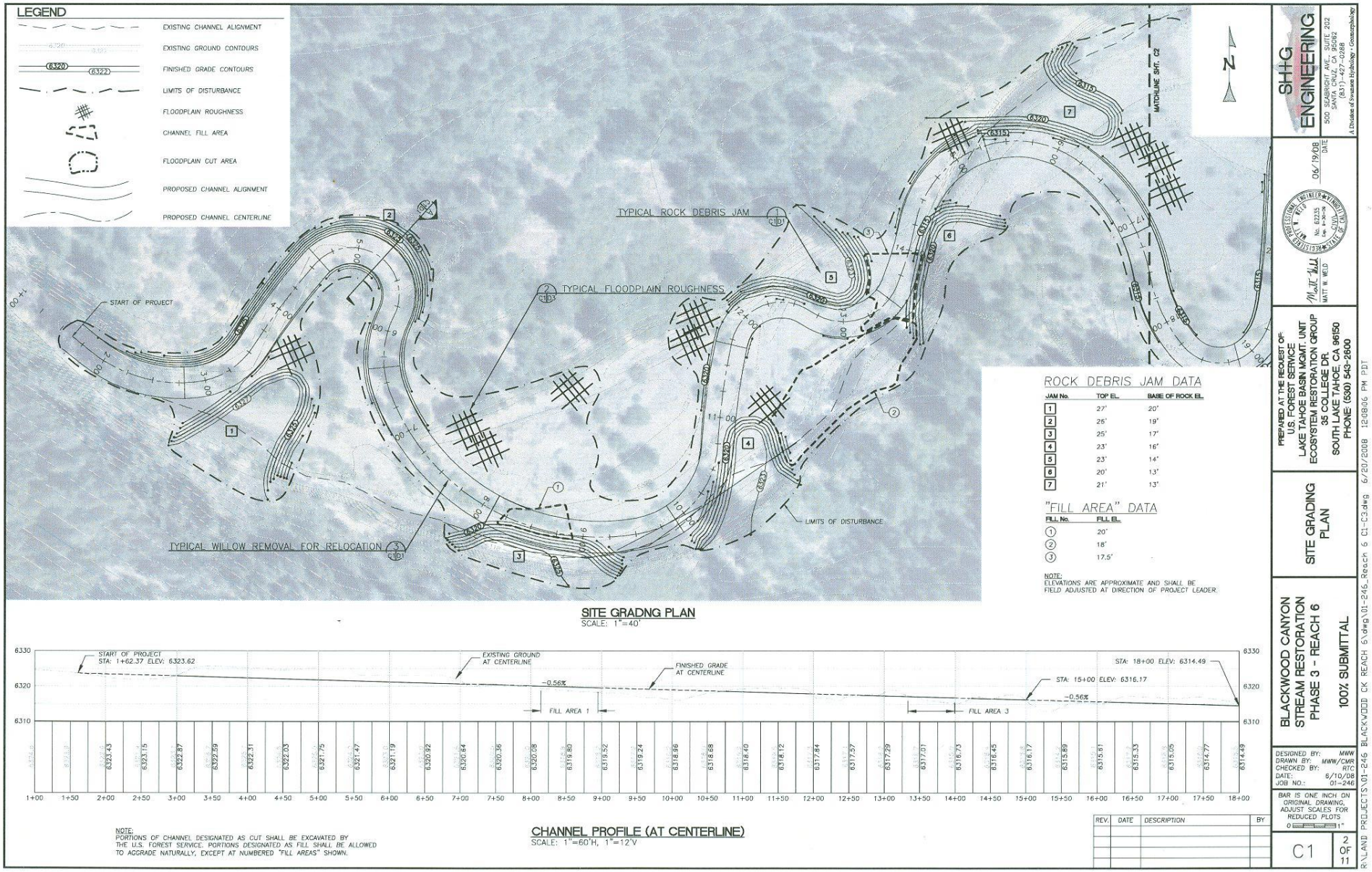
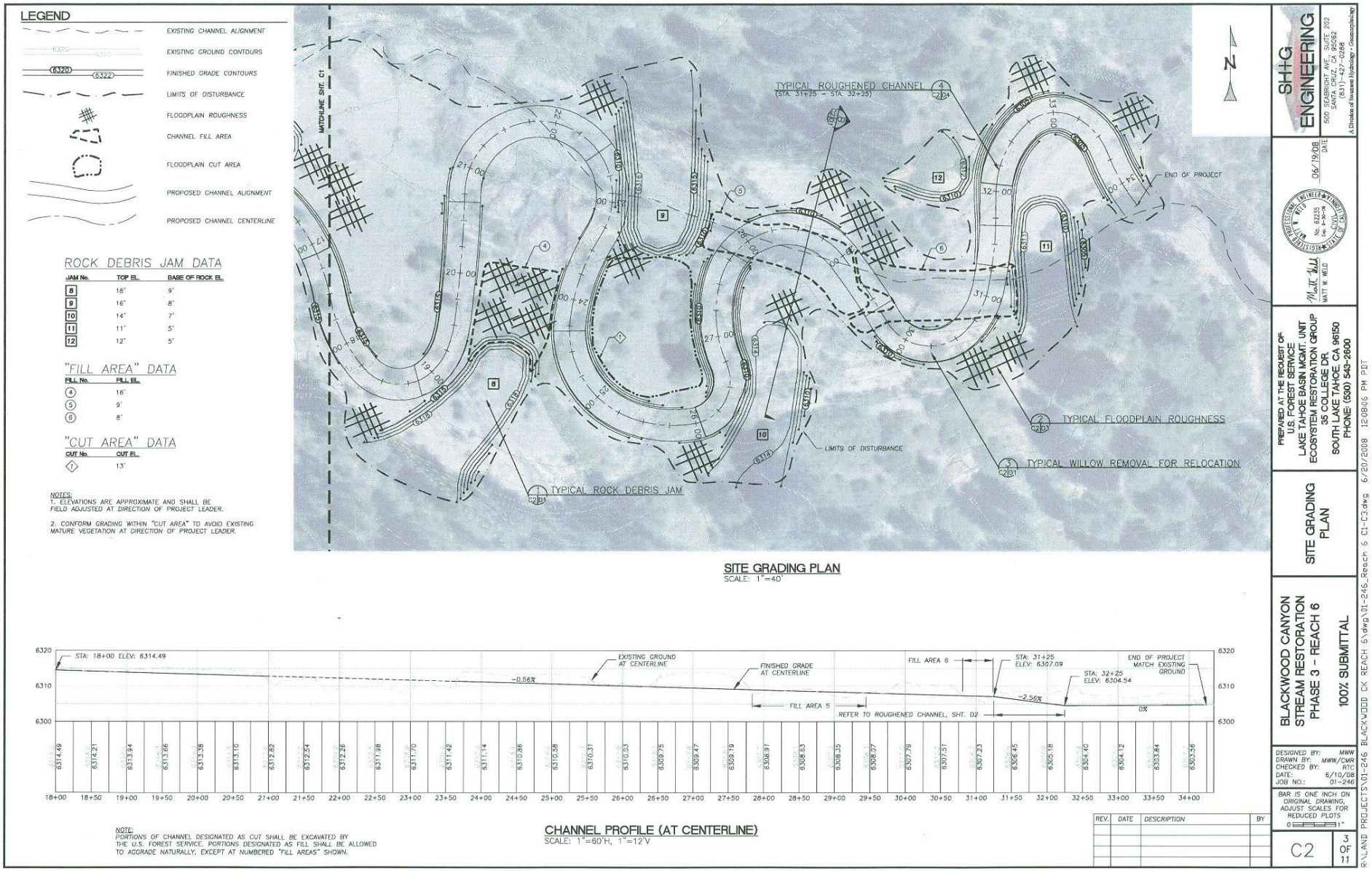
Appendix A

