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Basslink Monitoring Program

Gordon River Basslink Monitoring Annual Report 2006-07

Volume II: The Appendices

Prepared by

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A1. Changes to monitoring regime

A1.1 Installation of duplicate erosion pins

The continued statistical analysis of the erosion pin results as developed for the Basslink Baseline Report and evaluation of established trigger values is dependant on the maintenance of the existing set of erosion pins. To add additional security to the data set, duplicate pins were installed alongside pins thought to be at risk of loss. The risk was determined by comparing the original lengths of the erosion pins with the present exposed length of the pins, and duplicating pins which were at risk of being eroded out, or buried through deposition. Where possible, the duplicate pins were installed downstream of the existing erosion pin within the same turbine level on the bank. A list of the erosion pin sites and pins duplicated is shown in Table 1-1. The data collected from these new pins will not be incorporated into the data set used for comparison to trigger values unless the original pin is lost.

Table 1-1. Duplicate erosion pins installed in March 2007

Zone/Site	Existing Pin #	Duplicate Pin #
2D	2D/1	2D/6
2K	2K/5	2K/6
3Ea	3Ea/4	3Ea/6
3G	3G/5	3G/6
4B	4B/1	4B/5
5G	5G/2	5G/7
5H	5H/1	5H/5
5H	5H/2	5H/6
5J	5J/4	5J/7

A1.2 Installation of additional erosion pin

An additional erosion pin was installed at site 2I in October 2006, which is a low-lying fine grained bank subject to scour (discussed in Basslink Baseline Report). The new pin was installed between the two existing pins, to provide a quantification of horizontal erosion rates as the muddy bank recedes.

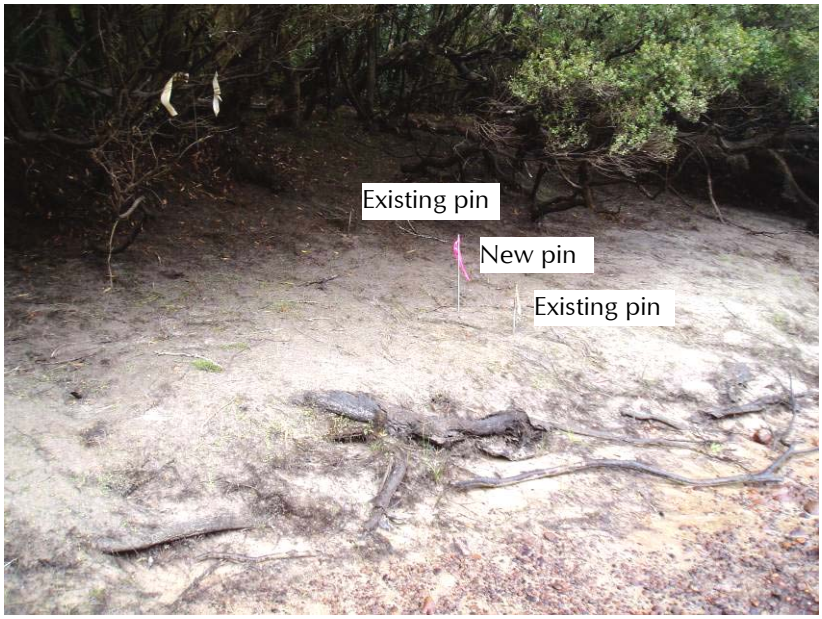


Photo 1-1. Erosion pin site 2I showing placement of new erosion pin on bank

A2. Installation of new piezometer array

Between March 2006 and October 2006, a new (third) set of piezometers was installed at geomorphology monitoring site 2G (site also known as G5a based on biological sampling site locations). The new array was installed to provide an array which could be cleaned and calibrated over the next several years of Basslink monitoring to increase the confidence in the monitoring results. The existing piezometers have been affected by siltation and have not been able to be calibrated or checked since installation. Discrepancies in the water level results recorded by the existing probes suggest they are not accurately recording water level behaviour in the bank.

The new array consists of seven probes, six installed in a bank profile at 10m intervals, beginning at the power station off low water level, and extending 50m inland. The previous piezometer array consisted of five probes extending 30m inland, so there is a 20m increase in bank coverage with the new array. The seventh probe in the array has been installed approximately 25m downstream of the profile, between 20m and 30m inland (between probes 3 and 4 in the new array). Data from this probe provides information about the longitudinal behaviour of ground water in the bank, and the site was selected because it is mid way between the piezometer array and an area on the bank which frequently shows seepage erosion.

The new (third) piezometer array became functional in October 2006, and both sets of probes are being maintained. The old piezometer array is now limited to four probes extending approximately 20m inland, as the fifth probe (27.2m inland) was damaged during installation of the new array, and no longer functions. No data was collected by either set of probes between 2 February 2007 and 17 March 2007 due to battery failure at the site. Unfortunately this period included the March monitoring shutdown.

A2.1 Comparison of results

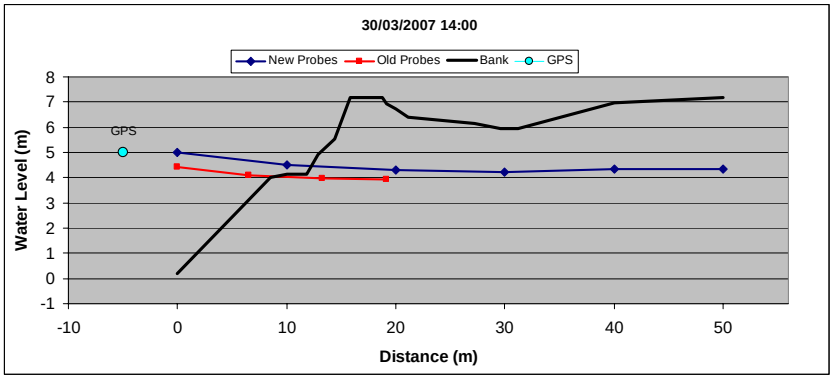
Data collected from both sets of probes are plotted against the bank profile during prolonged 3-turbine power station usage in Figure 2-1 and through a power station shutdown in Figure 2-1.

The graphs show that at high flow there is a consistent difference in water level readings between the two sets of instruments. At low river flows, the discrepancy between the river level probes (probes 1 in each array) diminishes. Results recorded by probe 1 in each piezometer array and from probe 4 in the old array (19.2m inland) and probe 3 in the new array (20m inland) were compared for the period 30 March 2007 and 3 May 2007, with the findings summarized in Table 2-1. This period of record includes extended 3-turbine power station usage and a 3-turbine to off power station shut down. The comparison shows that the discrepancies are not uniform, with the results from probe 1 in each array having a greater range of differences and standard deviation. The underlying causes for the differences in the data may be associated with surveying errors, movement of the bank since surveying and installation during installation of the 'old' probes, a

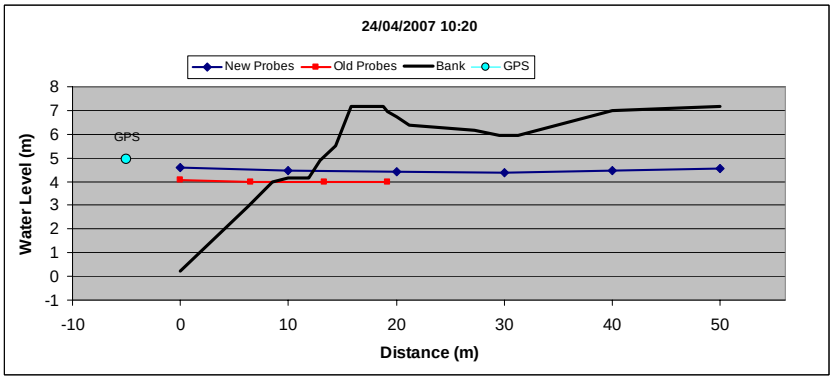
deterioration in the sensitivity of the 'old' probes, or offset errors in either or both of the arrays. These potential causes will be investigated when power station operating conditions and field access permits access the site.

Table 2-1 Summary of differences between water levels recorded by new and old piezometer arrays. Analysis based on comparison of data recorded between 30 March 2007 and 3 May 2007 which includes extended 3-turbine power station operation and a 3-turbine to off power station shutdown.

30/03/07 – 03/05/07 n=3308	Probe 1 New – Probe 1 Old (river level)	Probe 3 New – Probe 4 Old (Approx 20m inland)
Average difference	0.40 m	0.47 m
Range of difference	-0.18 to 0.62 m	0.32 to 0.67 m
Std deviation of differences	0.18 m	0.07 m

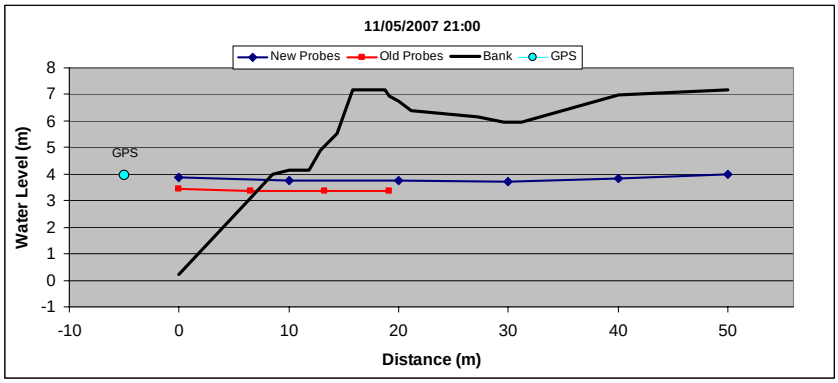


A

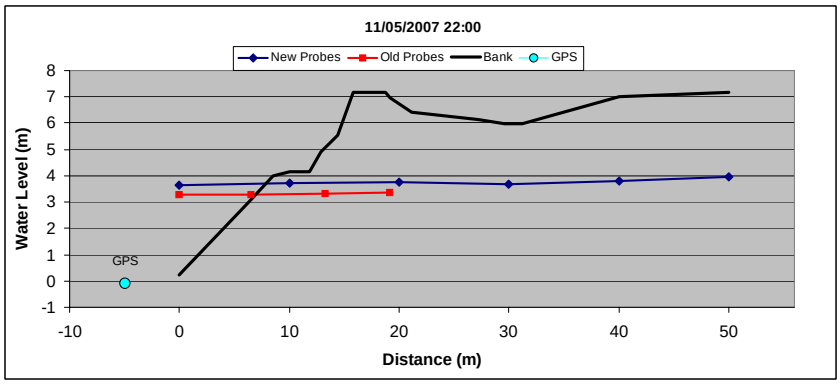


B

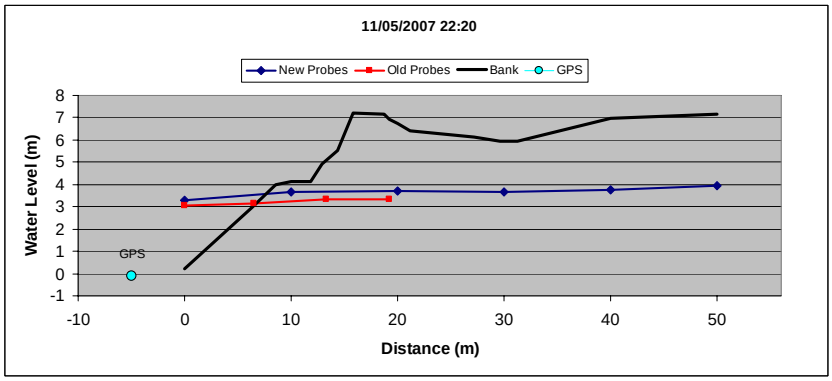
Figure 2-1. Piezometer results from old and new arrays during extended period of 3-turbine power station operation. GPS indicates power station output