Blackwood Reach 6 Restoration Design Plans



Appendix A: Blackwood Reach 6 Restoration Design Plan – Upper Half



Appendix A: Blackwood Reach 6 Restoration Design Plan – Lower Half

Appendix B

Blackwood Restoration Monitoring Maps

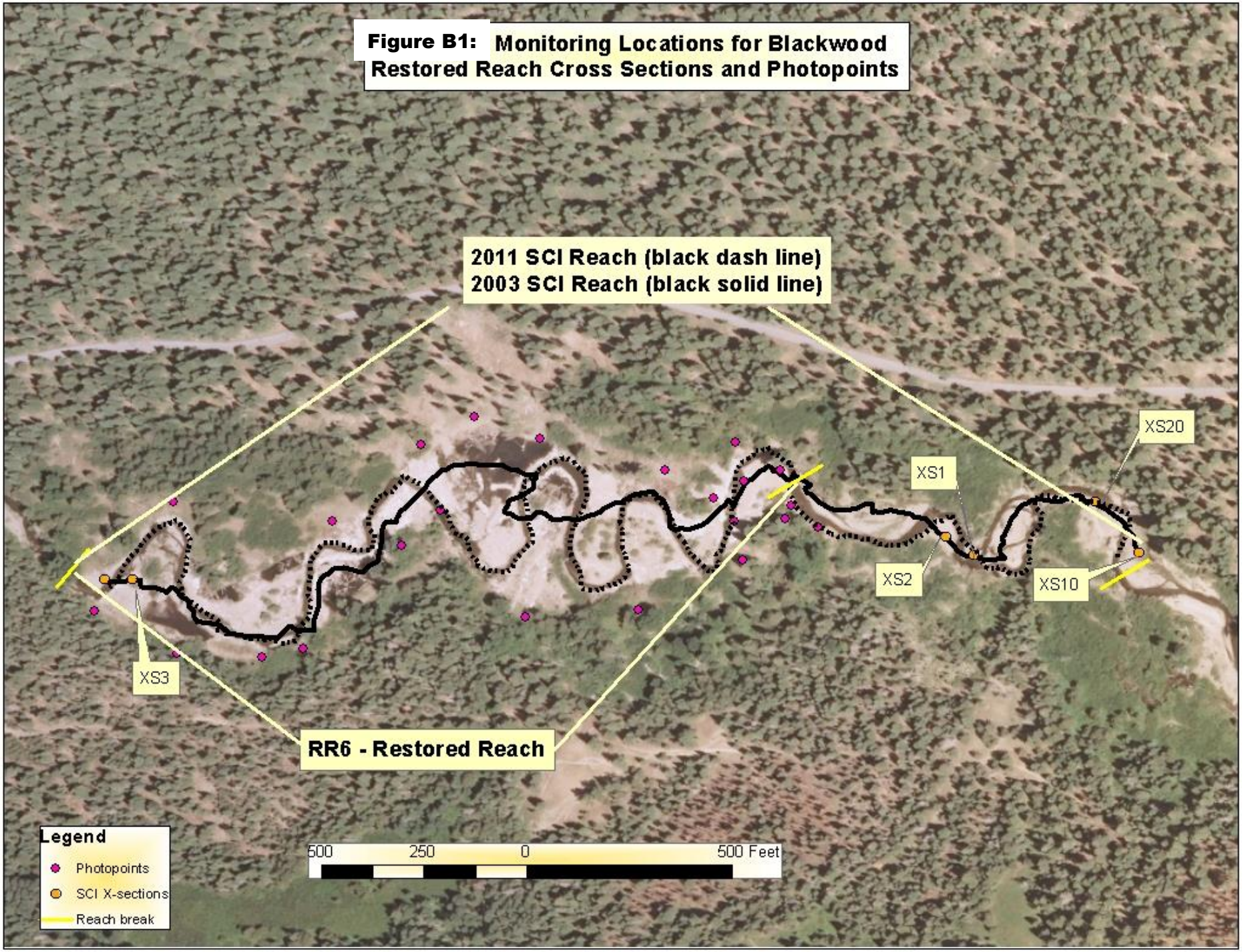


Figure B1: Monitoring Locations for Blackwood Restored Reach Cross Sections and Photopoints

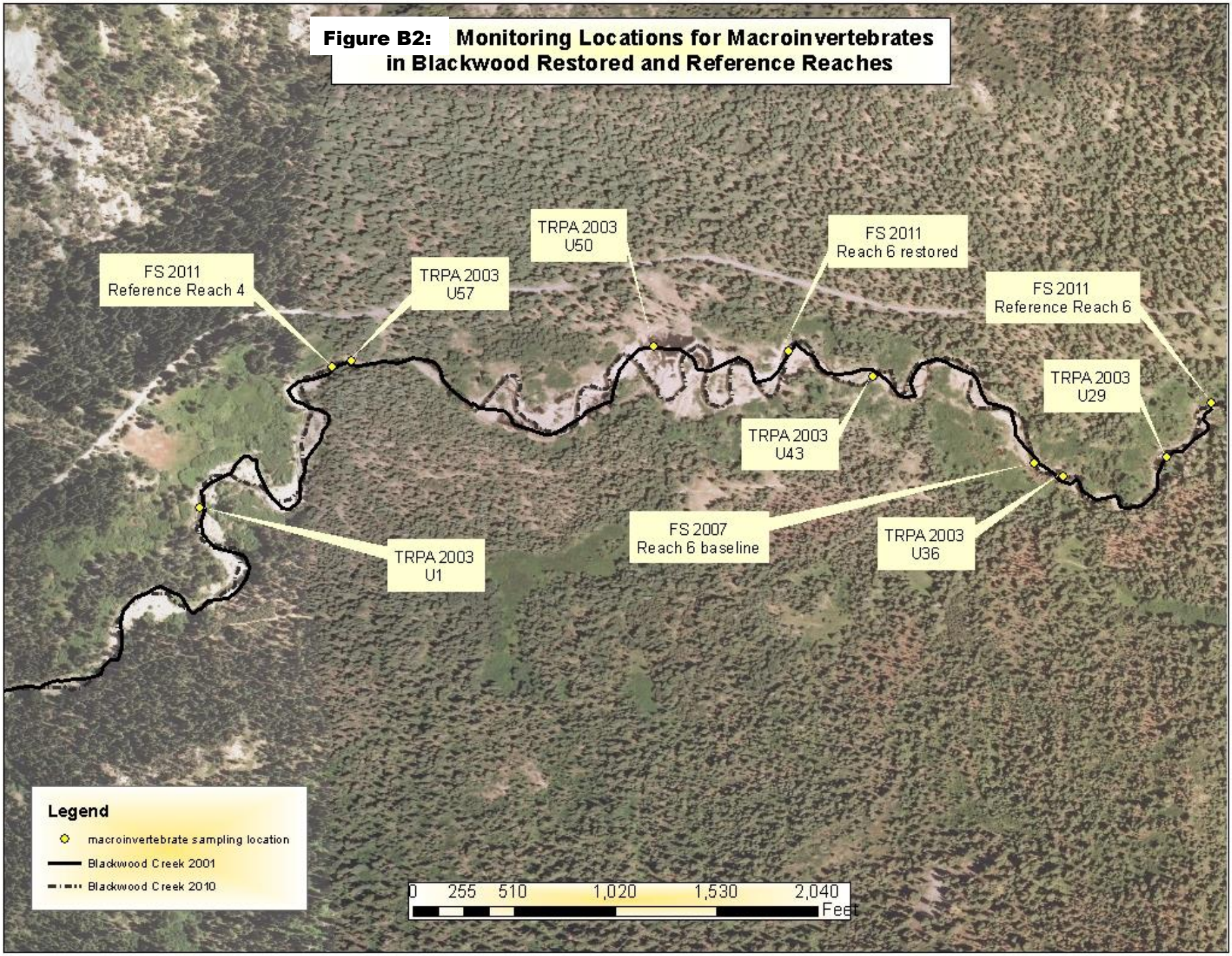
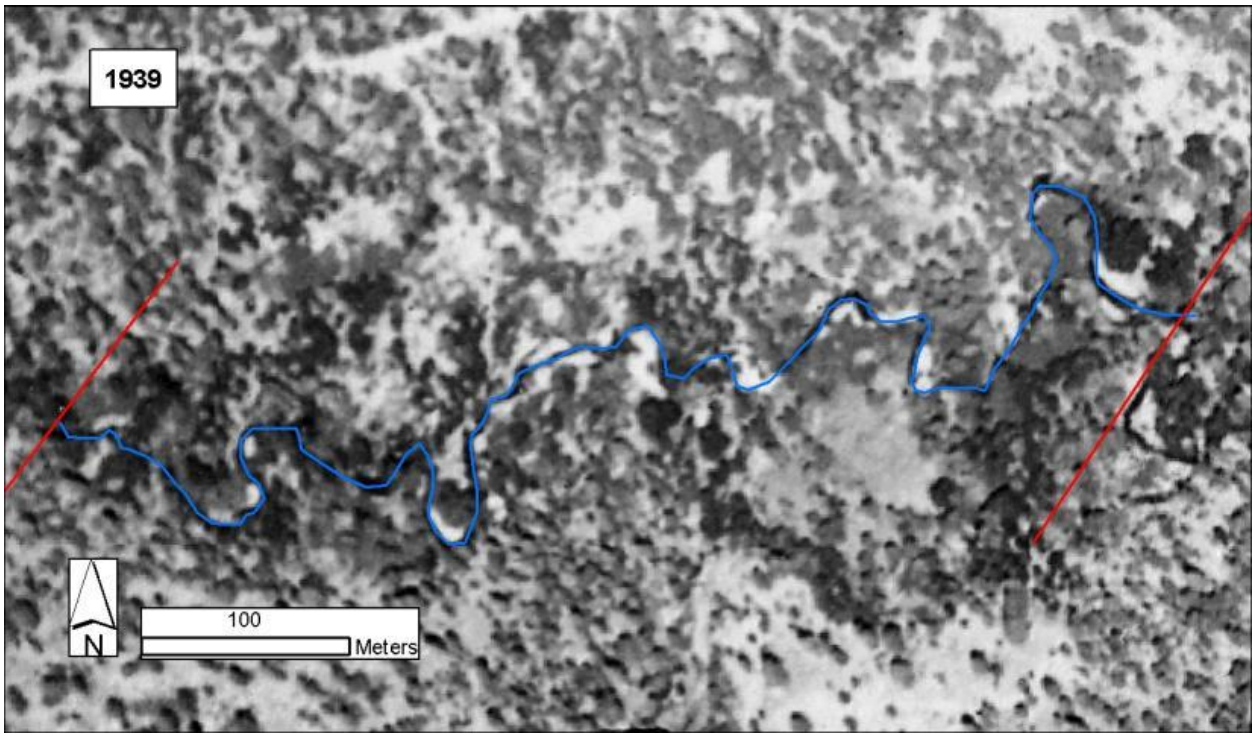


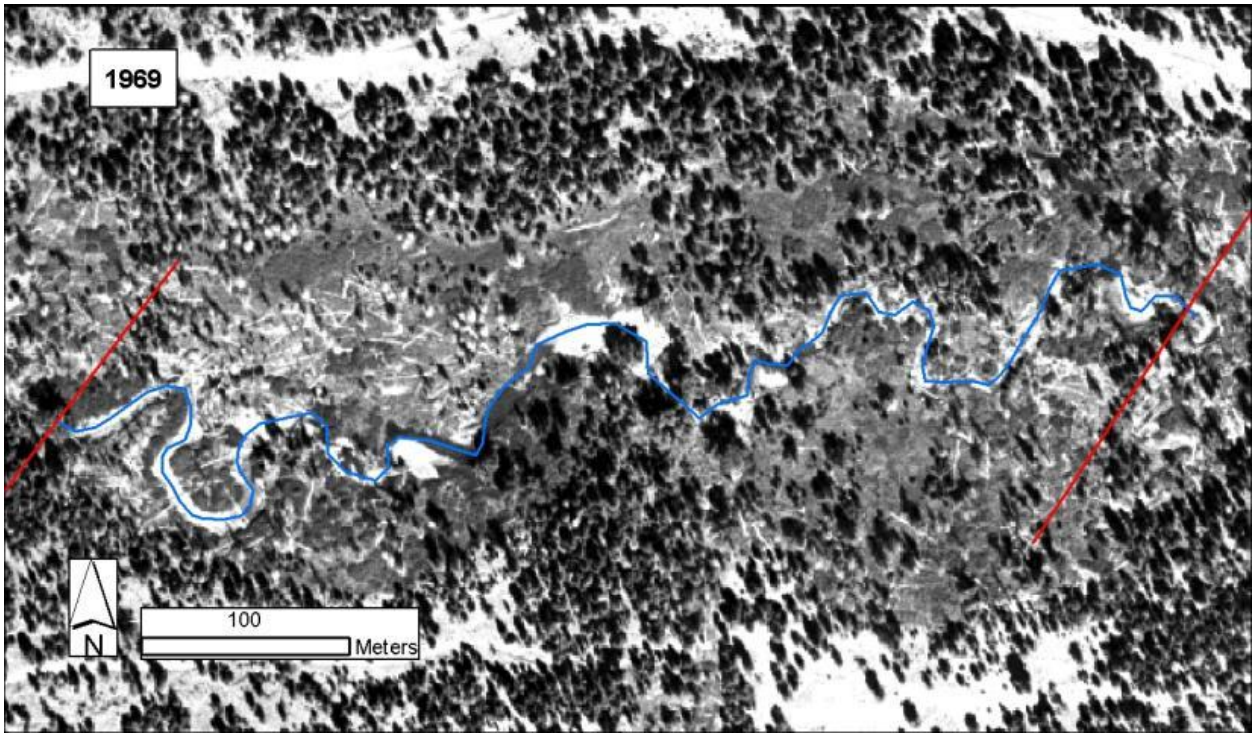
Figure B2: Monitoring Locations for Macroinvertebrates in Blackwood Restored and Reference Reaches
FS 2011 Reference Reach 4
TRPA 2003 U57
TRPA 2003 U50
FS 2011 Reach 6 restored
FS 2011 Reference Reach 6
TRPA 2003 U29
TRPA 2003 U43
FS 2007 Reach 6 baseline
TRPA 2003 U36
TRPA 2003 U1
Legend
macroinvertebrate sampling location
Blackwood Creek 2001
Blackwood Creek 2010
0 255 510 1,020 1,530 2,040
Feet