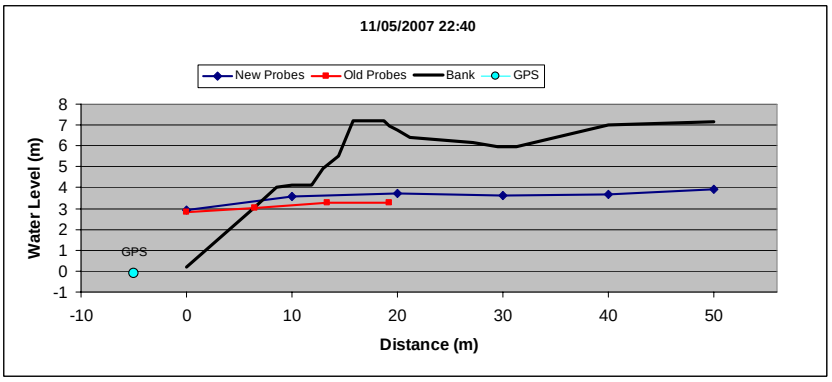
A



B

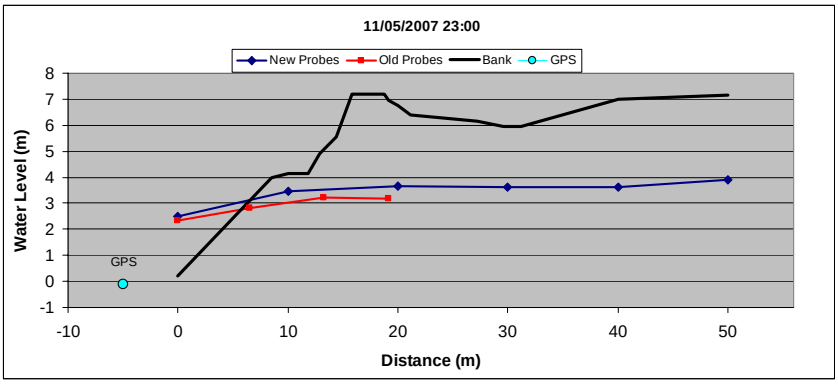


C



D

Figure 2-1 continued



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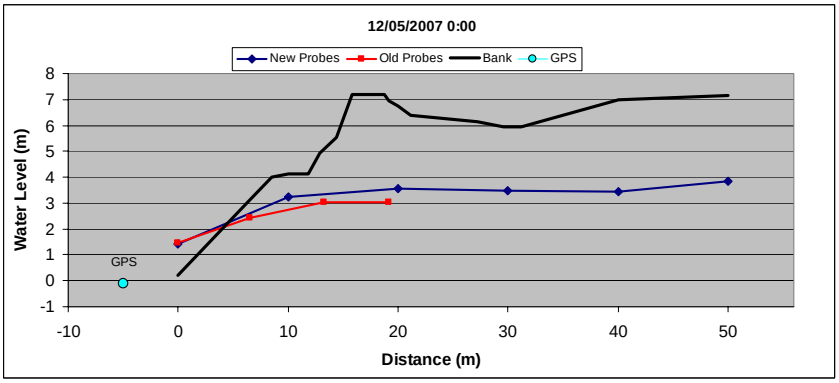
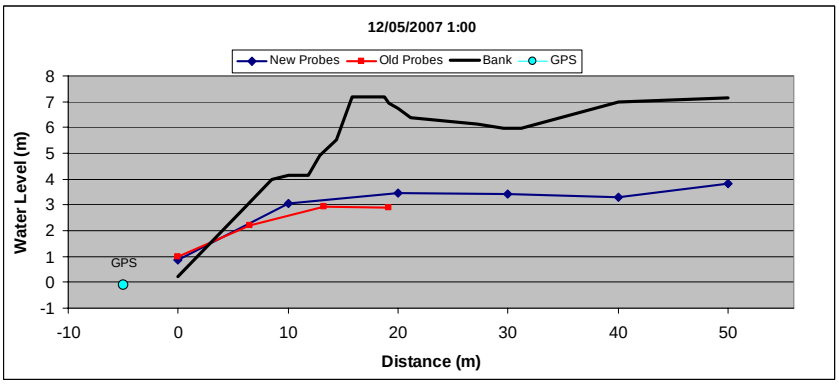
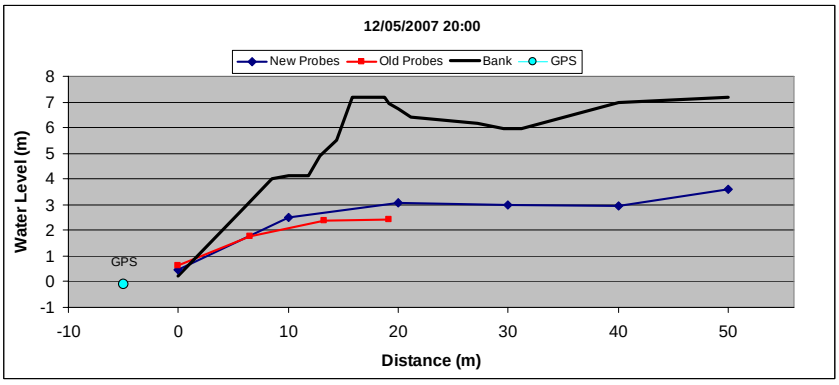


F



G



H

Figure 2-1 (continued)

A3. Erosion pin and scour chain results

A3.1 Abbreviations used in graphs

a,b,c – at Site 1A, 3-pipes at one site distinguished by a,b,c

b/slope – back slope; slope behind crest of bank

b/water – back water

cave – bank cavity

cob – vertical cobble bank

col – vertical colluvial bank

crest – crest of bank

flow – sediment flow

HW – Star picket at 3-turbine power station on high water level

pipe – casing for piezometer measured as erosion pin

slope – sandy bank slope

toe – sandy bank toe

top – top of bank

Top/Bot – Top or bottom (upslope/downslope) of pin measurement

<1 – below 1-turbine level

1-2 – 1-2 turbine level

2-3 – 2-3 turbine level

>3 - >3 turbine level

Table 3-1 Zone 1 erosion pin results 1/4. Exposed pin length recorded in mm

Zone	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**
Site	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**
Pin number	**1**	**1**	**2**	**2**	**3**	**3**	**4**	**4**	**5**	**5**	**6**	**6**	**7**	**7**	**8**	**8**	**8**	**8**	**8**	**8**	**9**	**9**
a,b,c,..															**a**	**a**	**b**	**b**	**c**	**c**		
Bank location	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	>3	>3	>3	>3	2-3	2-3	Col	Col
Top/Bot of pin	Top	Bot	To	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot
11-Dec-99	155		165		516		158		191		544		140		112		203		136		198	
18-Dec-99	157		164		514		161		191		555		140		112		204		137		196	
4-Mar-00	158		164		512		161		192		560		141		122		204		137		198	
25-Mar-00	165		168		515		167		170		562		142		128		200		135		192	
22-Jul-00	165		160		500		158		190		560		142		125		201		139		186	
2-Sep-00	160		165		510		165		170		572		125		124		210		134		188	
4-Aug-01	160		165		520		160		170		590				122		168		133			
23-Nov-01	167		163		510	525	165		186		612		139		121	129	172	169	125	135	190	
9-Dec-01																						
10-Feb-02	163	158	161	147	512	508	168	158	168	153	615		119	130	120	130	165	163	120	140	188	178
9-Mar-02	163	155	161	141	512	505	175	162	173	155	610	530	124	130	121	128	162	154	131			
5-Oct-02	168	154	163	150	514	510	174	165	171	155	620		134	139	129	134	163	154	118	142	185	179
16-Dec-02	172	154	163	151	515	509	216	167	188	155	620	525	138	140	125	138	161	163	121	147	191	180
29-Mar-03	170	160	164	150	515	518	218	170	177	156	613		121	138	112	138	110	170	131	142	188	181
18 Oct 03	170	156	164	153	514	506	220	167	182	157	611	530	142	139	102	141	150	162	127	137	185	181
6 Ma 04	173	157	163	156	513	508	220	176	159	155	600	455	136	132	98	141	137	171	126	139	186	183
9-Oct-04	174	157	161	154	511	512	197	168	149	153	585	519	143	140	110	140	138	165	128	143	185	183
2-Apr-05	173	169	183	152	512	509	218	172	182	152	597	513	152	142	113	140	145	168	132	149	184	178
15-Oct-05	175	175	168	160	415	425	250	180	185	156	610	420	175	170	115	150	160	178	140	162	191	188

Table 3-1 continued next page

Zone	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**
Site	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**
Pin number	**1**	**1**	**2**	**2**	**3**	**3**	**4**	**4**	**5**	**5**	**6**	**6**	**7**	**7**	**8**	**8**	**8**	**8**	**8**	**8**	**9**	**9**
a,b,c,..															**a**	**a**	**b**	**b**	**c**	**c**		
Bank location	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	>3	>3	>3	>3	2-3	2-3	Col	Col
Top/Bot of pin	Top	Bot	To	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot
11 Mar 06	173	159	165	156	513	514	228	175	166	155	597	521	160	162	100	138	152	170	150	180	188	186
17-Oct-06	175	155	165	154	514	510	227	175	174	158	600	535	150	190	108	144	156	174	195	327	184	186
17-Mar-07	169	157	163	156	511	509	226	175	174	155	596	549	149	190	106	140	157	175	203	313	188	187

Table 3-1 continued

Table 3-2. Zone 1 Erosion Pin Results 2/4. Exposed pin length recorded in mm

Zone	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**
Site	**B**	**B**	**B**	**B**	**B**	**B**	**B**	**B**	**B**	**B**	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**D**	**D**	**D**	**D**
Pin Number	**1**	**1**	**2**	**2**	**3**	**3**	**4**	**4**	**5**	**5**	**1**	**1**	**2**	**2**	**3**	**3**	**4**	**4**	**1**	**1**	**2**	**2**
Bank Location	1-2 cav	1-2 cav	2-3 cav	2-3 cav	1-2 flow	1-2 flow	1-2 cav	1-2 cav	2-3	2-3	<1	<1	<1	<1	<1	<1	<1	<1	2-3 cav	2-3 cav	1-2	1-2
Top/Bot of Pin	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot
11-Dec-99																						
18-Dec-99																						
4-Mar-00																						
25-Mar-00																						
22-Jul-00																						
2-Sep-00																						
4-Aug-01																						
23-Nov-01	815		276		744		259		503		830		936		797		902		390		286	
9-Dec-01	807	809	265		738		253		505		835	841	925	934	781		893	893	428	424	282	280
10-Feb-02																						
9-Mar-02	800	828	271	259	739	748	265	251	504	510	829	836	923	932	780	793	893	892	433	448	297	294
5-Oct-02	806	806			735	745	250	230	527	532	834	846	928	940	778	788	892	894	455	459	311	303
16-Dec-02											835	841	931	939	779	791	894	900	416	466	321	314
29-Mar-03	796	822	267	206	722	740	260	248	536	550	844	850	923	936	776	794	884	892	449	466	292	294
18 Oct 03	923	941	236	227	720	737	222	214	562	579	843	860	934	939	780	797	889	893	446	463	319	318
6-Mar-04	826	859	227	210	720	737	252	230	565	583	854	862	934	938	780	796	887	893	469	460	310	306
9-Oct-04	924	932	210	198	710	730	199	215	114	110	832	845	933	937	785	800	890	895	481	468	319	322
2 Apr 05	858	880	190	153	717	738	243	256	121	112	829	840	932	937	780	801	884	893	468	476	286	285
15-Oct-05	940	963	113	110	723	799	295	304	110	108	850	843	940	936	805	787	894	892	483	473	313	307
11-Mar-06	962	998	115	119	784	805	374	389	107	111	853	844	936	942	790	809	892	898	480	475	307	307

Table 3-2 continued next page

Zone	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**
Site	**B**	**B**	**B**	**B**	**B**	**B**	**B**	**B**	**B**	**B**	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**D**	**D**	**D**	**D**
Pin Number	**1**	**1**	**2**	**2**	**3**	**3**	**4**	**4**	**5**	**5**	**1**	**1**	**2**	**2**	**3**	**3**	**4**	**4**	**1**	**1**	**2**	**2**
Bank Location	1-2 cav	1-2 cav	2-3 cav	2-3 cav	1-2 flow	1-2 flow	1-2 cav	1-2 cav	2-3	2-3	<1	<1	<1	<1	<1	<1	<1	<1	2-3 cav	2-3 cav	1-2	1-2
Top/Bot of Pin	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot
17-Oct-06	961	995	90	105	808	824	404	430	112	107	838	850	938	941	790	810	890	900	484	484	310	310
17-Mar-07	949	964	77	118	782	785	415	418	114	107	833	838	932	938	791	806	893	901	486	475	300	304

Table 3-2 continued

Table 3-3. Zone 1 Erosion Pin Results 3/4. Exposed pin length recorded in mm

Zone	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**
Site	**D**	**D**	**D**	**E**	**E**	**E**	**E**	**E**	**E**	**E**	**E**	**E**	**E**	**F**	**F**	**F**	**F**
Pin Number	**3**	**3**	**4**	**1**	**1**	**2**	**2**	**3**	**3**	**4**	**4**	**5**	**5**	**1**	**2**	**3**	**4**
Bank Location	slope	slope	cav	toe	toe	slope	slope	slope	slope	slope	slope	top	top	cav	cav	cav	cav
Top/Bot of Pin	Top	Bot	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Bot	Bot	Bot	Bot
11-Dec-99																	
18-Dec-99																	
4-Mar-00																	
25-Mar-00																	
22-Jul-00																	
2-Sep-00																	
4-Aug-01																	
23-Nov-01	229		410	324		272		265		216		181		941	217	577	414
9-Dec-01	220		414	328	326	279	279	264	267	215	217	183	181	975	228	561	410
10-Feb-02																	
9-Mar-02	215	195	418	330	327	279	280	268	268	215	217	184	180	918	235	566	436
5-Oct-02	204	193	390	182	167	212	210	280	284	276	274	336	340	875	229	571	498
16-Dec-02	212	194	422	181	170	207	211	284	285	278	275	343	344	937	226	571	301
29-Mar-03	216	194	410	179	174	204	207	291	285	280	275	338	341	911	224	529	338
18 Oct 03	215	200	420	184	157	200	201	287	286	263	258	335	340	840	227	555	382
6 Mar-04	217	193	408	184	167	203	202	291	291	263	261	338	342	829	222	568	315
9-Oct-04	220	191	399	190	165	201	202	294	295	238	237	319	323	510	224	571	362
2 Apr 05	212	190	398	195	164	203	203	283	286	224	225	317	326	458	224	535	338
15-Oct-05	221	191	376	200	163	206	203	270	269	226	230	294	295	415	225	588	375
11 Mar 06	222	199	377	203	167	209	204	273	271	219	217	292	298	194	224	629	378
17 Oct-06	228	191	480	200	175	211	209	235	235	210	205	291	295	1085	230	555	405
17-Mar-07	216	194	472	200	186	214	212	247	254	210	211	300	301	1045	228	598	377

Table 3-4. Zone 1 erosion pin results 4/4. New Pins installed December 2004. Exposed pin length recorded in mm

Zone	**1**	**1**	**1**	**1**
Site	**E**	**E**	**E**	**E**
Pin Number	**6**	**6**	**7**	**7**
Bank Location	2-3	2-3	2-3	2-3
Top/Bot of Pin	Top	Bot	Bot	Top
11-Dec-04	168	177	141	142
2 Apr 05	171	173	140	142
15-Oct-05	164	167	140	141
11 Mar 06	176	167	130	138
17 Oct-06	170	168	141	138
17-Mar-07	170	167	138	138