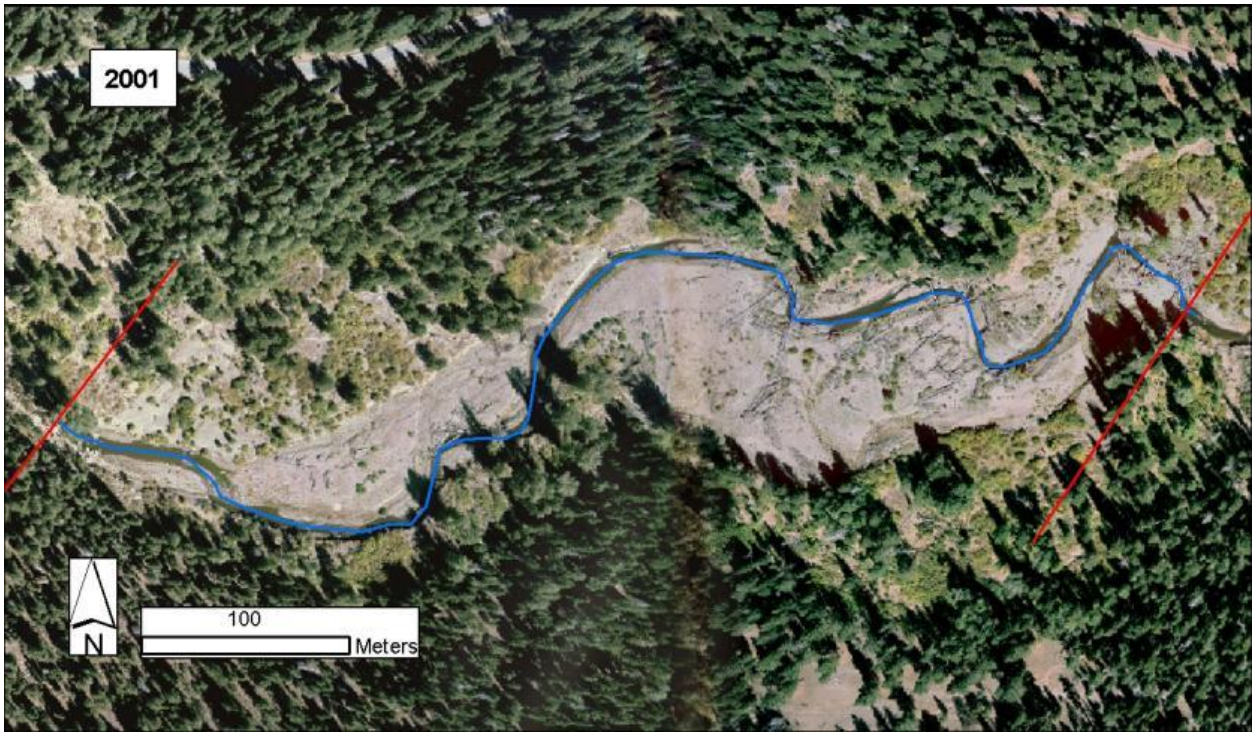
AppendixC

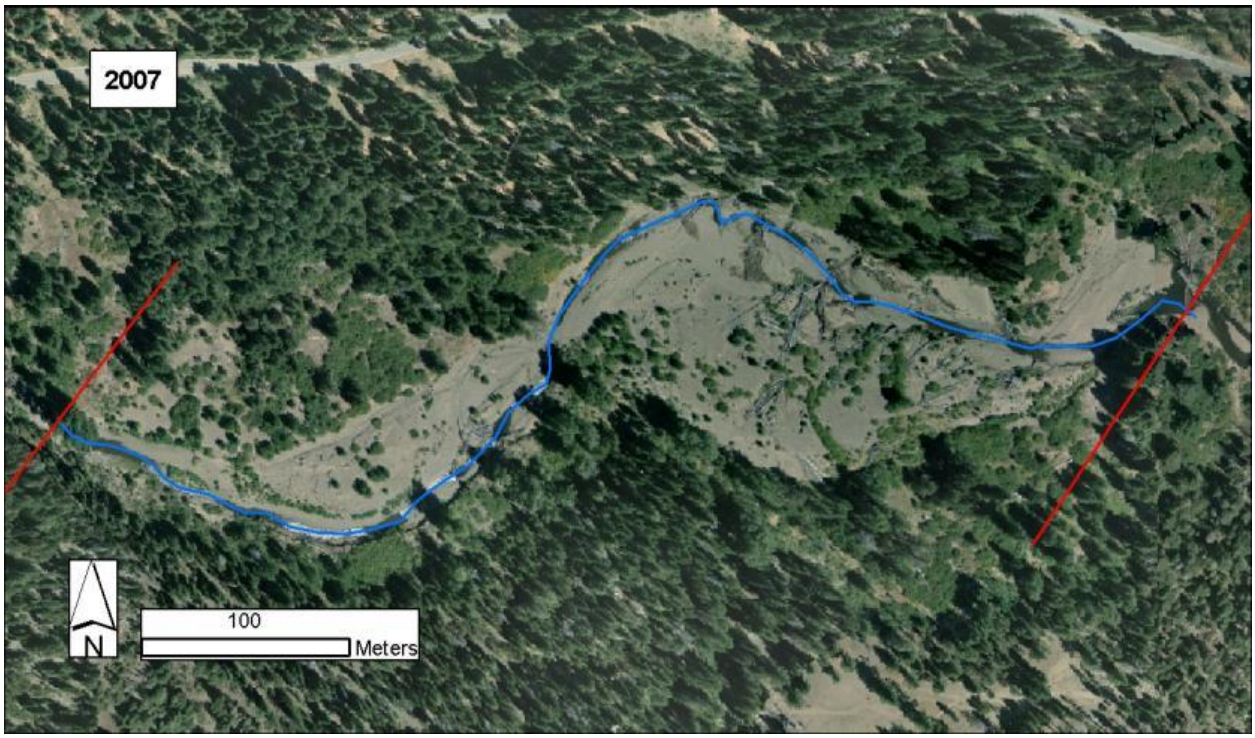
Blackwood Reach 6 Restoration Sinuosity Change

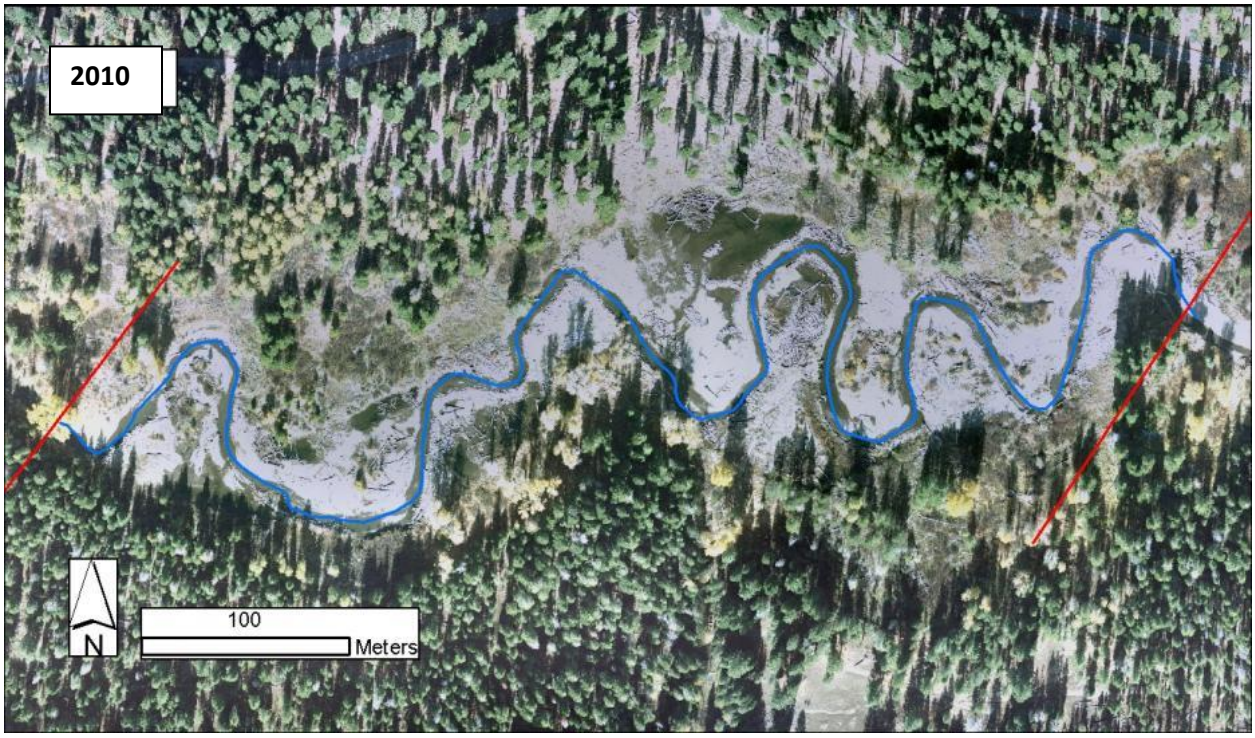
Appendix C: Blackwood Restored Reach 6 Sinuosity Changes






2001
N
100
Meters


2007
N
100
Meters


2010
N
100
Meters

Appendix D

Blackwood Post Construction Photos

2009, 2011

(includes 2 photos from 2012 at PP7A)

PP 1A Panorama 07/13/2009. Post Construction

PP1A Panorama 9/8/11. Post Construction

.

PP 2A 11/02/2009. Post Construction

PP2A 9/8/11. Post Construction

PP 2A Panorama 07/13/2009. Post Construction.

PP 2A Panorama 9/1/2011. Post Construcction

PP 5B Panorama 07/13/2009. Post Construction.

PP5B Panorama 9/1/11. Post Construction

PP 7 Panorama 11/09/2009.

PP7A Panorama 9/1/11.

See insets next page

PP7A 9/1/11 (inset 1)

PP7A July 2012

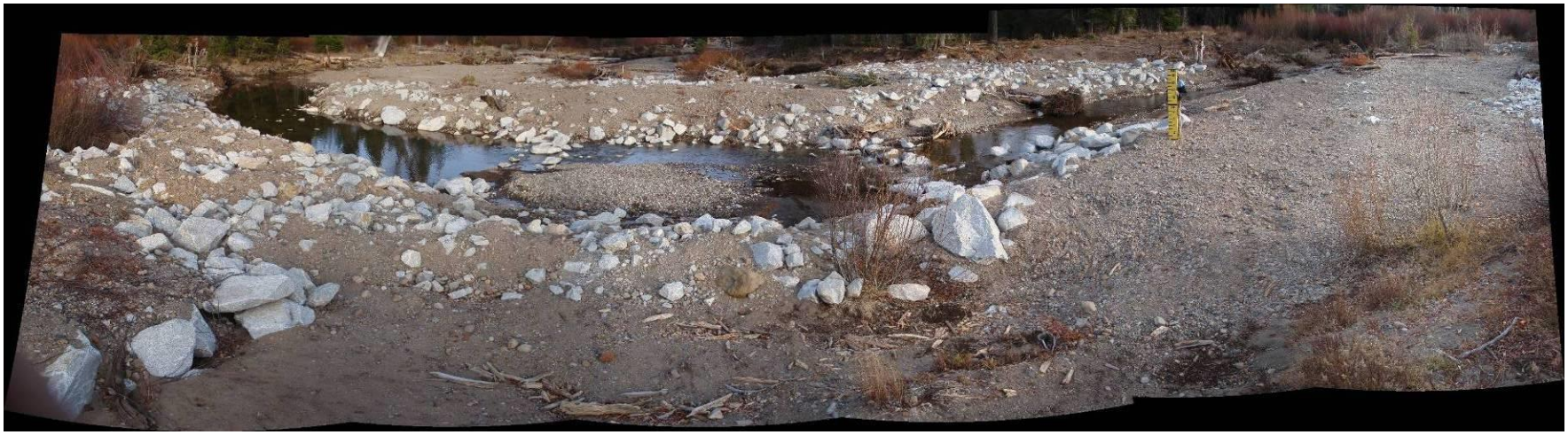
PP7A July 2012 (inset 2)

PP 9A Panorama 10/27/2009.

PP9A Panorama 9/13/11

See inset next page

PP 15B Panorama 11/09/2009



PP15B Panorama 9/1/2011

PP 17A Panorama 11/09/2009 Post Construction.

PP17A Panorama 9/1/11

PP 18A Panorama 11/09/2009 Post Construction.

PP18A Panorama 9/1/11

PP 23 - 10/12/2009

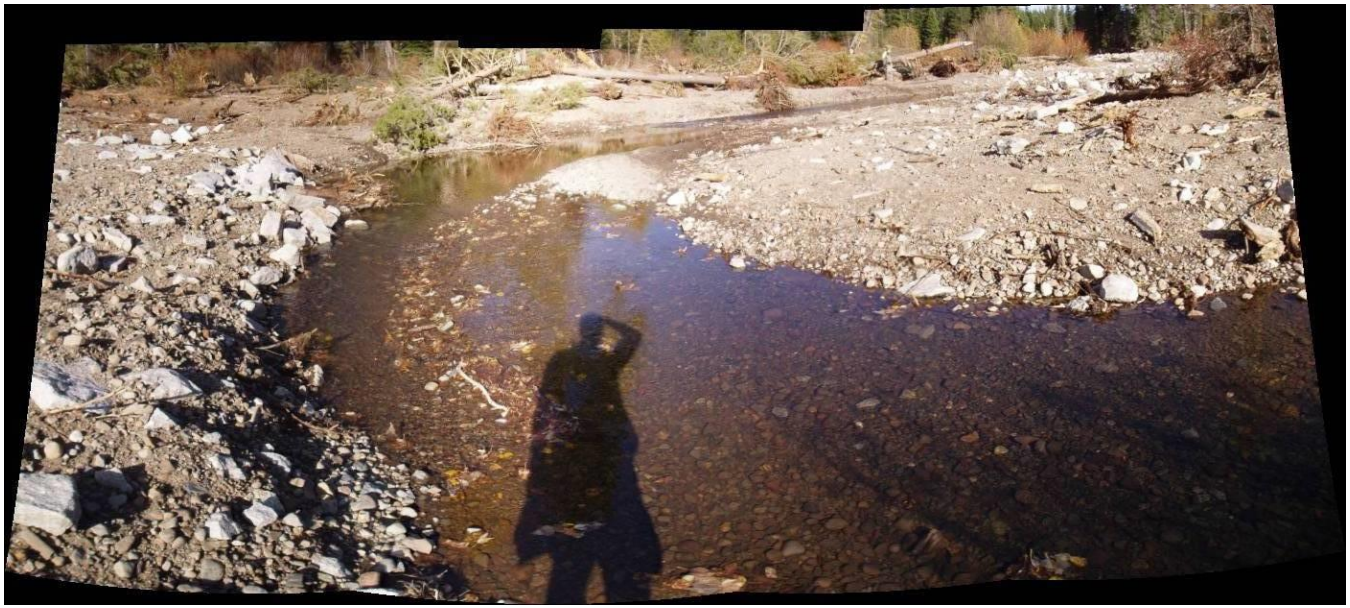
PP 23 - 10/26/2009 (sediment deposit after storm event)

PP- 23 - 8/15/2011 (Sediment deposit gone)

PP27 10/12/2009

PP27 8/15/11

PP28 10/26/2009



PP28 8/15/11

Google Earth images illustrating sediment deposition processes in Blackwood Creek 2010 through 2012.

8/2012
N
Google earth
Imagery Date: 8/28/2012
1969
39°06'38.52" N 120°10'52.11" W elev 6328 ft
Eye alt 7219 ft

Appendix E

Blackwood Reach 6 Stream Condition Inventory Data and Figures

E1: Stream Condition Inventory Data

E2: Thalweg Survey Profiles

Appendix E1: Stream Condition Inventory Transect Data

W/D and Entrenchment measured at 8 cross sections/transects in 1996.1997, 2001, and at all fast water units in 2011.

Width Depth Ratios

SCI Reach				RR6	Restored Reach	RR4
1996	**1997**	**2001**	**2011**	**2011**	**2011**	**2011**
44.3	25.23	10.4	47.2	14.4	22.2	49.6
40.6	30.12	16.7	53.3	41.7	27.0	18.9
34.5	67.7	76.8	22.2	28.5	44.3	45.5
22.4	20.27	6.3	27	28.8	18.0	41.7
29.9	20.5	13.4	44.3	45.1	16.6	28.6
25.3	30.2	14.6	18	69.5	16.6	33.4
38.7	32.9	9.8	16.6	17.8	25.9	22.0
25.6	27.7	7	20.1			13.1
			25.9			34.6
						39.8
						32.8

32.2	**28.9**	**11.9**	**25.9**	**28.8**	**22.2**	**33.4**	Medians

Entrenchment Ratios

SCI Reach				RR6	Restored Reach	RR4	
1996	**1997**	**2001**	**2011**	**2011**	**2011**	**2011**	
1	4.1	3.7	1.3	1.8	1.7	2.6	
3	4	2	2.9	1.2	3.3	1.2	
1.1	3.1	1.6	1.7	3.7	5.3	1.5	
1.7	4.4	5.3	3.3	9.1	15.5	1.9	
3	4.9	2	5.3	8.7	16.2	2	
2.2	1.6	1.2	15.5	1.6	14.5	4	
3.2	4.5	1.6	16.2	2.9	10.4	10.9	
1.4	4.1	2	14.5			1	
			10.4			3.8	
						1.7	
						2.2	
2.0	**4.1**	**2.0**	**5.3**	**2.9**	**10.4**	**2.0**	**Medians**

Total Shade

SCI Reach				RR6	Restored Reach	RR4	
1996	1997	2001	2011	2011	2011	2011	
34	5	3	14	36	12	0	
8	5	13	11	35	0	0	
5	2	33	12	37	0	14	
6	4	11	0	27	11	4	
5	44	5	0	4	5	9	
2	27	4	11	9	14	2	
9	9	25	5	3	5	14	
7	6	3	14			21	
6	16	4	5			13	
6	53	4				31	
3.5	21	4				12	
16.5	12	4					
10	7	7					
7	3	7					
18	3	3					
15	5	47					
1	11	29					
14	7	3					
19	9	2					
3	5	8					
16	10	10					
5	11	6					
5	19	2					
5	0	1					
9	5	2					
1	14	12					
6	12	3					
8	21	2					
4	24	26					
10	4	8					
16	13	6					
20	3	4					
30	5	3					
54	2	2					
51	3	4					
18	3	26					
46	2	27					
20	11	23					
9	6	36					
31	4	8					
18	13	13					
25	11	7					
15	7	6					
2	15	3					
4	15	3					
3	22	2					
1	8	2					
3	6	2					
3	7	4					
3	42	0					
1.3	11	9					
8	**8**	**4**	**11**	**27**	**5**	**12**	Medians

Measured along 50 evenly spaced transects in 1996, 1997, and 2001. Measured at all fast water units in 2011.