Table 3-5. Zone 2 erosion pin results 1/6. Exposed pin length recorded in mm

Zone	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**
Site	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**B**	**B**	**B**	**B**	**B**	**B**	**B**	**B**
Pin Number	**1**	**1**	**2**	**2**	**3**	**3**	**4**	**4**	**5**	**5**	**6**	**6**	**7**	**7**	**1**	**1**	**2**	**3**	**3**	**4**	**5**	**5**
Bank Location	1-2	1-2	1-2	1-2	2-3	2-3	>3 crest	>3 crest	2-3 b/slope	2-3 b/slope	2-3 b/slope	2-3 b/slope	2-3 b/water	2-3 b/water	1-2 flow	1-2 flow	2-3 cav	1-2 flow	1-2 flow	2-3 cav	1-2 flow	1-2 flow
Top/Bot of Pin	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Bot	Top	Bot	Bot	Top	Bot
11-Dec-99																						
19-Dec-99																						
4-Mar-00																						
24-Mar-00																						
22-Jul-00																						
26-Sep-00																						
25-Nov-00																						
28-Jul-01																						
4-Aug-01																						
23-Nov-01	361		338		213						301		306		604		1024	866		883	228	
9-Dec-01	368	369	344	346	218	226	500	500	397	403	295	298	311	311	594	598	1002	856	856	884	271	276
9-Feb-02	373	375	339	342	219	222	501	501	399	404	291	293	310	304	526	562	1002	852	853	887	257	260
9-Mar-02	370	379	340	341	216	225	500	502	399	404	294	294	306	303	535	565	1003	859	856	893	181	256
13-Apr-02	377	379	346	347	216	222	499	501	400	405	289	291	292	297	527	569	1001	849	844	890	201	237

Table 3-5 continued next page

Zone	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**
Site	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**B**	**B**	**B**	**B**	**B**	**B**	**B**	**B**
Pin Number	**1**	**1**	**2**	**2**	**3**	**3**	**4**	**4**	**5**	**5**	**6**	**6**	**7**	**7**	**1**	**1**	**2**	**3**	**3**	**4**	**5**	**5**
Bank Location	1-2	1-2	1-2	1-2	2-3	2-3	>3 crest	>3 crest	2-3 b/slope	2-3 b/slope	2-3 b/slope	2-3 b/slope	2-3 b/water	2-3 b/water	1-2 flow	1-2 flow	2-3 cav	1-2 flow	1-2 flow	2-3 cav	1-2 flow	1-2 flow
Top/Bot of Pin	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Bot	Top	Bot	Bot	Top	Bot
5-Oct-02	363	371	337	340	206	220	500	500	396	405	290	295	301	300	562	603	1039	890	890	907	218	280
16-Dec-02	365	368	337	341	211	217	500	498	400	394	290	288	298	287	568	616	1058	874	888	928	213	214
29-Mar-03	370	371	336	339	208	218	500	500	395	399	280	279	300	298	502	575	1000	831	882	909	102	203
18 Oct 03	368	369	337	344	205	216	499	498	390	396	281	285	297	299	588	615	1001	879	916	879	145	270
6 Mar-04	364	362	335	337	203	217	500	499	391	398	277	284	296	300	577	599	1002	893	912	886	163	230
9-Oct-04	371	370	333	340	201	213	495	499	388	397	276	280	300	301	610	611	1001	913	929	874	197	266
9 Apr 05	361	369	335	340	200	213	495	495	390	401	277	277	298	300	564	609	1015	887	880	910	195	205
15-Oct-05	374	377	340	347	200	206	495	497	390	394	272	276	308	305	627	627	1001	941	943	872	257	260
11 Mar 06	371	373	341	350	199	210	496	492	390	394	272	273	314	308	631	633	1002	948	935	909	253	270
17 Oct 06	366	373	343	348	200	210	494	492	390	394	270	272	403	354	625	635	1001	966	958	1097	263	263
17-Mar-07	357	359	335	340	198	203	494	493	388	392	260	265	390	381	626	625	1001	952	954	958	264	266

Table 3-5 continued

Table 3-6. Zone 2 Erosion Pin Results 2/6. Exposed pin length recorded in mm

Zone	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**
Site	**B**	**B**	**B**	**B**	**B**	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**D**	**D**	**D**	**D**	**D**	**D**	**D**	**D**	**E**	**E**	**E**	**E**	**E**
Pin Number	**6**	**7**	**7**	**8**	**8**	**1**	**1**	**2**	**3**	**3**	**4**	**4**	**1**	**1**	**2**	**2**	**3**	**3**	**4**	**4**	**1**	**2**	**2**	**3**	**3**
Bank Location	2-3 cav	1-2 flow	1-2 flow	<1	<1	2-3 cav	2-3 cav	2-3 cav	1-2 flow	1-2 flow	<1	<1	2-3	2-3	2-3	2-3	1-2	1-2	<1	<1	2-3 cav	2-3	2-3	1-2	1-2
Top/Bot of Pin	Bot	Top	Bot	Top	Bot	Top	Bot	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Bot	Top	Bot	Top	Bot
11-Dec-99																						110		155	
19-Dec-99													150		159		145		950			123		70	
4-Mar-00									295				150		98		143		934			118		151	
24-Mar-00																									
22-Jul-00									390				129		140		150		985			111		165	
26-Sep-00																									
25-Nov-00																									
28-Jul-01																									
4-Aug-01																									
23-Nov-01	961	289							450	333			154	165	112	156	120	138	783	821	572	112	130	151	215
9-Dec-01	947	390	389			1849		822	434	481			154	168	109	128	129	146	835	862	572	112	130	155	213
9-Feb-02	956	311	313			1844		792	348	464			155	169	115	125	137	147	858	880	582	113	128	154	220
9-Mar-02	946	308	321			1795	1799	784	358	476			155	169	109	116	143	156	878	886	582	117	143	180	218
13-Apr-02	920	295	307			1807	1790	783	290	481			155	165	88	90	151	165	862	867	583	123	145	151	218
5-Oct-02	510	241	327	241	327	1845	1813	794	393	542	250	248	151	153	131	152	140	160	853	866	586	130	154	150	220
16-Dec-02	505	245	329	428	438	1868	1811	783	410	519	264	266	150	150	152	167	145	160	850	870	594	129	152	145	223
29-Mar-03	430	243	325	493	500	1810	1850	782	473	538	260	266	154	160	116	120	223	227	840	840	597	134	161	144	233
18 Oct 03	515	316	332	413	416	1779	1778	719	466	571	277	279	145	155	199	202	161	167	819	828	588	129	151	230	144
6 Mar-04	506		282	422	431	1511	1625	727	470	575	272	276	144	155	169	180	170	180	828	831	597	129	153	134	234

Table 3-6 continued next page

Zone	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**
Site	**B**	**B**	**B**	**B**	**B**	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**D**	**D**	**D**	**D**	**D**	**D**	**D**	**D**	**E**	**E**	**E**	**E**	**E**
Pin Number	**6**	**7**	**7**	**8**	**8**	**1**	**1**	**2**	**3**	**3**	**4**	**4**	**1**	**1**	**2**	**2**	**3**	**3**	**4**	**4**	**1**	**2**	**2**	**3**	**3**
Bank Location	2-3 cav	1-2 flow	1-2 flow	<1	<1	2-3 cav	2-3 cav	2-3 cav	1-2 flow	1-2 flow	<1	<1	2-3	2-3	2-3	2-3	1-2	1-2	<1	<1	2-3 cav	2-3	2-3	1-2	1-2
Top/Bot of Pin	Bot	Top	Bot	Top	Bot	Top	Bot	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Bot	Top	Bot	Top	Bot
9-Oct-04	502	317	344	423	425	1777	1663	716	488	582			148	159	172	190	188	203	786	804	594	154	136	188	387
9 Apr 05	517	310	325	430	435	1152	1178	730	500	570	280	285	165	210	175	191	214	216	830	852	605	136	140	209	315
15-Oct-05	521	346	345	405	410	1787	1838	754	514	577	284	287	215	240	213	217	185	196	860	854	595	141	165	247	362
11 Mar 06	390	326	338	399	404	1690	1690	754	523	583	281	286	216	296	217	219	196	209	769	802	609	138	164	238	365
17 Oct-06	939	341	346	369	374	1695	1695	777	466	532	288	292	179	150	202	201	194	207	807	821	600	174	149	249	272
17-Mar-07	908	347	346	378	380	1771	1776	829	468	522	288	282	171	157	183	184	177	186	792	806	615	196	176	256	340

Table 3-6 continued

Table 3-7. Zone 2 Erosion Pin Results 3/6. Exposed pin length recorded in mm.

Zone	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**
Site	**E**	**E**	**E**	**E**	**F**	**F**	**F**	**F**	**G**	**G**	**G**	**G**	**G**	**G**	**G**	**G**	**H**	**H**	**H**	**H**	**H**	**H**	**H**
Pin Number	**4**	**4**	**5**	**5**	**1**	**1**	**2**	**2**	**1**	**2**	**2**	**3**	**4**	**5**	**6**	**6**	**1**	**1**	**2**	**2**	**3**	**3**	**4**
Bank Location	1-2	1-2	<1	<1	cob	cob	cob	cob	2-3 cav	1-2 flow	1-2 flow	2-3 cav	2-3 cav	2-3 cav	<1	<1	2-3	2-3	1-2	1-2	<1	<1	2-3 cav
Top/Bot of Pin	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Bot	Top	Bot	Bot	Bot	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Bot
11-Dec-99	135		810																				
19-Dec-99	138		827																				
4-Mar-00	139		815																				
24-Mar-00																							
22-Jul-00	140		818																				
26-Sep-00																							
25-Nov-00																							
28-Jul-01																							
4-Aug-01																							
23-Nov-01	127	165	789	828	222		194		846	415		696		1000			301		299		322		405
9-Dec-01	129	165	790	822	231	229	215	175	858	408		693		1015									
9-Feb-02	129	166	799	835	236	229	218	164	872	432	435	682	1423	1032			295	295	273	276	333	329	409
9-Mar-02	134	160	790	824	242	231	239	167	878	460	466	672	1531	1026			291	295	258	259	316	306	393
13-Apr-02	136	161	790	824	246	250	235	162															
5-Oct-02	126	128	762	773	249	246	239	194	875	486	498	673	1531	1036	173	172	261	258	256	261	332	328	392
16-Dec-02	133	131	765	809	246	252	235	208	885	489	504	673	1567	1094	181	190	263	271	241	245	310	320	400
29-Mar-03	142	150	782	670					888	432	500	676	1535	1109	142	143	264	267	263	266	342	336	391
18 Oct 03	133	174	767	778	244	248	246	203	1069	449	472	671	1136	1115	174	178	258	256	228	232	261	257	286
6 Mar-04	138	194	765	777	248	232	216	207	1262	423	468	675	1533	1073	134	178	260	265	241	248	296	313	380
9-Oct-04	157	185	748	758					946	398	427	686	1636	1051	220	233	272	271	255	262	310	310	374

Table 3-7 continued next page

Zone	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**
Site	**E**	**E**	**E**	**E**	**F**	**F**	**F**	**F**	**G**	**G**	**G**	**G**	**G**	**G**	**G**	**G**	**H**	**H**	**H**	**H**	**H**	**H**	**H**
Pin Number	**4**	**4**	**5**	**5**	**1**	**1**	**2**	**2**	**1**	**2**	**2**	**3**	**4**	**5**	**6**	**6**	**1**	**1**	**2**	**2**	**3**	**3**	**4**
Bank Location	1-2	1-2	<1	<1	cob	cob	cob	cob	2-3 cav	1-2 flow	1-2 flow	2-3 cav	2-3 cav	2-3 cav	<1	<1	2-3	2-3	1-2	1-2	<1	<1	2-3 cav
Top/Bot of Pin	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Bot	Top	Bot	Bot	Bot	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Bot
9 Apr 05	155	170	760	765	265	265	244	205	1175	390	440	680	1700	730	114	170	275	277	255	262	323	320	400
15-Oct-05	179	181	731	735					915	437	446	688	1649	651	144	164	275	275	257	260	298	300	225
11 Mar 06	208	210	749	783					1052	444	478	680	1536	838	131	193	277	276	253	258	297	300	223
17 Oct-06	162	167	724	725					1051	512	518	696	1590	1016	93	133	276	276	247	257	295	297	70
17-Mar-07	164	170	745	748					1062	507	521	694	1596	1038	76	95	273	276	241	250	289	288	80

Table 3-7 continued

Table 3-8. Zone 2 erosion pin results 4/6. Exposed pin length recorded in mm.