 # pieces of Large Wood in 2011

SCI Reach				RR6	Restored Reach	RR4
1996	1997	2001	2011	2011	2011	2011
See next page			2	3	1	1
			0	0	0	1
			0	1	2	0
			0	0	1	1
			1	0	0	0
			0	0	0	0
			2	0	0	0
			1		0	1
			0		0	0
			0		0	1
			0		0	0
			0		0	0
			0		0	0
			0		0	0
			0		1	0
			0			0
			0			1
			0			0
			1			0
						1
						4
Totals						
32	**12**	**59**	**7**	**4**	**5**	**11**

2011 large wood definition: L = Diameter > 20 in (.5m) at a length of 35 ft. (10.6m) from the large end

SCI Large Wood Data 1996, 1997, and 2001

1996

Length Class(m)	0.4 to 0.8	0.8 to 1.6	>1.6
8 to 16	22	5	
16 to 32			
> 32	5		

Total = 32

1997

Length Class(m)	0.4 to 0.8	0.8 to 1.6	>1.6
8 to 16	5		
16 to 32	7		
> 32			

Total = 12

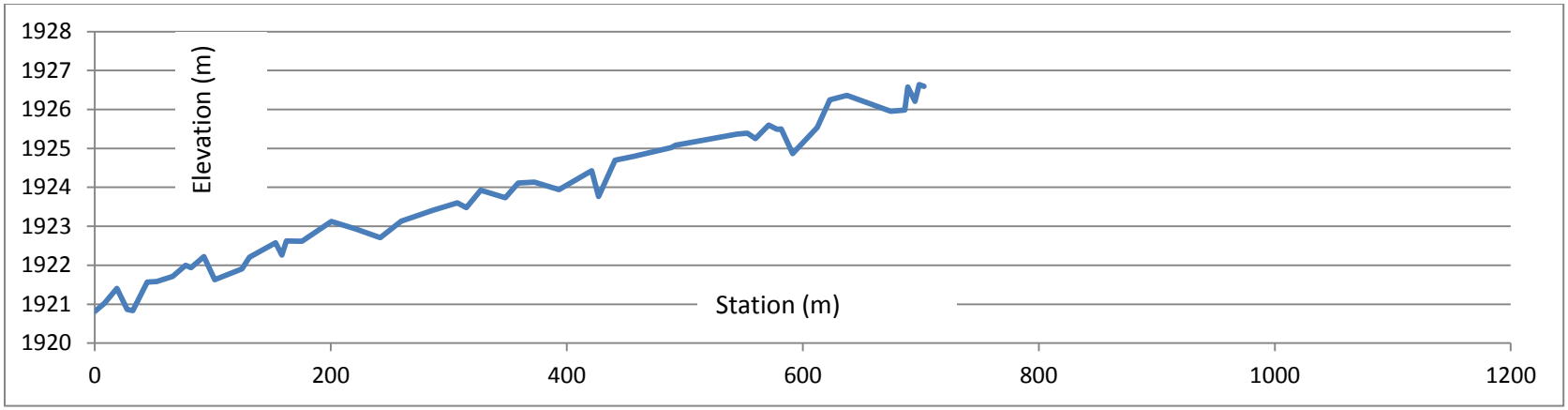
2001

Length Class(m)	0.4 to 0.8	0.8 to 1.6	>1.6
8 to 16	39		
16 to 32	20		
> 32			

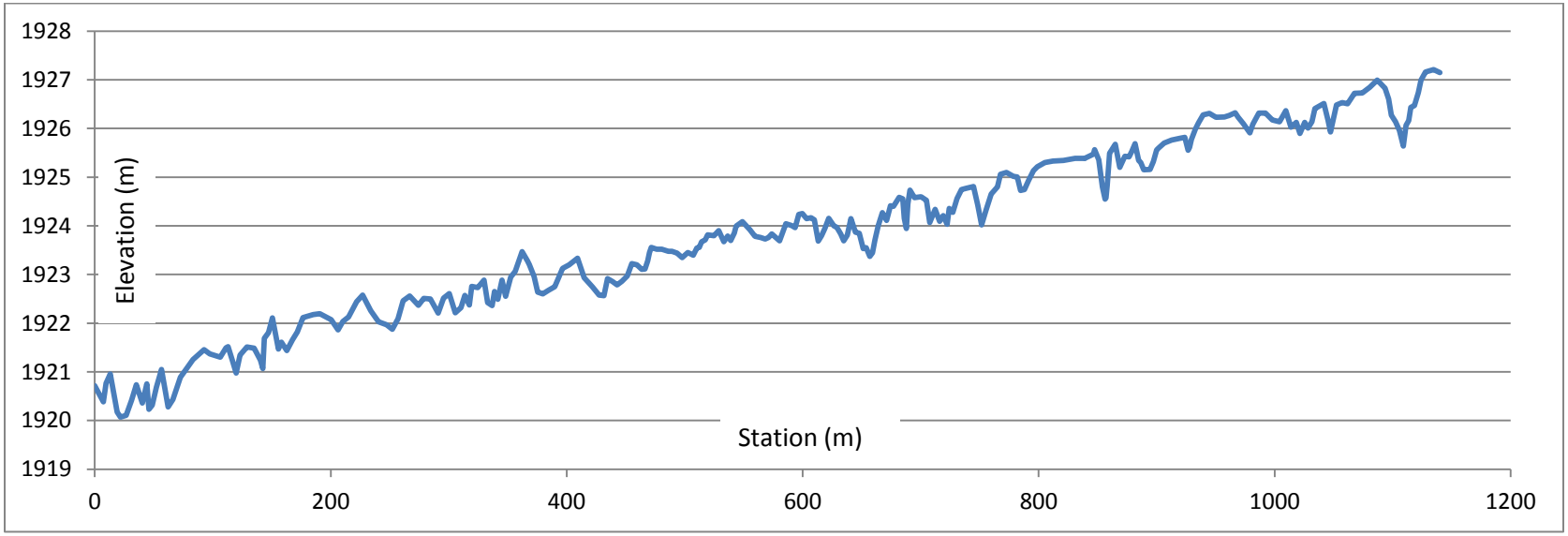
Total - 59

Pre-2011 large wood definition: L = Diameter > .4.m , length $\geq$ 8m

E2: Blackwood Thalweg Profiles

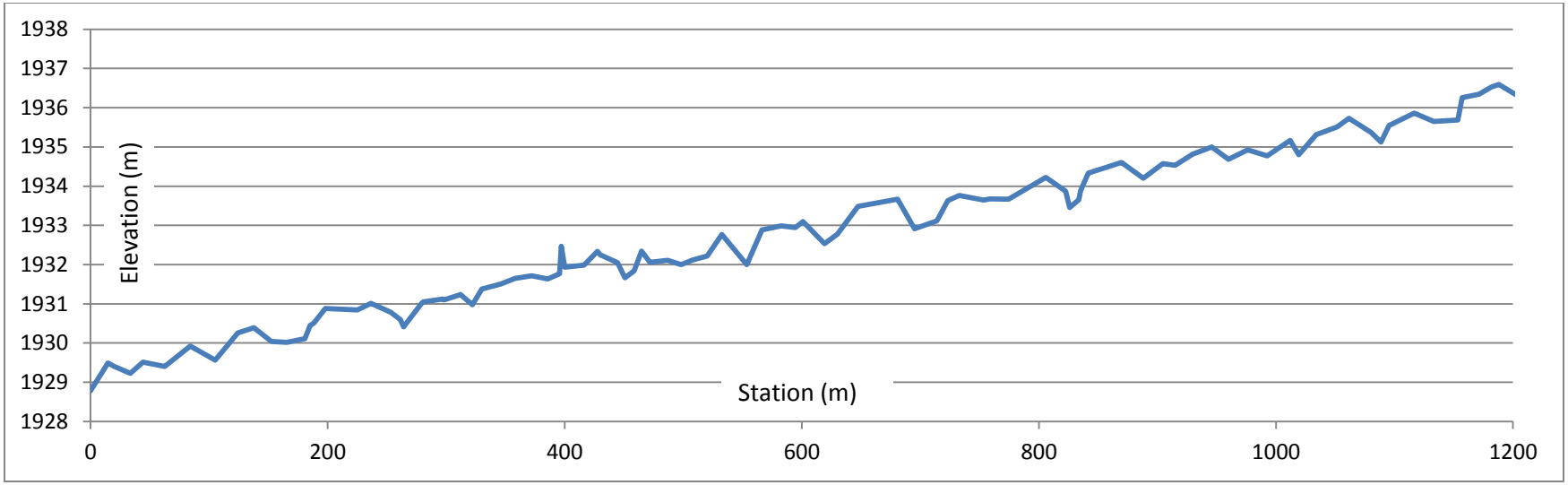


2001 Restored Reach (Pre-Restoration) Thalweg Profile

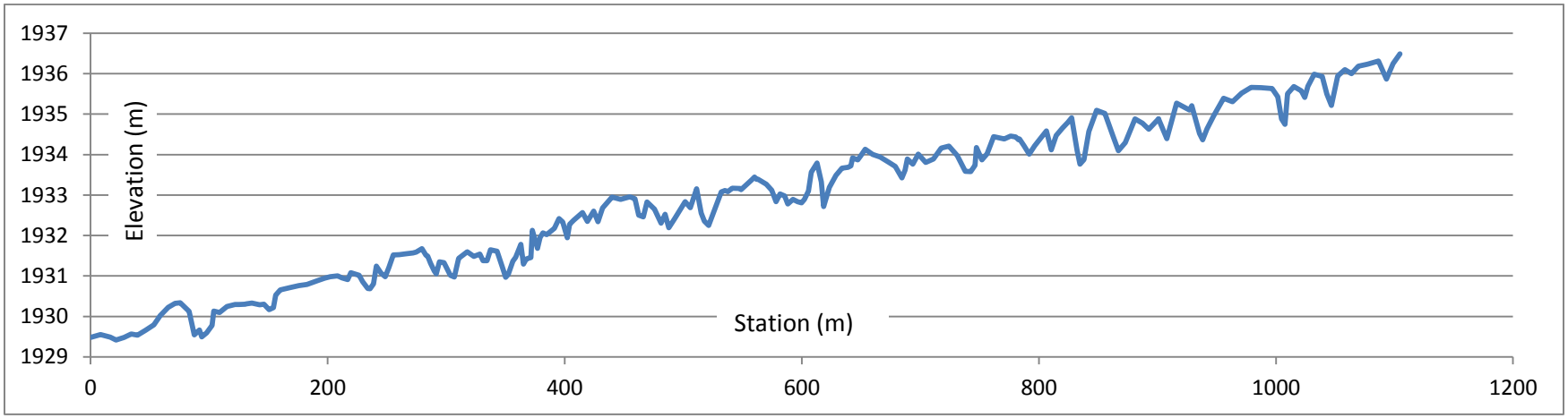


2011 Restored Reach (Post Restoration) Thalweg Profile

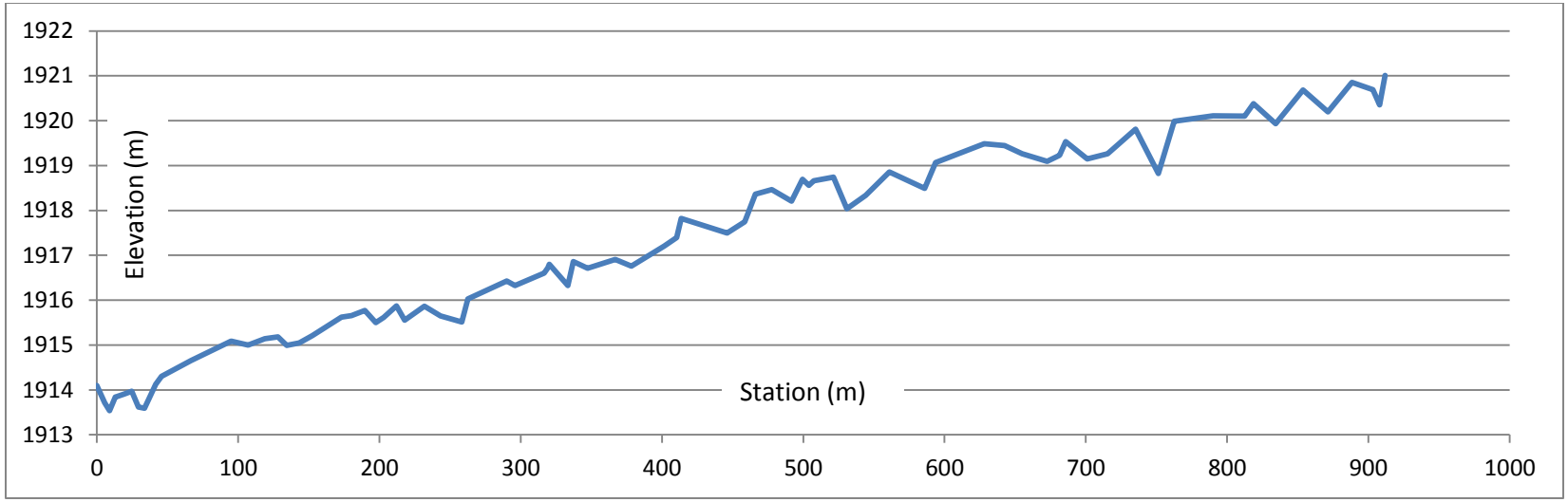
(2001 measured by Swanson Hydrology, 2011 measured by LTBMU)



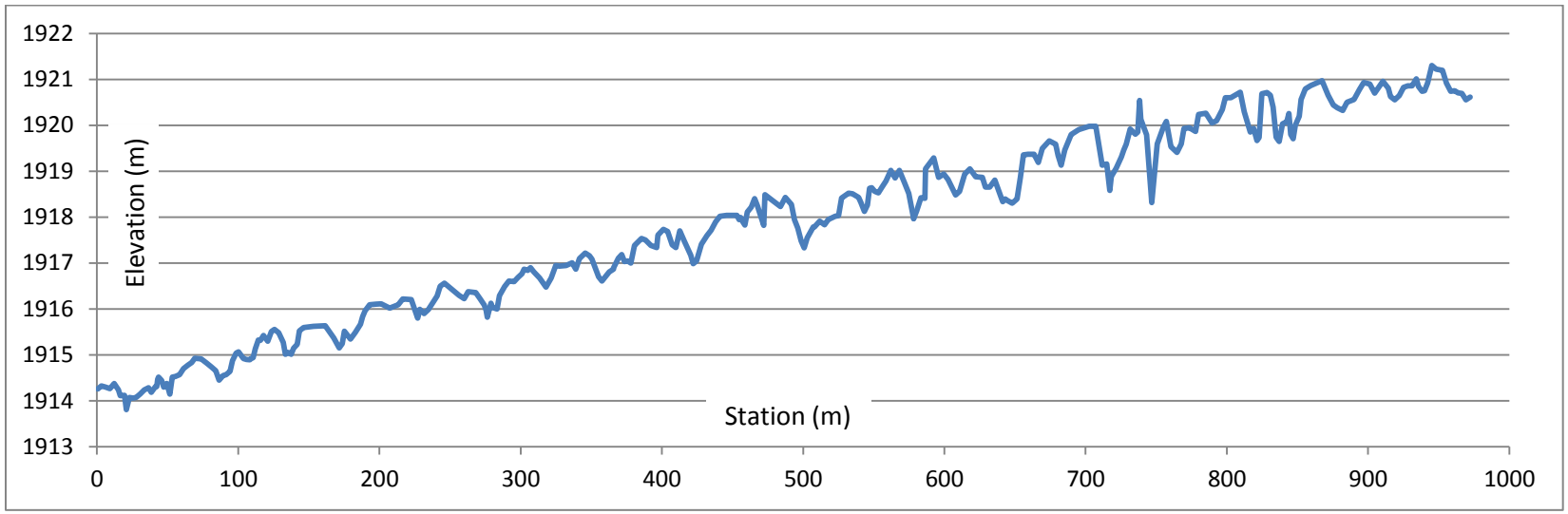
2001 Reference Reach 4 Thalweg Profile



2011 Reference Reach 4 Thalweg Profile



2001 Reference Reach 6 Thalweg Profile



2011 Reference Reach 6 Thalweg Profile

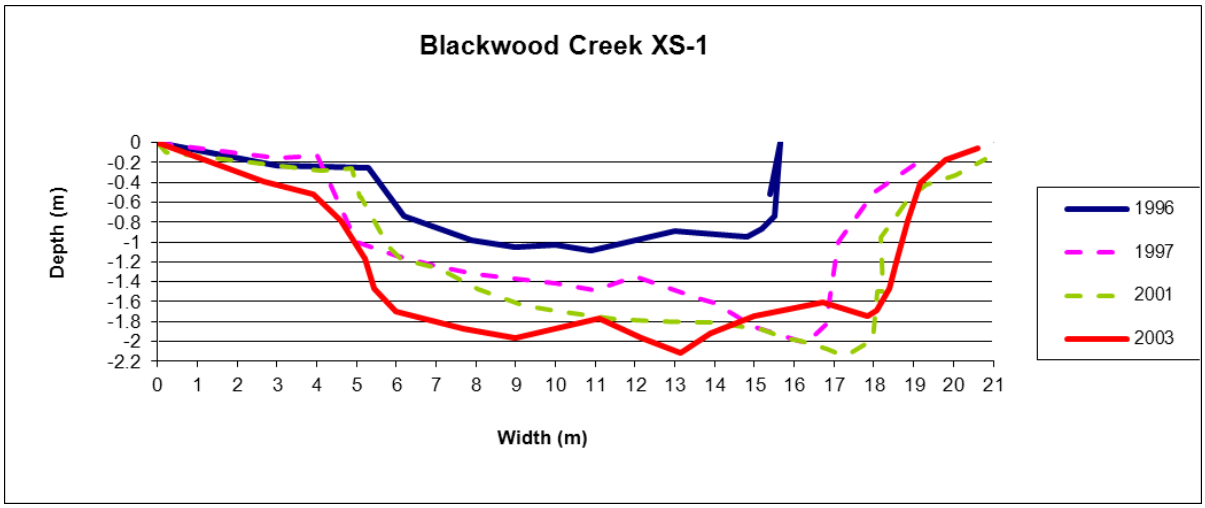
Appendix F

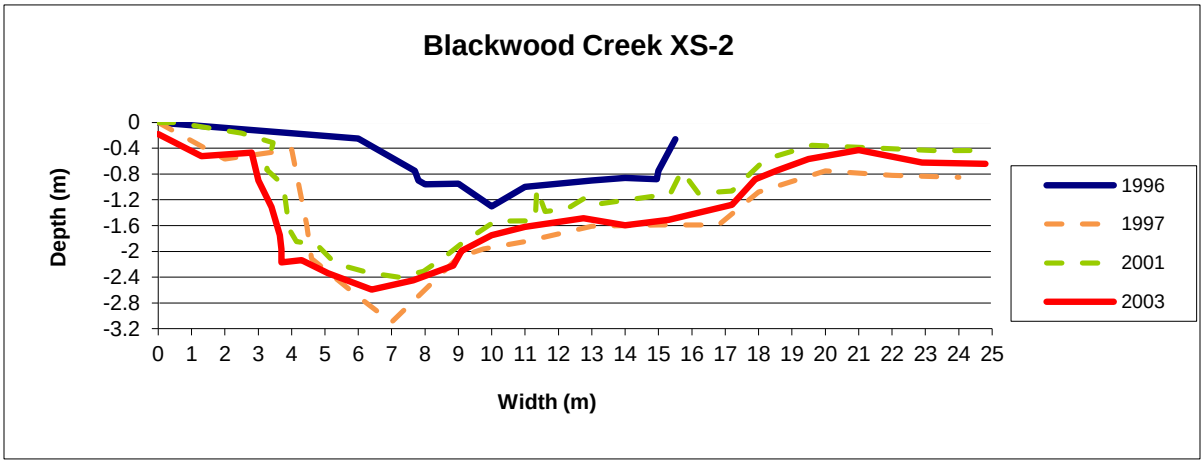
Blackwood Reach 6 Restoration Cross Sections