Zone	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**
Site	**H**	**H**	**H**	**H**	**I**	**I**	**I**	**I**	**J**	**J**	**J**	**J**	**J**	**J**	**K**	**K**	**K**	**K**	**K**	**K**	**K**	**K**
Pin Number	**5**	**5**	**6**	**6**	**1**	**1**	**2**	**2**	**1**	**1**	**2**	**2**	**3**	**3**	**1**	**2**	**3**	**3**	**4**	**4**	**5**	**5**
Bank Location	1-2	1-2	<1	<1	1-2	1-2	1-2	1-2	2-3	2-3	1-2	1-2	<1	<1	2-3 cav	2-3 cav	1-2	1-2	1-2	1-2	<1	<1
Top/Bot of Pin	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Bot	Bot	Top	Bot	Top	Bot	Top	Bot
11-Dec-99									160		120		150				115		160		980	
19-Dec-99																	152		133		893	
4-Mar-00																						
24-Mar-00																					1032	
22-Jul-00																	185		160		900	
26-Sep-00																					938	
25-Nov-00																	104		34		954	
28-Jul-01																						
4-Aug-01																						
23-Nov-01	385		275		261		291		170		244	260	223		772	921	165		158		1020	1062
9-Dec-01																						
9-Feb-02	405	415	293	293	262	259	288	288	202		245	258	218		760	950	163	204	175	250	1042	1101
9-Mar-02	493	496	255	301	260	258	288	289	184	272	253	290	226		762	1078	163	196	227	240	1086	1103
13-Apr-02																						
5-Oct-02	476	482	322	317	254	253	284	285	152	375	310	306	167	175	761	181	120	138	220	211	1062	1098
16-Dec-02	484	494	257	262																		
29-Mar-03	511	540	240	230	252	253	284	287	188	182	329	412	256	260	769	257	211	240	350	354	1229	1244
18 Oct 03	400	351	305	390	242	240	274	278	160	185	364	382	200	208	767	515	409	414	277	289	1141	1154
6 Mar-04	350	335	202	181	241	238	275	286	200	235	373	432	243	259	760	461	413	432	265	328	1199	1210
9-Oct-04	370	380	175	177	240	237	278	286	336	363	350	369	245	243	617	798	433	471	258	272	1160	1175

Table 3-8 continued next page

Zone	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**
Site	**H**	**H**	**H**	**H**	**I**	**I**	**I**	**I**	**J**	**J**	**J**	**J**	**J**	**J**	**K**	**K**	**K**	**K**	**K**	**K**	**K**	**K**
Pin Number	**5**	**5**	**6**	**6**	**1**	**1**	**2**	**2**	**1**	**1**	**2**	**2**	**3**	**3**	**1**	**2**	**3**	**3**	**4**	**4**	**5**	**5**
Bank Location	1-2	1-2	<1	<1	1-2	1-2	1-2	1-2	2-3	2-3	1-2	1-2	<1	<1	2-3 cav	2-3 cav	1-2	1-2	1-2	1-2	<1	<1
Top/Bot of Pin	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Bot	Bot	Top	Bot	Top	Bot	Top	Bot
9 Apr 05	392	392	184	185	235	232	279	281	300	414	333	411	290	300	164	672	401	487	332	387	1123	1130
15-Oct-05	289	386	177	184	233	231	270	273	295	358	380	413	303	309		662	441	479	380	392	1313	1354
11 Mar 06	370	394	175	174	235	230	267	278	303	360	380	437	290	293	458	663	440	483	369	396	1270	1288
17 Oct-06	391	395	173	173	233	229	275	289	398	450	389	424	275	280	407	225	305	444	269	317	1396	1321
17-Mar-07	354	338	143	146	221	227	280	289	386	470	322	430	349	347	386	154	302	307	156	297	1318	1340

Table 3-8 continued

Table 3-9 Zone 2 Erosion Pin Results 5/6. Exposed pin length recorded in mm.

Zone	**2**	**2**	**2**	**2**	**2**	**2**	**2**
Site	**L**	**L**	**L**	**L**	**L**	**L**	**L**
Pin Number	**1**	**2**	**2**	**3**	**3**	**4**	**4**
Bank Location	2-3 cav	1-2	1-2	1-2	1-2	<1	<1
Top/Bot of Pin	Bot	Top	Bot	Top	Bot	Top	Bot
11-Dec-99		96		175		942	
19-Dec-99							
4-Mar-00		92.5		175		980	
24-Mar-00		100		175		1118	
22-Jul-00		98		160		1130	
26-Sep-00		97		188		1150	
25-Nov-00		92		190		1166	
28-Jul-01		100		186		1169	
4-Aug-01		100		187		1169	
23-Nov-01	763	98	101	190	192	1167	
9-Dec-01							
9-Feb-02	769	97	100	174	180	1167	1175
9-Mar-02	765	96	100	184	188	1152	1182
13-Apr-02							
5-Oct-02	767	98	101	199	224	1149	1161
16-Dec-02							
29-Mar-03	769	98	104	211	220	1167	1165
18 Oct 03	757	103	106	259	276	1145	1154
6 Mar-04	771	102	108	269	286	1168	1179
9-Oct-04	776	121	209	345	350	1162	1165
9 Apr 05	772	191	216	320	342	1164	1184
15-Oct-05	768	243	261	321	334	1164	1180
11 Mar 06	763	237	266	357	354	1165	1180
17 Oct-06	766	250	291	258	254	1161	1176
17-Mar-07	757	276	282	249	252	1160	1173

Table 3-10. Zone 2 Erosion Pin Results 6/6. New pins installed in December 2004 Exposed pin length recorded in mm.

Zone	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**
Site	**D**	**D**	**G**	**G**	**G**	**G**	**L**	**L**	**L**	**L**	**K**	**K**	**L**	**L**	**D**	**D**	**I**	**I**	**L**	**L**	**D**	**D**	**I**	**I**
Pin Number	**5**	**5**	**7**	**7**	**8**	**8**	**5**	**5**	**6**	**6**	**2**	**2**	**7**	**7**	**6**	**6**	**3**	**3**	**7**	**7**	**6**	**6**	**3**	**3**
a,b,c,..											**new**	**new**												
Bank Location	2-3 turb	2-3 turb	2-3 turb	2-3 turb	2-3 turb	2-3 turb	2-3 turb	2-3 turb	2-3 turb	2-3 turb	2-3 turb	2-3 turb	2-3 turb?	2-3 turb?	2-3 turb	2-3 turb	1-2 turb	1-2 turb	2-3 turb?	2-3 turb?	2-3 turb	2-3 turb	1-2 turb	1-2 turb
Top/Bot of Pin	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	top	bot	top	bot	top	bot
11 Dec-04	196	195	177	161	191	189	160	158	200	191														
9 Apr 05	200	200	174	160	197	195	160	152	194	190														
15 Oct-05	202	201	171	162	199	193	160	151	192	187														
11 Mar 06	201	202	174	161	198	192	160	149	183	216	458	462												
17 Oct-06	200	199	171	169	201	199	153	146	223	214	225	246	208	210	272	285	467	467	208	210	272	285	467	467
17-Mar-07	199	199	171	166	201	222	151	144	208	208	154	161	199	199	171	166	201	222	200	207	268	282	463	463

Table 3-11. Zone 3 Erosion Pin Results 1/5 - Exposed pin length recorded in mm.

Zone	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**
Site	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**B**	**B**	**B**	**B**	**B**	**B**	**B**	**B**	**C**	**C**	**C**	**C**	**C**
Pin Number	**1**	**1**	**2**	**2**	**3**	**3**	**4**	**4**	**1**	**1**	**2**	**3**	**4**	**4**	**5**	**5**	**1**	**2**	**2**	**3**	**3**
Bank Location	<1	<1	1-2	1-2	1-2	1-2	<1	<1	1-2	1-2	2-3 cav	2-3 cav	1-2	1-2	<1	<1	2-3 cav	1-2	1-2	1-2	1-2
Top/Bot of Pin	Top	Bot	Top	Bot					Top	Bot	Bot	Top	Top	Bot	Top	Bot	Bot	Top	Bot	Top	Bot
18-Dec-99	390								175				154		325						
6 Mar 00	510																				
26-Sep-00	540																				
23 Nov-01	674								159												
8-Dec-01	682								135		504	676	68				1835	389		268	281
10-Feb-02	730								83	105	482	680	170	185			1770	404	407	264	279
9-Mar-02	765	773							142	274	465	686			191	237	1837	396	404	257	279
13 Apr-02																					
5 Oct-02	Lost	Lost	156	149	274	278	767	770	172	191	420	675	Lost	Lost	199	203	1686	390	395	248	287
16 Dec-02			152	160	283	283	769	769	174	195	415	677	114	69	202	211	1871	381	378	248	286
29-Mar-03			320	335	345	339	853	855	170	199	425	689	237	262	266	270	1888	380	395	250	284
18 Oct 03			444	446	378	380	951	948	180	198	425	698	275	291	204	270	1685	368	383	248	256
6-Mar-04			516	522	500	501	777	777	173	201	415	690	282	272	215	268	1874	365	386	245	256
9-Oct-04			523	522	420	416	733	735	195	221	418	713	307	308	190	236	1855	360	369	245	440
2 Apr 05			581	570	309	309	641	645	186	214	140	718	253	308	269	193	1795	359	370	431	439
15 Oct-05			533	530	200	194	714	714	243	231	132	721	301	317	256	256	1796	362	370	415	443
11 Mar 06			568	667	190	187	687	685	233	246	143	704	295	306	263	265	1682	361	366	416	430
17 Oct-06			510	504	115	108	652	656	214	255	130	715	276	282	227	248	1680	367	372	485	509
17-Mar-07			495	491	171	177	699	699	190	232	78	740	280	296	230	285	1875	364	373	465	486

Table 3-12. Zone 3 Erosion Pin Results 2/5 - Exposed pin length recorded in mm.

Zone	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**
Site	**C**	**C**	**C**	**C**	**D**	**D**	**D**	**D**	**D**	**D**	**Ea**	**Ea**	**Ea**	**Ea**	**Ea**	**Ea**	**Ea**	**Ea**	**Ea**	**Ea**	**Ea**	**Ea**
Pin Number	**4**	**4**	**5**	**5**	**1**	**1**	**2**	**2**	**3**	**3**	**1**	**1**	**2**	**2**	**3**	**3**	**4**	**4**	**5**	**5**	**6**	**6**
Bank Location	1-2	1-2	<1	<1	2-3 cav	2-3 cav	1-2	1-2	<1	<1	>3	>3	2-3	2-3	<1	<1	1-2	1-2	2-3	2-3	>3 HW	>3 HW
Top/Bot of Pin	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot
18-Dec-99																						
6-Mar-00																						
26-Sep-00																						
23-Nov-01											105		244		245		119		115			
8-Dec-01	261	280	434	434	600		581	578	340	333	102	104	239	233	242	241	137	117	122	120		
10-Feb-02	258	288	486	490	588	605	582	586	340	355	100	85	237	241	234	255	69	69	158	152		
9-Mar-02	244	277	479	496	616	589	577	584	329	333	98	75	240	241	219	220	27	30	210	204		
13-Apr-02											78	98	235	238	208	205	0		221	213		
5-Oct-02	395	395	390	395	615	396	580	582	310	321	97	80	300	306	260	329	122	123	190	184	417	394
16-Dec-02	366	395	408	414		592	580	580	334	344	84	93	330	331	251	308	134	128	176	174	422	422
29-Mar-03	260	292	430	437	613	604	576	576	428	430	96	84	317	316	263	262	72	82	214	202	420	405
18 Oct 03	373	390	351	356	608	583	576	583	450	454	86	64	371	388	248	257	136	134	191	186	420	388
6-Mar-04	376	385	313	313	645	582	582	576	496	501	74	68	350	373	251	259	93	102	230	198	420	397
9-Oct-04	363	369	329	330	566	327	602	605	493	495	68	66	381	470	246	244	126	129	195	192	420	395
2 Apr 05	338	355	253	265	588	548	614	614	547	549	77	65	384	433	224	232	64	63	225	222	420	391
15-Oct-05	319	360	238	235	587	555	704	718	550	556	67	86	404	467	172	177	91	99	215	211	418	397
11 Mar 06	318	341	237	240	553	583	697	707	496	490	88	70	480	539	190	188	102	100	245	238	426	389
17 Oct-06	283	287	199	204	551	598	692	693	475	480	220	218	421	418	191	191	167	163	250	244	420	395
17-Mar-07	274	288	228	230	568	601	660	670	576	580	341	257	344	347	150	163	65	66	273	265	420	406

Table 3-13. Zone 3 Erosion Pin Results 3/5 - Exposed pin length recorded in mm.

Zone	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**
Site	**Eb**	**Eb**	**Eb**	**Eb**	**Eb**	**Eb**	**Eb**	**Eb**	**Eb**	**F**	**F**	**F**	**F**	**F**	**F**	**F**	**F**	**F**	**F**	**G**	**G**	**G**
Pin Number	**1**	**2**	**2**	**3**	**3**	**4**	**4**	**5**	**5**	**1**	**1**	**2**	**2**	**3**	**3**	**4**	**4**	**5**	**5**	**1**	**2**	**2**
Bank Location	>3	2-3	2-3	1-2	1-2	1-2	1-2	<1	<1	2-3 cav	2-3 cav	1-2	1-2	1-2	1-2	<1	<1	>3 HW	>3 HW	2-3 cav	1-2	1-2
Top/Bot of Pin	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Bot	Top	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Top	Bot
18-Dec-99																						
6-Mar-00																						
26-Sep-00																						
23-Nov-01		150		210		222		170														
8-Dec-01	161	142	151	207	208	227	229	186	185	1492		125		180		212				479	195	192
10-Feb-02	159	145	149	237	240	247	252	227	224	1245		138		179	178	230	227			478	196	191
9-Mar-02	161	145	150	246	255	286	286	254	253	1185		133	133	175	174	236	234			484	194	195
13-Apr-02	160	234	243	273	291	303	300	268	269	1307		133	134	177	177	240	242			482	181	182
5-Oct-02	164	133	140	452	455	332	334	245	240	1205	1250	132	133	169	170	218	220	738	680	484	191	186
16-Dec-02	164	131	136	448	450	351	350	229	233	1360		145	145	173	173	226	230			489	190	188
29-Mar-03	163	137	139	496	501	328	326	220	218	1205	1373	139	138	174	173	226	225			490	183	180
18 Oct 03	156	127	131	542	556	352	352	215	223	1221	1210	136	133	169	169	223	220	730	696	476	193	190
6-Mar-03	156	124	131	555	658	371	372	270	270	1220	1200	138	138	171	169	244	240	735	698	475	186	187
9-Oct-04	151	121	121	601	606	390	385	270	271	2000	2002	143	143	168	168	209	209	732	699	475	202	189
2 Apr 05	154	118	122	587	592	374	373	270	269	2484		141	140	191	188	227	224	739	706	482	195	193
15-Oct-05	152	120	120	586	603	358	354	253	248	1236		152	152	182	184	196	195	700	731	472	207	200
11 Mar 06	153	164	120	117	573	604	376	374	256	256	1202	1245	151	152	186	192	203	203	735	700	476	217
17 Oct-06	152	161	120	114	559	563	365	363	242	240	1239	1246	150	149	200	201	201	197	733	690	475	233
17-Mar-07	150	171	115	115	573	590	376	378	258	258	1260	1254	140	141	205	200	212	218	730	700	508	231

Table 3-14. Zone 3 Erosion Pin Results 4/5 - Exposed pin length recorded in mm.

Zone	**3**	**3**	**3**	**3**	**3**	**3**
Site	**G**	**G**	**G**	**G**	**G**	**G**
Pin Number	**3**	**3**	**4**	**4**	**5**	**5**
Bank Location	1-2	1-2	1-2	1-2	<1	<1
Top/Bot of Pin	Top	Bot	Top	Bot	Top	Bot
18-Dec-99						
6-Mar-00						
26-Sep-00						
23-Nov-01						
8-Dec-01	134	134	230	235	129	131
10-Feb-02	138	140	237	238	142	165
9-Mar-02	135	138	232	237	145	160
13-Apr-02	130	131	231	233	217	235
5-Oct-02	111	113	230	228	265	300
16-Dec-02	106	109	213	215	230	263
29-Mar-03	105	108	200	215	237	241
18 Oct 03	98	104	207	210	95	98
6-Mar-04	97	105	225	230	181	200
9-Oct-04	119	121	222	232	167	
2 Apr 05	134	138	243	243	114	123
15-Oct-05	151	146	226	224	69	89
11 Mar 06	149	150	215	218	47	55
17 Oct-06	158	157	192	192	52	56
17-Mar-07	150	148	174	180	101	112

Table 3-15. Zone 3 Erosion Pin Results 5/5 – New pins installed in December 2004. Exposed pin length recorded in mm.

Zone	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**
Site	**A**	**A**	**A**	**A**	**A**	**A**	**C**	**C**	**D**	**D**	**D**	**D**	**Eb**	**Eb**	**Eb**	**Eb**
Pin Number	**55**	**55**	**5**	**5**	**6**	**6**	**55**	**55**	**55**	**55**	**4**	**4**	**55**	**55**	**6**	**6**
Top/Bot of Pin	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Bot	Top	Top	Bot	Top	Bot	Top
11 Dec 04	159	175	185	173	168	170			130	137	169	149	102	111	108	101
2 Apr 05	173	188	180	174	189	188	107	134	114	125	166	148	75	77	123	133
15 Oct 05	180	188	214	214	200	199	105	171	105	123	167	144	63	68	151	156
11 Mar 06	266	284	210	217	205	203	158	184	110	127	170	150	71	71	159	245
17 Oct-06	270	296	211	270	207	210			216	199	166	149	57	59	403	478
17-Mar-07	276	295	215	271	208	205	130	163	150	173	167	150	81	82	340	410

Table 3-16. Zone 4 Erosion Pin Results 1/5 - Exposed pin length recorded in mm.

Zone	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**
Site	**A**	**A**	**A**	**A**	**A**	**A**	**B**	**B**	**B**	**B**	**B**	**B**	**C**	**C**	**D**	**D**	**D**	**D**	**D**	**D**
Pin Number	**1**	**1**	**2**	**2**	**3**	**3**	**1**	**1**	**2**	**2**	**3**	**3**	**1**	**2**	**1**	**1**	**2**	**2**	**3**	**3**
Bank Location	2-3	2-3	1-2	1-2	<1	<1	2-3	2-3	1-2	1-2	<1	<1	cob	cob	2-3	2-3	1-2	1-2	1-2	1-2
Top/Bot of Pin	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Bot	Top	Top	Bot	Top	Bot	Top	Bot
18 Dec 99																				
25 Sep 00																				
23 Nov 01																				
8 Dec 01	188	192	208	210	151	150	256	258	377	381	150	151	321	269	221	224	231	234	220	220
10 Feb 02	196	195	204	212	199	201	270	264	415	410	150	160	332	281	211	216	238	242	251	255
10 Mar 02	196	198	190	193	214	213	238	231	369	382	158	158	323	288	210	217	244	246	266	268
13 Apr 02	191	196	195	205	268	269	165	136	367	334	161	168	324	294	201	212	218	244	263	267
5 Oct 02	169	170	196	236	362	365	Lost	Lost	208	210	128		341	298	175	181	240	248	243	247
16 Dec 02	170	173	195	220	357	357			228	205			324	298	185	190	252	267	250	250
29 Mar 03	166	171	193	240	410	405			229	225	225	270			185	196	238	240	245	247
18 Oct 03	131	135	211	217	395	393			218	214	238	238			157	167	263	265	237	242
6 Mar -4	124	135	178	183	396	393	840	846	252	244	133	138			159	166	246	251	233	235
9 Oct 04	106	110	208	218	339		887	888			160	160	323	289	135	152	250	250	273	276
2 Apr 05	105	111	185	194	403	410	884	878	342	342	167	178			136	151	245	247	253	257
15 Oct 05	98	105	197	207	404	388	883	873			182	206	320	286	141	161	280	282	294	302
11 Mar 06	91	102	210	214	396	396	899	893	380		232	232			147	161	300	301	308	311
17 Oct 06	113	123	249	253	455	450	934	915	360	360	215	233			164	181	275	277	285	287
17 Mar 07	100	108	168	174	485	475	905	850	392		205	323	320	287	168	180	256	158	252	255

Table 3-17. Zone 4 Erosion Pin Results 2/5 - Exposed pin length recorded in mm.

Zone	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**
Site	**E**	**E**	**E**	**E**	**E**	**E**	**E**	**E**	**F**	**F**	**F**	**F**	**F**	**F**	**F**	**F**	**F**	**F**
Pin Number	**1**	**1**	**2**	**2**	**3**	**3**	**4**	**4**	**1**	**1**	**2**	**2**	**3**	**3**	**4**	**4**	**5**	**5**
Bank Location	2-3	2-3	2-3	2-3	1-2	1-2	<1	<1	2-3	2-3	2-3	2-3	1-2	1-2	1-2	1-2	1-2	1-2
Top/Bot of Pin	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot
18 Dec 99									195		225							
25-Sep-00									191		232							
23 Nov 01									194		229							
8-Dec-01	236	261	305	305	228	229	210	215	184	193	215	225	217	224	151	161	391	398
10 Feb 02	251	255	327	330	237	241	145	201	169	191	209	216	220	227	187	191	408	407
10 Mar 02	247	266	330	335	230	240	280	285	171	184	184	196	232	240	193	201	413	409
13 Apr 02	255	267	330	337	241	249	240	254	199	199	224	215	230	242	185	192	416	418
5-Oct-02	243	268	322	331	230	268	300	320	190	203	224	241	175	185	131	134	428	425
16 Dec 02	246	269	329	336	231	270	302	320	202	203	234	245	206	212	175	185	443	440
29-Mar-03	236	251	320	322	245	284	326	333	201	206	236	240	201	210	216	219	412	416
18 Oct 03	240	270	323	330	267	268	313	324	188	192	230	240	195	205	240	245	440	445
6-Mar04	246	269	322	335	286	297	335	348	190	190	210	230	227	261	233	245	430	442
9-Oct-04	249	273	340	348	280	311	344		195	197	219	232	184	250	94	115	450	454
2 Apr 05	256	287	491	511	345	351	385	402	180	206	220	232	246	262	261	275	450	460
15 Oct 05	267	298	620	600	363	367	350	360	201	208	242	259	254	268			479	478
11 Mar 06	269	303	lost		325	341	367	390	212	214	241	255	262	278	291		477	477
17 Oct-06	722	698			303	304			206	211	239	259	266	286	308	311	480	480
17-Mar-07	738	770			310	313	322	330	200	215	255	250	271	310	310	320	450	455

Table 3-18. Zone 4 Erosion Pin Results 3/5 - Exposed pin length recorded in mm.

Zone	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**
Site	**Ga**	**Ga**	**Ga**	**Ga**	**Ga**	**Ga**	**Ga**	**Ga**	**Gb**	**Gb**	**Gb**	**Gb**	**Gb**	**Gb**	**Gb**	**Gb**	**Gb**	**Gb**
Pin Number	**1**	**1**	**2**	**2**	**3**	**3**	**4**	**4**	**1**	**1**	**2**	**2**	**3**	**3**	**4**	**4**	**5**	**5**
Bank Location	2-3	2-3	1-2	1-2	<1	<1	<1	<1	2-3	2-3	1-2	1-2	<1	<1	<1	<1	<1	<1
Top/Bot of Pin	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot
18 Dec 99																		
25-Sep-00																		
23-Nov-01																		
8-Dec-01	316	325	368	370	305	325	314	318	259	262	375	386	275	280	310	315	254	255
10-Feb-02																		
10-Mar-02	315	333	363	368	304	313	372	385	262	266	398	412	295	296	349	343	279	279
13-Apr-02	318	342	364	368	303	321	356	369	270	274	395	399	304	306	332	340	285	284
5 Oct 02	333	345	400	398	290	331	354	411	270	286	409	423	340	343	386	389	298	298
16 Dec 02	331	345	391	390	286	333			287	285	401	415	339	332	371	378	265	274
29 Mar 03	333	347	413	417	303	360	356	420	280	298	393	414	341	350	396	403	334	329
18 Oct 03	285	350	420	425	344	391	360	405	280	287	410	416	369	373	411	416	300	300
6 Mar 04	286	351	408	414	393	408	386	415	282	303	407	242	389	391	446	451	297	296
9 Oct 04	276	351	436	437	425	432			295	308	390	405	425	430	377	377		
2 Apr 05	355	374	411	421	402	422	354	436	326	311	411	421	451	453	378	381	273	280
15 Oct 05	348	363	415	426	367	420	461	465	286	313	411	419	482	482	402	398		
11 Mar 06	345	368	406	442	365	380	347	360	288	308	412	444	278	260	384	390	262	267
17 Oct-06	340	358	446	448	338	347	350	350	289	313	438	449	187	179	405	411	257	262
17-Mar-07	352	397	448	463	350	365	354	426	308	323	412	423	323	310	426	433	267	275

Table 3-19. Zone 4 Erosion Pin Results 4/5 - Exposed pin length recorded in mm.

Zone	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**
Site	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**
Pin Number	**1**	**1**	**2**	**2**	**3**	**3**	**4**	**4**	**5**	**5**
Bank Location	2-3	2-3	2-3	2-3	1-2	1-2	<1	<1	<1	<10
Top/Bot of Pin	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot
18-Dec-99										
25-Sep-00										
23-Nov-01										
8-Dec-01	473	473	370	374	287	288	318	320	338	341
10-Feb-02										
10-Mar-02	485	490	384	381	304	307	327	329	266	266
13-Apr-02	485	487	379	380	300	304	327	331	565	564
5-Oct-02	481	480	377	378	282	285	310	325	363	360
16-Dec-02	481	487	379	375	285	288	319	327	361	357
29-Mar-03	481	491	374	375	286	291	318	325	355	351
18 Oct 03	499	488	368	366	271	278	321	328	366	365
6 Mar 04	483	487	357	352	275	283	319	326	375	371
9 Oct 04	484	489	357	359	258	262	316	323	387	389
2 Apr 05	482	490	345	344	264	272	313	320	387	395
15 Oct 05	479	489	338	337	250	258	317	318	398	403
11 Mar 06	478	486	330	331	241	247	312	317	378	378
17 Oct-06	474	484	324	323	241	246	314	317	369	411
17-Mar-07	471	478	311	312	237	242	307	309	401	411

Table 3-20. Zone 4 Erosion Pin Results 5/5 – New pins installed December 2005 Exposed pin length recorded in mm.

Zone	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**
Site	**A**	**A**	**B**	**B**	**D**	**D**	**D**	**D**	**F**	**F**	**E**	**E**
Pin Number	**4**	**4**	**4**	**4**	**4**	**4**	**5**	**5**	**HW**	**HW**	**2**	**2**
a,b,c,..											**new**	**new**
Bank Location												
Top/Bot of Pin	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot
2 Apr 05	209	209	180	182	139	140	346	340	945	995		
15-Oct-05	208	209	163	193	142	160	343	337	945	1007		
11 Mar 06	198	207	168	196	136	160	344	340	942	1015	330	340
17 Oct-06	197	208	225	225	118	152	336	338	937	1013	273	276
17-Mar-07	200	208	268	263	170	173	340	337	951	1010	290	310

Table 3-21. Zone 5 Erosion Pin Results 1/6 - Exposed pin length recorded in mm.