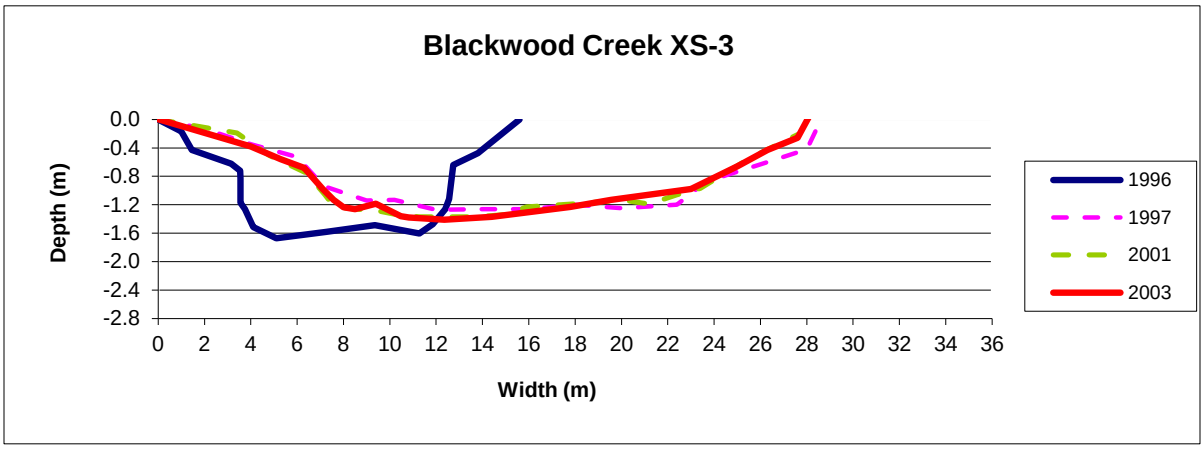
F1: Cross Section Graphs

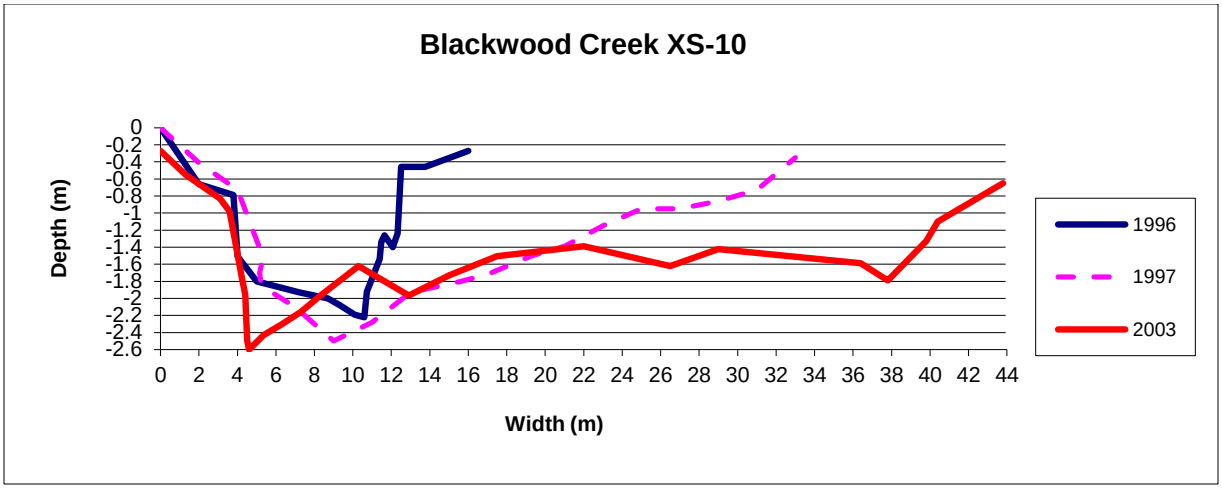
F2: Scour and Fill Graphs

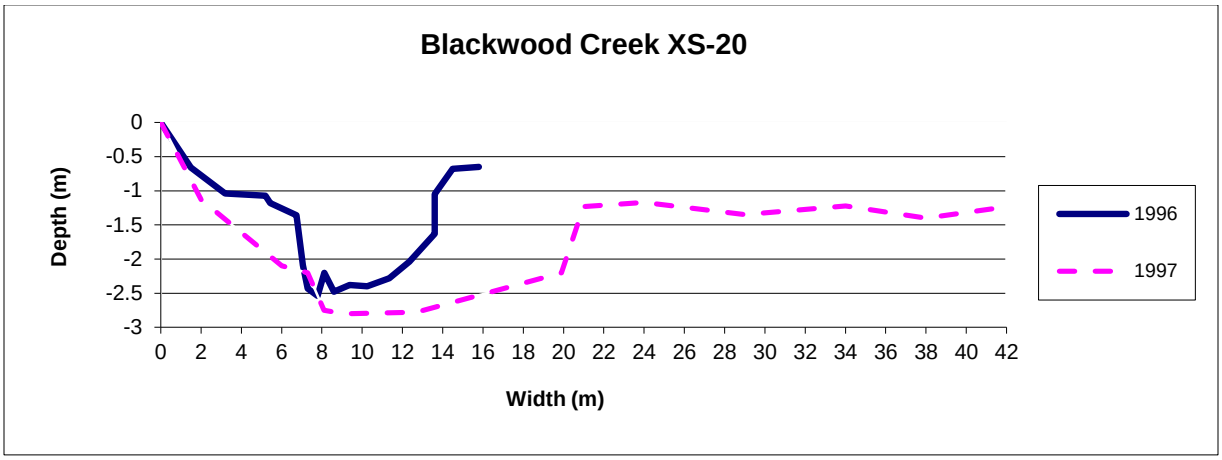
Appendix F.1 Blackwood Creek SCI Reach Cross Sections

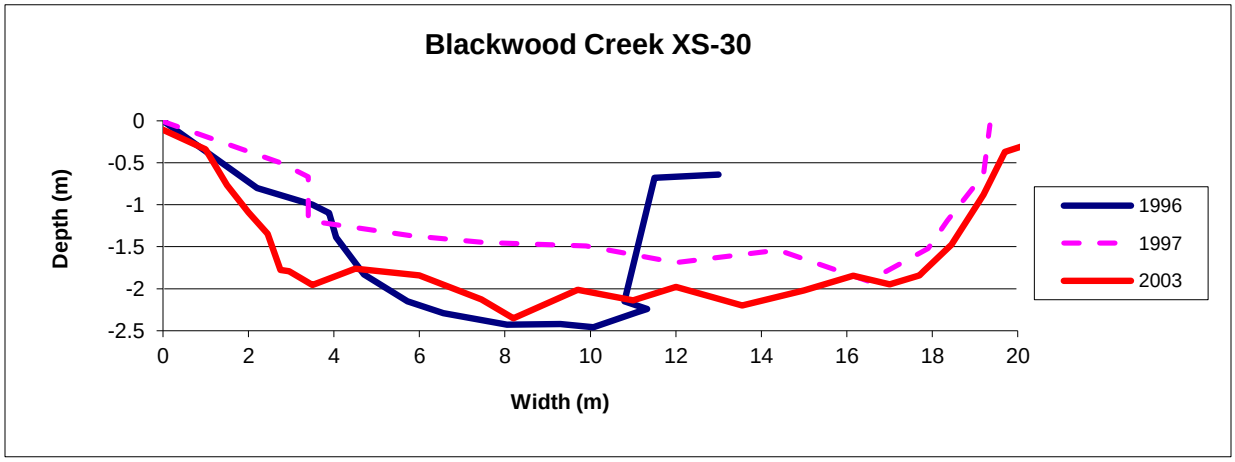




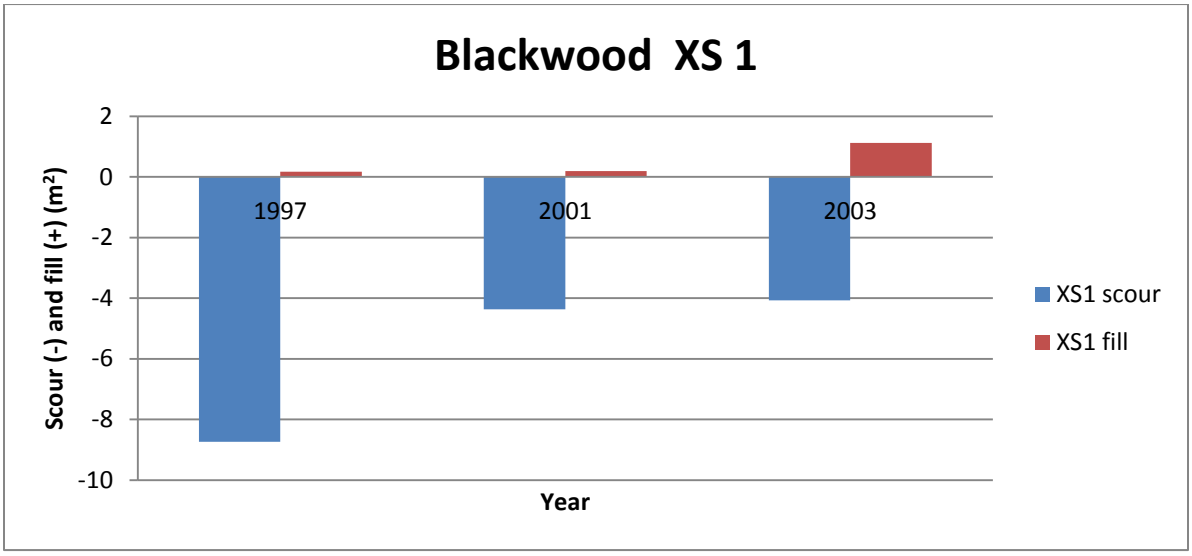


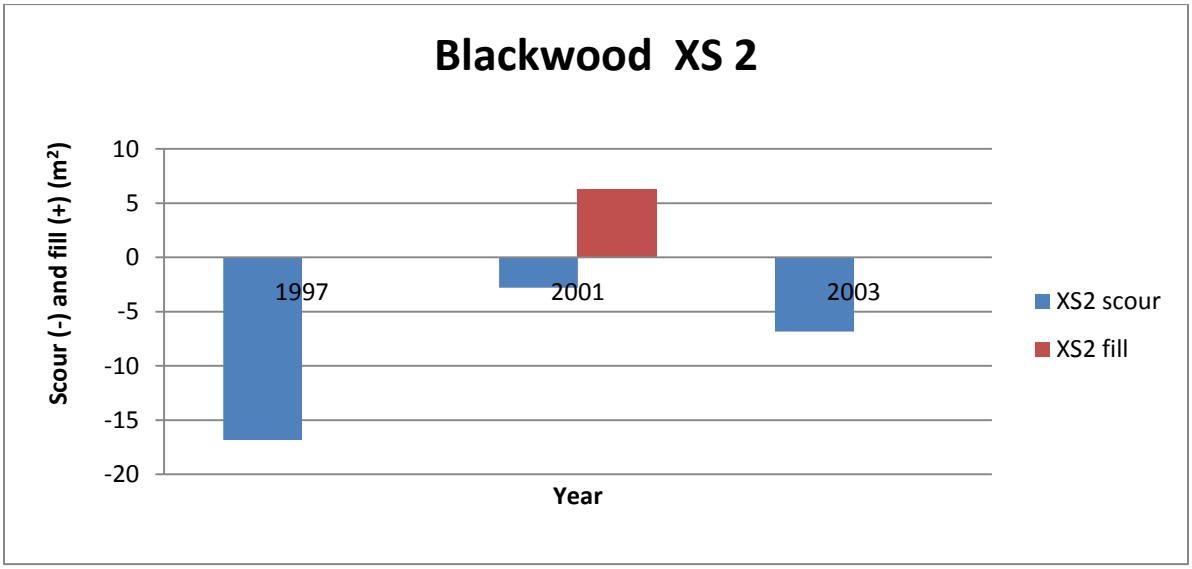

Blackwood Creek XS-10
Depth (m)
0
-0.2
-0.4
-0.6
-0.8
-1
-1.2
-1.4
-1.6
-1.8
-2
-2.2
-2.4
-2.6
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44
Width (m)
1996
1997
2003

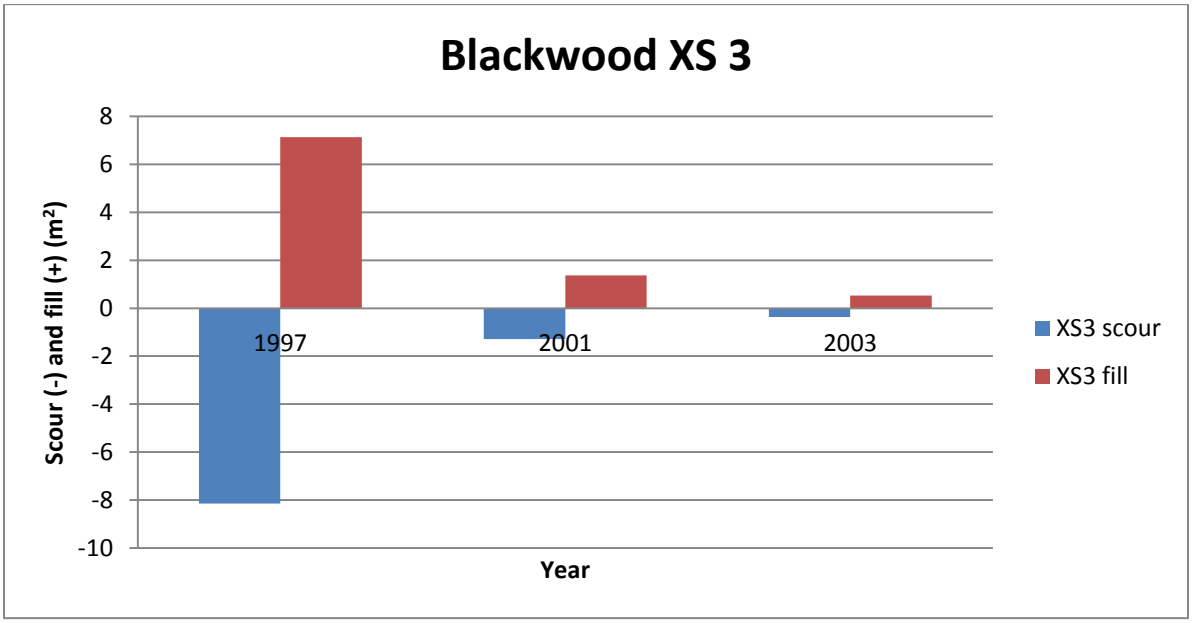

Blackwood Creek XS-20
Depth (m)
0
-0.5
-1
-1.5
-2
-2.5
-3
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42
Width (m)
1996
1997

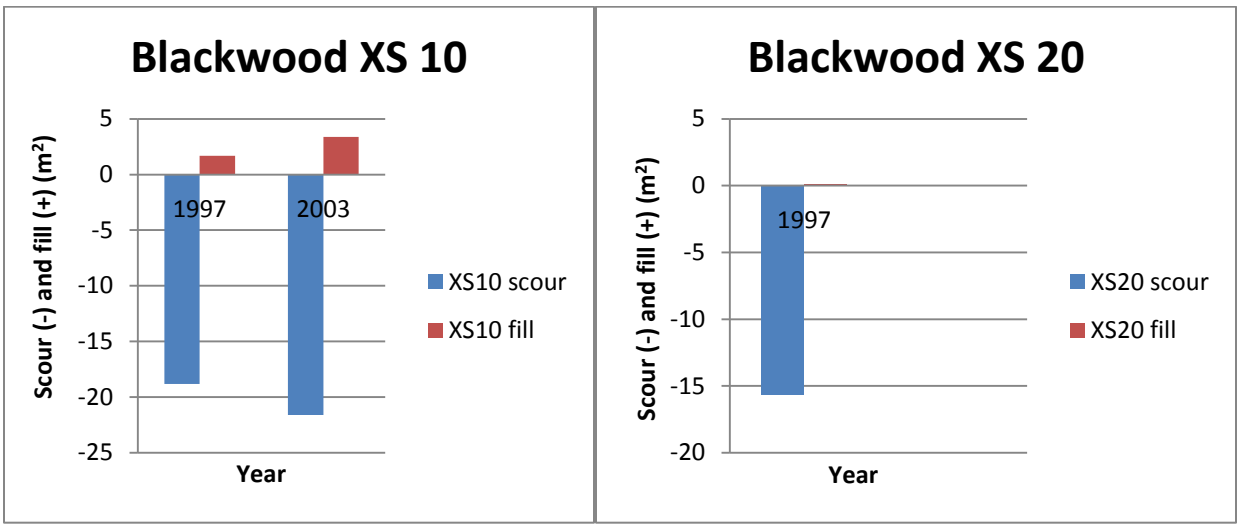

Blackwood Creek XS-30
Depth (m)
0
-0.5
-1
-1.5
-2
-2.5
0 2 4 6 8 10 12 14 16 18 20
Width (m)
1996
1997
2003

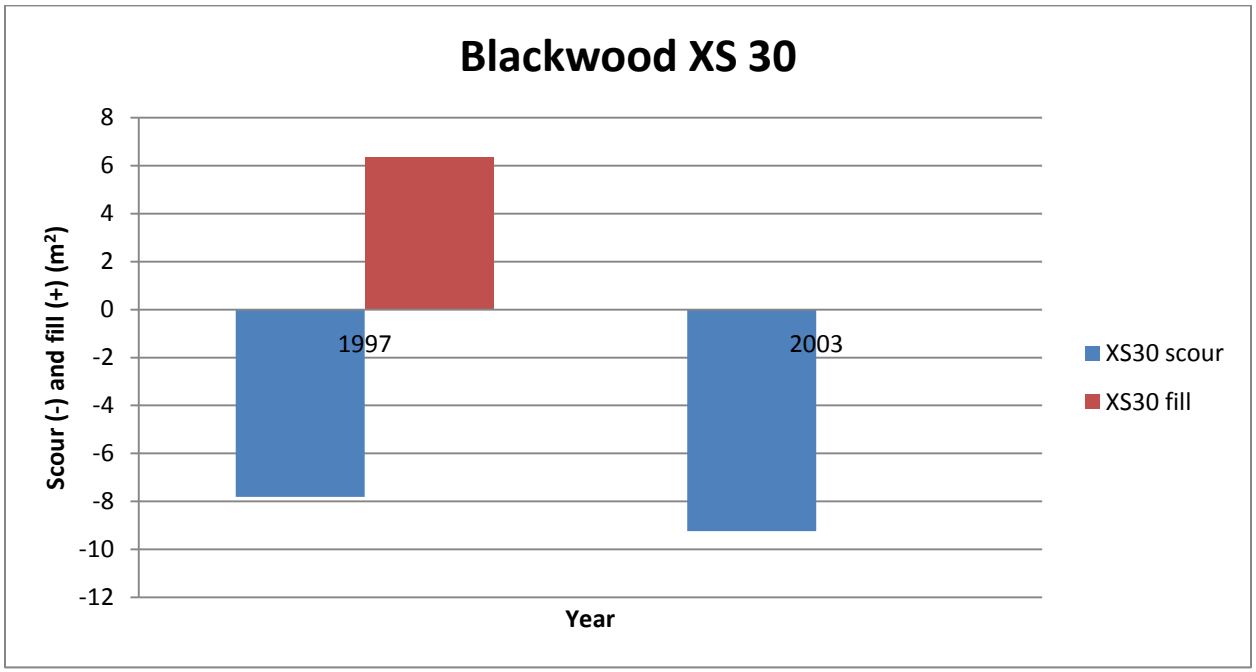
F2: Blackwood Cross Sections Scour and Fill








Blackwood XS 10
Scour (-) and fill (+) (m²)
5
0
-5
-10
-15
-20
-25
1997
2003
Year
XS10 scour
XS10 fill
Blackwood XS 20
Scour (-) and fill (+) (m²)
5
0
-5
-10
-15
-20
1997
Year
XS20 scour
XS20 fill


Blackwood XS 30
Scour (-) and fill (+) (m²)
8
6
4
2
0
-2
-4
-6
-8
-10
-12
1997
2003
Year
XS30 scour
XS30 fill