Zone	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**
Site	**A**	**A**	**A**	**A**	**A**	**A**	**B**	**B**	**B**	**B**	**B**	**B**	**B**	**B**	**C**	**C**	**C**	**C**	**C**	**C**
Pin Number	**1**	**2**	**3**	**3**	**4**	**4**	**1**	**1**	**2**	**2**	**3**	**3**	**4**	**4**	**1**	**1**	**2**	**2**	**3**	**3**
Bank Location	2-3 cav	2-3 cav	1-2	1-2	<1	<1	2-3	2-3	1-2	1-2	1-2	1-2	<1	<1	2-3	2-3	1-2	1-2	<1	<1
Top/Bot of Pin	Bot	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot
20 Dec 99																				
26 Sep 00																				
23 Nov 01																				
9 Dec 01	700	233	496	499	517	525	209	217	222	226	202	208	292	294	195	195	125	122	426	427
10 Feb 02																				
10 Mar 02	700	230	506	507	584	595	208	218	219	226	205	208	304	307	200	202	126	126	435	439
13 Apr 02	701	230	495	499	623	660	212	221	218	224	205	208	309	312						
5 Oct 02	890	221	519	519	491	489	210	231	185	187	126	127	363	370	203	200	105	100	435	436
16 Dec 02	973	234	550	547	541	546	210	231	194	196	111	114	350	366	198	208	143	173	405	405
29 Mar 03	979	224	508	504	620	623	212	233	192	194	118	122	374	390	186	199	117	114	420	420
18 Oct 03	985	226	532	530	481	474	218	228	189	190	100	107	376	395	191	202	98	96	411	409
6 Mar 04	884	224	505	506	604	597	216	226	177	179	95	112	416	440	196	200	104	102	409	414
9 Oct 04			391	390	480	461	197	228	149	148	65	74	574	576	196	205	98	99	428	460
2 Apr 05	new pin 293	new pin 276	362	363	529	520	195	219	149	151	60	64	560	563	203	205	99	98	411	415
15 Oct 05	292	317	412	407	570	562	184	220	148	143	28	34			282	285	109	106	441	439
11 Mar 06	291	319	464	457	558	550	195	217	144	150	43	50			201	203	123	127	467	465
17 Oct-06	291	447	460	458	520	513	173	215	138	141	38	51			193	208	180	180	453	455
17-Mar-07	291	405	595	584	652	626	198	224	124	130	41	54			201	209	180	191	452	454

Table 3-22. Zone 5 Erosion Pin Results 2/6 - Exposed pin length recorded in mm.

Zone	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**
Site	**D**	**D**	**D**	**D**	**D**	**D**	**E**	**E**	**E**	**E**	**E**	**E**	**E**	**E**	**F**	**F**	**F**	**F**	**F**	**F**
Pin Number	**1**	**1**	**2**	**2**	**3**	**3**	**1**	**1**	**2**	**2**	**3**	**3**	**4**	**4**	**1**	**1**	**2**	**2**	**3**	**3**
Bank Location	2-3	2-3	1-2	1-2	<1	<1	2-3 cav	2-3 cav	1-2	1-2	<1	<1	<1	<1	2-3	2-3	1-2	1-2	<1	<1
Top/Bot of Pin	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot
20-Dec-99																				
26-Sep-00																				
23-Nov-01																				
9-Dec-01	116	135	186	186	318	325	807		224	224	171	176	145	145	246	249	207	211	243	245
10-Feb-02																				
10-Mar-02	125	161	185	196	310	322	853	777	162	172	163	167	168	170	249	247	221	228	258	260
13-Apr-02	148	169	184	185	299	309	859	715	160	166	163	166	175	179	248	249	225	230	263	265
5-Oct-02	115	155	190	195	280	282	780	720	169	169	191	190	210	210	240	245	196	200	94	72
16-Dec-02	116	175	207	206	296	303	650	625	162	164	191	199	193	195	80		216	216	243	245
29-Mar-03	119	165	206	207	306	313	203	1160	133	137	194	189	203	205	91	66	222	228	242	248
18 Oct 03	88	142	199	202	223	235			144	134	150	151	202	209	247	250	198	202	296	307
6-Mar-04	81	124	203	206	224	232	980	980	130	129	166	165	209	213	245	249	201	205	275	277
9-Oct-04	89	163	206	210			970	984	127	124	123	121			245	248	165	172	311	304
2 Apr 05	95	127	245	245	168	174	988	988	115	114	126	124	202	202	254	250	154	156	289	288
15-Oct-05	87	125	233	234	162	168	812	760	95	84	75	94	185	176	244	245	188	193	289	295
11 Mar 06	83	173	226	234	181	187	1010	1028	94	88	68	85	71	73	243	245	208	212	218	218
17 Oct-06	83	263	222	225	151	157	32	32	78	78	30	96	185	195	241	241	190	195	248	245
17-Mar-07	77	163	220	220	185	192	30	30	68	64	41	99	174	170	249	244	202	200	260	265

Table 3-23. Zone 5 Erosion Pin Results 3/6 - Exposed pin length recorded in mm.

Zone	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**
Site	**G**	**G**	**G**	**G**	**G**	**G**	**G**	**G**	**G**	**G**	**G**	**G**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**
Pin Number	**1**	**1**	**2**	**2**	**3**	**3**	**4**	**4**	**5**	**5**	**6**	**6**	**1**	**1**	**2**	**2**	**3**	**3**	**4**	**4**
Bank Location	2-3	2-3	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	<1	<1	2-3	2-3	1-2	1-2	1-2	1-2	<1	<1
Top/Bot of Pin	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot
20-Dec-99	128		170		173		522		469		398									
26-Sep-00	122		161		143		465		456		409									
23-Nov-01	134		149		119		450		490		422									
9-Dec-01	135	120	150	150	113	114	416	426	492	492			240	242	137	137	346	353	466	480
10-Feb-02																				
10-Mar-02	138	121	150	150	106	116	451	452	479	480	432	444	240		135	136	347	357	488	525
13-Apr-02	137	122	147	147	106	110	449	448	473	475	434	459								
5-Oct-02	140	123	140	140	101	102	441	442	500	502	410	430	241	245	114	119	330	338	510	570
16-Dec-02	140	125	146	146	106	110	435	444	517	518	410	418	245	241	120	125	360	362	520	533
29-Mar-03	149	136	141	143	103	112	438	443	494	495	440	453	249	265	113	125	344	361	540	548
18 Oct 03	151	140	143	142	106	107	446	448	516	517	404	423	260	278	101	102	366	368	488	500
6-Mar-04	154	143	136	137	79	84	441	443	482	493	458	475	293	311	93	92	347	358	496	505
9-Oct-04	161	146	137	143	82	86	483	490	515	515	422	428	300	321	66	59	345	356	511	532
2 Apr 05	159	149	132	136	110	116	482	479	503	506	439	453	314	340	49	50	351	361	513	525
15-Oct-05	163	387	148	149	77	75	489	489	510	516	438	438	342	348	6	12	448	453		
11 Mar 06	163	357	154	153	114	115	500	500	536	537	399	411	348	341	12	14	333	350	492	519
17 Oct-06	160	358	165	158	82	83	520	520	509	511	354	353	323	303	0	0	350	355	477	520
17-Mar-07	190	360	56	59	49	55	538	538	495	494	488	500	336	330	-5	-5	344	353	491	534

Table 3-24. Zone 5 Erosion Pin Results 4/6 - Exposed pin length recorded in mm.

Zone	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**
Site	**I**	**I**	**I**	**I**	**I**	**I**	**I**	**I**	**J**	**J**	**J**	**J**	**J**	**J**	**J**	**J**	**K**	**K**	**K**	**K**	**K**	**K**
Pin Number	**1**	**1**	**2**	**2**	**3**	**3**	**4**	**4**	**1**	**1**	**2**	**2**	**3**	**3**	**4**	**4**	**1**	**1**	**2**	**2**	**3**	**3**
Bank Location	2-3	2-3	1-2	1-2	1-2	1-2	<1	<1	2-3	2-3	1-2	1-2	1-2	1-2	<1	<1	2-3	2-3	1-2	1-2	<1	<1
Top/Bot of Pin	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot
20-Dec-99																						
26-Sep-00																						
23-Nov-01																						
9-Dec-01	231	231	228	227	296	299	288	290														
10-Feb-02	231	232	240	240	307	316	296	298	167	174	191	196	319	321	201	204	151	157	229	229	317	310
10-Mar-02	230	237	234	236	309	315	298	306	167	169	190	193	313	316	209	210	150	156	225	231	331	345
13-Apr-02	232	234	212	218	311	316	308	310														
5-Oct-02	256	260	178	180	376	384	288	290	111	124	163	166	359	360	246	244	104	116	113	124	203	209
16-Dec-02	251	266	230	230	361	370	270	273	140	143	177	176	364	361	245	240	100	112	102	104	210	218
29-Mar-03	253	266	216	218	344	354	343	348	136	141	176	179	350	349	242	242						
18 Oct 03	243	268	168	168	295	307	307	314	122	126	180	184	362	365	263	268			118	127	249	262
6-Mar-04	243	255	89	91	375	373	282	286	111	116	189	191	380	386	297	296	15	28	163	170	242	255
9-Oct-04	244	263	163	171	381	378	263	263	51	56	272	276	388	387	338	336	0	0	17	29	244	256
2 Apr 05	248	265	220	221	339	348	272	280	125	128	300	309	394	387	335	330	497	506	60	65	241	260
15-Oct-05	241	250	234	232	323	318	347	352	135	144	304	311	420	406	355	357			118	128	226	225
11 Mar 06	240	255	221	227	325	325	333	340	174	178	357	359	391	387	338	340			108	125	215	246
17 Oct-06	226	240	250	256	318	320	315	311	188	190	340	345	370	351	305	298			100	110	211	221
17-Mar-07	218	226	204	209	287	294	339	340	194	198	332	332	350	337	283	275			144	178	241	269

Table 3-25. Zone 5 Erosion Pin Results 5/6 - Exposed pin length recorded in mm.

Zone	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**
Site	**L**	**L**	**L**	**L**	**L**	**L**	**L**	**L**	**M**	**M**	**M**	**M**	**M**	**M**	**K**	**K**
Pin Number	**1**	**1**	**2**	**2**	**3**	**3**	**4**	**4**	**1**	**1**	**2**	**2**	**3**	**3**	**0**	**0**
Bank Location	2-3	2-3	1-2	1-2	1-2	1-2	<1	<1	2-3	2-3	1-2	1-2	<1	<1	2-3	2-3
Top/Bot of Pin	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot
20-Dec-99																
26-Sep-00																
23-Nov-01																
9-Dec-01																
10-Feb-02	194	195	178	178	133	141	136	144	411	431	216	210	167	166		
10-Mar-02	189	193	162	168	135	145	165	178	413	430	207	210	165	167		
13-Apr-02																
5-Oct-02	170	175	191	193	154	180	161	162	311	330	208	214	203	215		
16-Dec-02	170	175	182	192	170	188	152	152	317	328	181	194	206	215		
29-Mar-03	181	192	166	186	179	193	176	192	335	346	180	213	174	222		
18 Oct 03	186	194	189	205	186	192	169	170	352	395	132	141	209	210		
6-Mar-04	185	191	207	217	212	216	184	199	352	371	71	141	161	181	577	585
9-Oct-04	200	212	234	240	231	226	149	149	295	308	57	92	45	45	319	324
2 Apr 05	234	235	223	233	236	237	210	217	280	320	96	122	124	130	497	506
15-Oct-05	220	226	241	250	248	246	210	212	247	273	55	81	165	158	387	382
11 Mar 06	225	232	255	266	250	256	205	215	251	282	76	90	100	176	360	365
17 Oct-06	230	244	290	310	294	295	215	221	245	260	45	118	244	242	365	360
17-Mar-07	275	280	304	306	314	319	243	249	263	276	125	150	85	88	479	475

Table 3-26. Zone 5 Erosion Pin Results 5/6 – New Pins December 2004 Exposed pin length recorded in mm

Zone	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**
Site	**B**	**B**	**B**	**B**	**C**	**C**	**D**	**D**	**I**	**I**	**I**	**I**	**J**	**J**	**J**	**J**
Pin Number	**5**	**5**	**6**	**6**	**4**	**4**	**HW**	**HW**	**5**	**5**	**6**	**6**	**5**	**5**	**6**	**6**
Bank Location																
Top/Bot of Pin	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot	Top	Bot
2 Apr 05	231	246	164	171	280	286	341	500	301	304	201	206	320	322	205	210
15 Oct 05	226	230	197	201	210	203	351	482	167	169	226	231	306	314	222	222
11 Mar 06	245	246	195	201	282	285	348	463	126	145	253	272	301	311	220	222
17 Oct-06	233	247	189	189	300	301	350	455	185	170	234	241	301	310	221	225
17-Mar-07	229	250	172	178	277	282	327	378	249	243	233	241	301	309	231	234

Zone	**5**	**5**
Site	**K**	**K**
Pin Number	**4**	**4**
a,b,c,..	**Top**	**Bot**
Bank Location		
Top/Bot of Pin		
2 Apr 05	270	278
15 Oct 05	155	172
11 Mar 06	73	99
17 Oct-06	100	120
17-Mar-07	181	195

Scour chain results

Note, results only shown for December 2001 – present. Previous results available in previous reports

Table 3-27, Scour chain results zone 1

Zone	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**2**	**2**	**2**	**2**	**2**
Site	**A**	**A**	**A**	**A**	**A**	**A**	**E**	**E**	**E**	**A**	**A**	**A**	**D**	**D**
Scour Chain #	**1a**	**1a**	**1a**	**4a**	**4a**	**4a**	**1e**	**1e**	**1e**	**2a**	**2a**	**2a**	**2d**	**2d**
Bank Location	Col	Col	Col	Col	Col	Col	Col	Col	Col	slope	slope	slope	slope	slope
mm/links/depo	mm	links	deposition	mm	links	deposition	mm	links	deposition	mm	links	deposition	mm	links
9-Dec-01													350	13
9-Feb-02										3200	33	0	380	14
10-Feb-02	715	27	0	540	20.5	0								
9-Mar-02	720	27	0	545	21	0	933	35	0				360	13
13-Apr-02										892	33	0	285	11
5-Oct-02	715	27	0	560	21	0	900	34	1	855	32	1	395	15
16-Dec-02	710	27	0	560	21	0	910	35	2	853	32	0	374	14
29-Mar-03	735	28	0	576	22	0	875	33	10	860	33	0	460	15
18-Oct-03	719	27	0	571	21	0	903	34	12	870	33	6	349	13
6-Mar-04	736	27	0	555	21	0	890	33.5	6	857	33	1	350	13
9-Oct-04	734	28	0	555	21	0	902	34.5	25	835	33	0	390	15
2-Apr-05	734	28	0	600	23	0	890	34	0	845	33	5	393	15
15-Oct-05	735	28	0	830	29	0	890	33	20	845	33	0	380	14
11-Mar-06	735	28	0	780	29	0	870	33	10	860	33	0		
17 Oct-06	735	28	0	780	29	0	874	33	10	820	32	0	420	16
17-Mar-07	715	28	0	775	29	0	875	33	0	840	33	0	375	14

Table 3-28. Scour chain results, zone 2

Zone	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**3**	**3**	**3**	**3**
Site	**D**	**H**	**H**	**H**	**K**	**K**	**K**	**L**	**L**	**L**	**A**	**A**	**A**	**B**
Scour Chain #	**2d**	**2h**	**2h**	**2h**	**2k**	**2k**	**2k**	**2l**	**2l**	**2l**	**3a**	**3a**	**3a**	**3b**
Bank Location	slope	slope	slope	slope	slope	slope	slope	slope	slope	slope	slope	slope	slope	slope
mm/links/depo	deposition	mm	links	deposition	mm	links	deposition	mm	links	deposition	mm	links	deposition	mm
9-Dec-01	10				727	27	100				760	28	1	683
9-Feb-02	20													
10-Feb-02					840	31	55	590	22	0	745	28	0	550
9-Mar-02	20				690	26	80	580	22	0	770	28	0	510
13-Apr-02	5													
5-Oct-02	45	780	29.5	10	798	29	145	585	22	0				685
16-Dec-02	25	755	29	17										676
29-Mar-03	50	770	29	0	950	35	5	620	23	22	935	35	30	670
18-Oct-03	45	755	29	15		26	150	711	26	14	975	37	45	680
6-Mar-04	15	759	29	5	794	29	33	685	26	15	1050	39	90	680
9-Oct-04	25	752	29.5	0	830	31	170	700	26	20	780	30	170	680
2-Apr-05	40	752	29	5	850	32	35	700	25	30				690
15-Oct-05	10	750	29	10	910	33	125	710	27	0	685	26	135	690
11-Mar-06		720	29	0	900	33	75	720	27	30				640
17 Oct-06	65	730	29	0	1080	38	180	710	27	25	520	21	190	670
Mar-17-07	45	720	28	0	860	32	0	700	27	25	545	22	40	675

Table 3-29. Scour chain results zone 3

Zone	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**4**	**4**	**4**	**4**	**4**	**4**
Site	**B**	**B**	**Eb**	**Eb**	**Eb**	**G**	**G**	**G**	**A**	**A**	**A**	**D**	**D**	**D**
Scour Chain #	**3b**	**3b**	**3Eb**	**3Eb**	**3Eb**	**3g**	**3g**	**3g**	**4a**	**4a**	**4a**	**4d**	**4d**	**4d**
Bank Location	slope	slope	slope	slope	slope	slope	slope	slope	slope	slope	slope	slope	slope	slope
mm/links/depo	links	deposition	mm	links	deposition	mm	links	deposition	mm	links	deposition	mm	links	deposition
9-Dec-01	25.5	0												
9-Feb-02														
10-Feb-02	21					965	36	0	830	31	0	800	30	0
9-Mar-02	19	30	815	31	13	927	35	22	840	31	25	805	31	10
13-Apr-02			812	33	6	955	36	6	817	31	25	775	30	35
5-Oct-02	26	10				955	36	0	880	34	25	805	31.5	15
16-Dec-02	24	13	925	35	40	953	36	25	875	33	20	780	31	20
29-Mar-03	25	10	920	35	55	932	36	25	890	34	13	840	32	70
18-Oct-03	26	0	960	36	1	910	36	20	850	33	40	790	31	50
6-Mar-04	26	0	930	36	5	900	36	0	860	33	35	835	32	65
9-Oct-04	26	0	930	36	5	900	36	0	868	33	60	798	31	12
2-Apr-05	26	45				965	37	0	860	34	95	815	32	40
15-Oct-05	25	0	960	37	65-85	Inundated			860	33	50	800	31	0
11-Mar-06	24	25	880	35	10	930	36	20	860	33	40	800	32	0
17 Oct-06	25	20	920	36	35	910	34	40	880	34	50	820	32	55
17-Mar-07	26	20	880	36	0	830	32	30	890	34	130	815	32	90

Table 3-30. Scour chain results zone 4

Zone	4	4	4	4	4	4	4	4	4	4	4	4	5	5
Site	E	E	E	F	F	F	Gb	Gb	Gb	H	H	H	B	B
Scour Chain #	4e	4e	4e	4f	4f	4f	4Gb	4Gb	4Gb	4h	4h	4h	5b	5b
Bank Location	slope	slope	slope	slope	slope	slope	slope	slope	slope	slope	slope	slope	slope	slope
mm/links/depo	mm	links	deposition	mm	links	deposition	mm	links	deposition	mm	links	deposition	mm	links
9-Dec-01				760	29	20								
9-Feb-02														
10-Feb-02	870	33	0	760	29	40								
9-Mar-02	830	32	0	765	29	55	920	35	0	935	35	0	790	30
13-Apr-02	842	32	20	742	27	40	902	35	6	935	36	6	790	30
5-Oct-02	890	33.5	45	740	27	12	960	37	0	960	36.5	10		
16-Dec-02	865	33	20	790	29	5	940	36	10	960	37	0		
29-Mar-03	900	34	15	790	29	20	940	36	13	920	36	0	800	31
18-Oct-03	830	31	55	770	29	30	960	37	58	940	36	0	730	28
6-Mar-04	835	32	15	780	29	35	960	37	15	940	36.5	0	690	26.5
9-Oct-04	860	33	45	796	29	40				950	37	4	660	25
2-Apr-05	900	35	0	750	30	40	980	38	80	950	37	0	675	26
15-Oct-05	950	37	10	830	30	0	underwater			950	38	0	705	28
11-Mar-06	910	36	25	760	30	15	945	37	30	960	38	5	690	27
17 Oct-06	940	36	110	790	30	10	940	36	70	960	38	0	665	27
17-Mar-07	890	35	5	780	30	35	945	38	10	945	39	5	675	28

Table 3-31. Scour chain results zone 5

Zone	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**
Site	**B**	**C**	**C**	**C**	**F**	**F**	**F**	**G**	**G**	**G**	**I**	**I**	**I**	**J**
Scour Chain #	**5b**	**5c**	**5c**	**5c**	**5f**	**5f**	**5f**	**5g**	**5g**	**5g**	**5i**	**5i**	**5i**	**5j**
Bank Location	slope	slope	slope	slope	slope	slope	slope	slope	slope	slope	slope	slope	slope	slope
mm/links/depo	deposition	mm	links	deposition	mm	links	deposition	mm	links	deposition	mm	links	deposition	mm
9-Dec-01								540	19.5	0				
9-Feb-02														
10-Feb-02											960	33	0	1150
9-Mar-02	0	855	33	0	915	35	0	505	19	10	868	33	19	1107
13-Apr-02	12				920	35	10	525	19	8	867	33	12	
5-Oct-02		793	31	35	1010	39	30	510	19	5	140	35	10	1120
16-Dec-02		815	32	30	975	38	50	520	20	0	870	34	40	1120
29-Mar-03	70	820	31	5	1000	38	50	525	19	5	870	33	0	1110
18-Oct-03	90	790	31	47	890	34	40	520	20	0	873	33	22	1149
6-Mar-04	5	805	31	20	875	34	22	525	19.5	5	880	34	0	1130
9-Oct-04	25	790	32	40	950	36	25	530	20	0				1245
2-Apr-05	25	815	32	25	940	36	65	544	20	27	870	34	25	1210
15-Oct-05	35	Underwater			890	33	35	520	20	0	880	34	40	Underwater
11-Mar-06	10	850	33	50	870	33	50	565	21	0	868	33	no recorded	1265
17 Oct-06	40	850	32	20	830	32	30	545	20	20	920	33	80	1190
17-Mar-07	2	885	34	50	840	32	20	565	21	30	900	35	40	1190

Table 3-32. Scour chain results zone 5 (cont)

Zone	**5**	**5**	**5**	**5**	**5**
Site	**J**	**J**	**L**	**L**	**L**
Scour Chain #	**5j**	**5j**	**5l**	**5l**	**5l**
Bank Location	slope	slope	slope	slope	slope
mm/links/depo	links	deposition	mm	links	deposition
9-Dec-01					
9-Feb-02					
10-Feb-02	43	0			
9-Mar-02	42	30	830	32	0
13-Apr-02					
5-Oct-02	42.5	0	845	33	0
16-Dec-02	43	40	840	33	0
29-Mar-03	43	15	845	32	0
18-Oct-03	43	27	847	33	0
6-Mar-04	45	0	840	33	0
9-Oct-04	47	0	870	33	0
2-Apr-05	47	30	895	34	20
15-Oct-05			900	35	10
11-Mar-06	47	50	905	36	10
17 Oct-06	46	40	945	31	10
17-Mar-07	45	20	975	37	20

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A4. Erosion pin graphs

A4.1 Abbreviations used in graphs

b/slope – back slope; slope behind crest of bank

b/water – back water

cave – bank cavity

cob – vertical cobble bank

col – vertical colluvial bank

crest – crest of bank

flow – sediment flow

HW – power station controlled high water marker

pipe – casing for piezometer measured as erosion pin

slope – sandy bank slope

toe – sandy bank toe

top – top of bank

A4.2 Zone 1

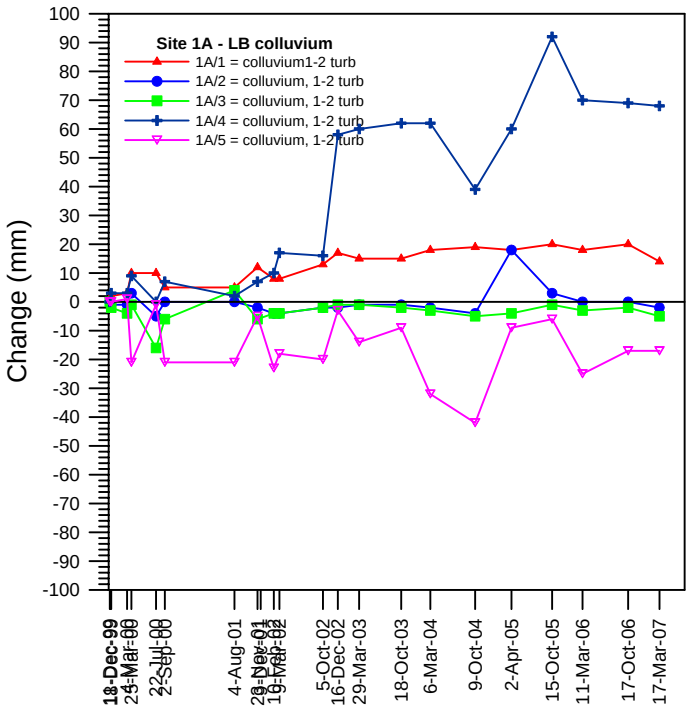

Figure 4-1. Erosion pin graph, site 1A

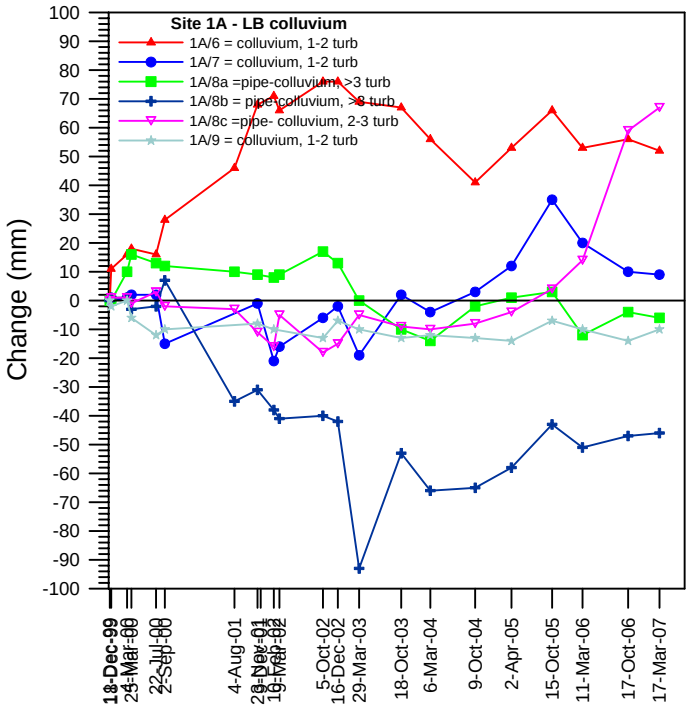

Figure 4-2. Erosion pin graph, site 1A (continued)

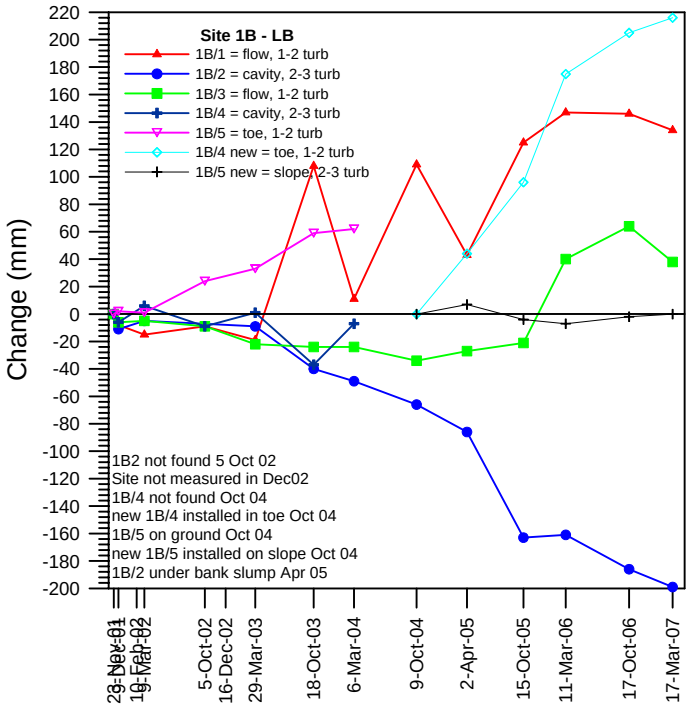

Figure 4-3. Erosion pin graph, site 1B

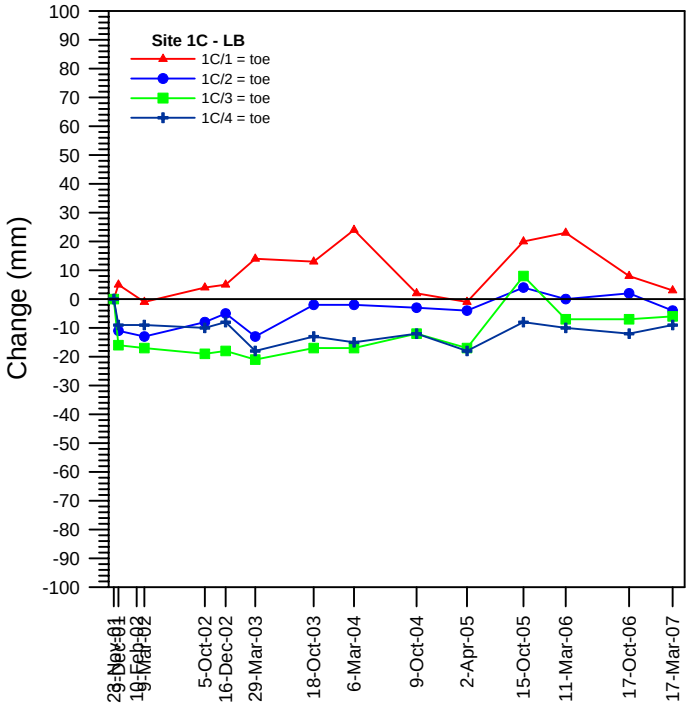

Figure 4-4. Erosion pin graph, site 1C

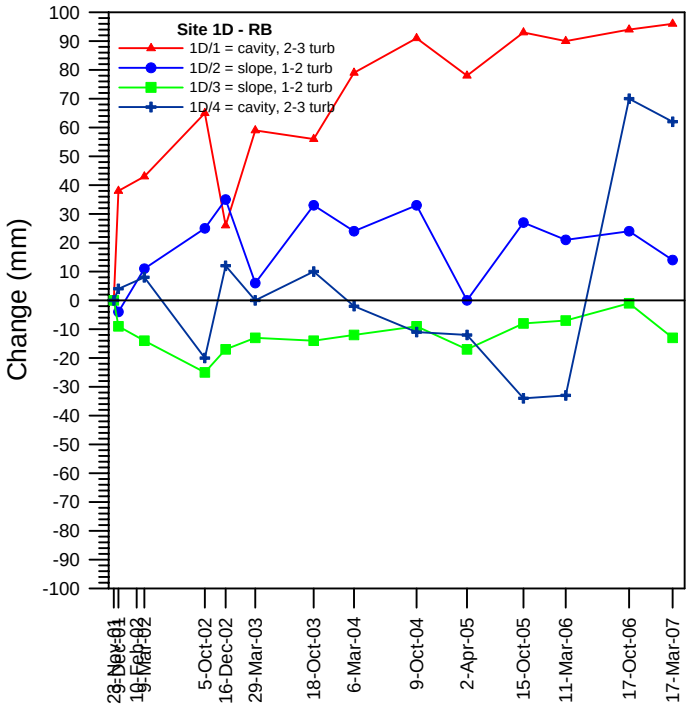

Figure 4-5. Erosion pin graph, site 1D

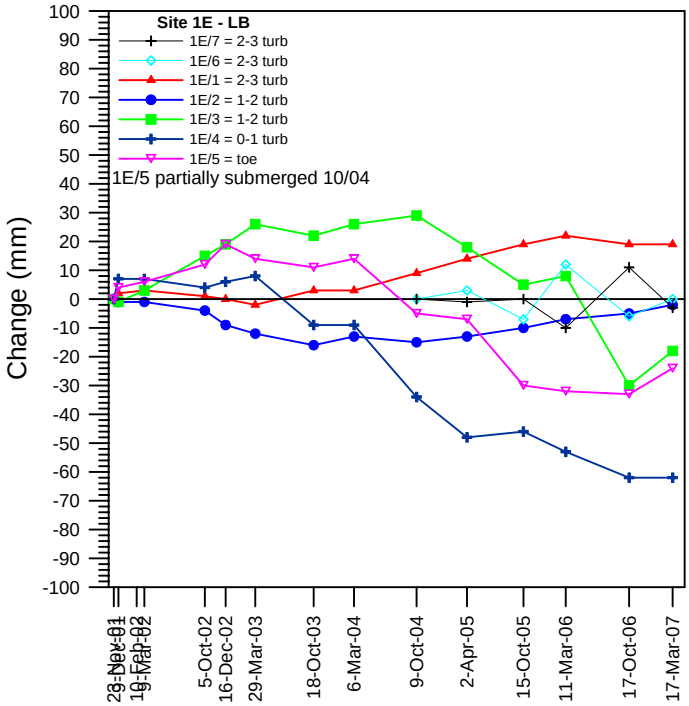

Figure 4-6. Erosion pin graph, site 1E

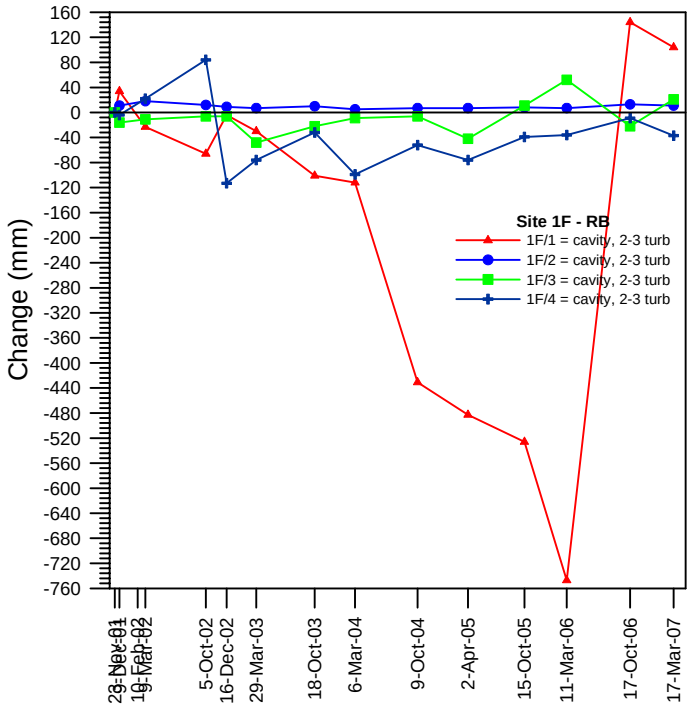

Figure 4-7. Erosion pin graph, site 1F

A4.3 Zone 2

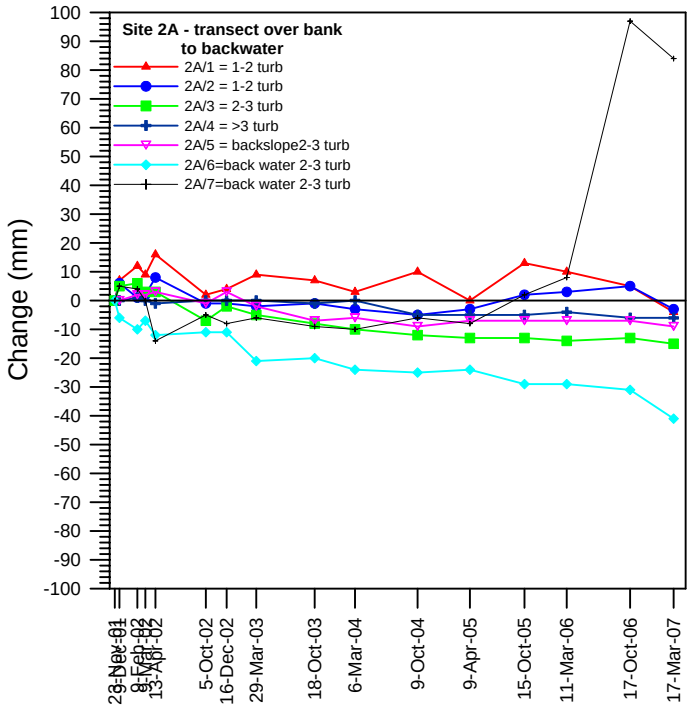

Figure 4-8. Erosion pin graph, site 2A

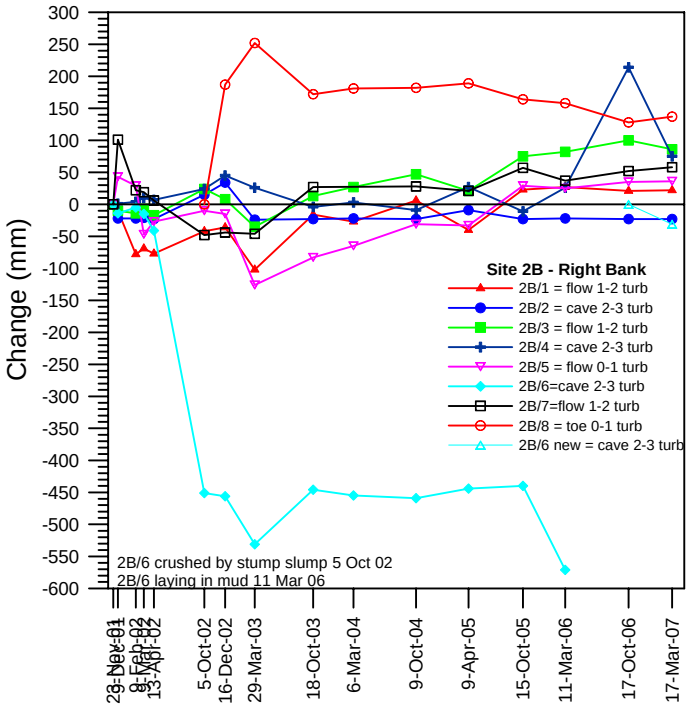

Figure 4-9. Erosion pin graph, site 2B

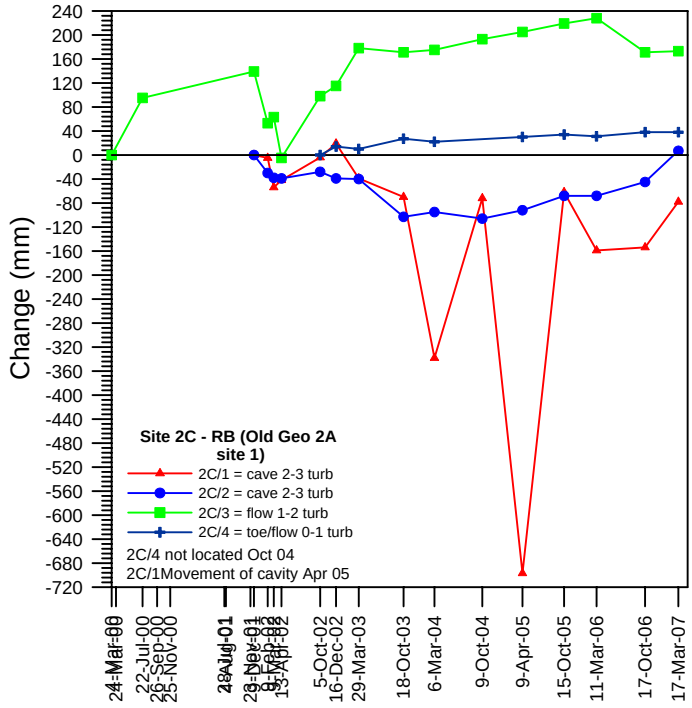

Figure 4-10. Erosion pin graph, site 2C

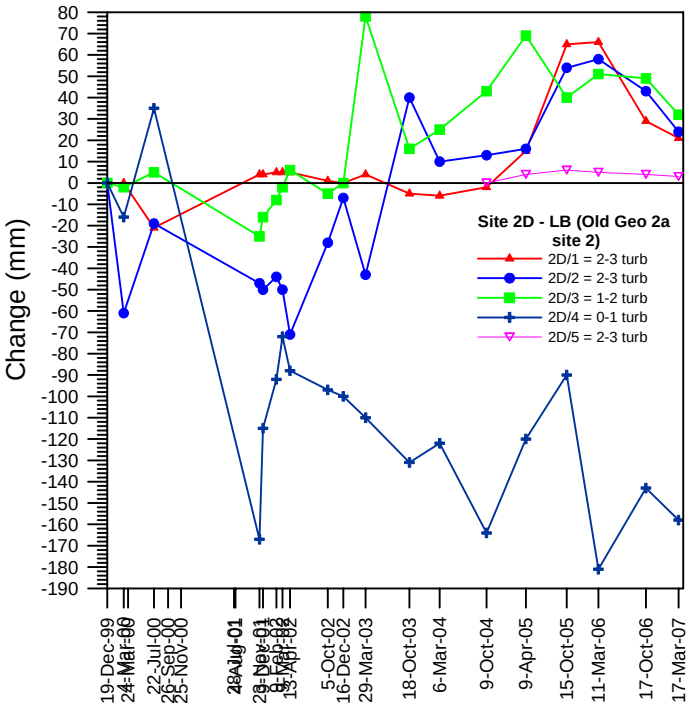

Figure 4-11. Erosion pin graph, site 2D

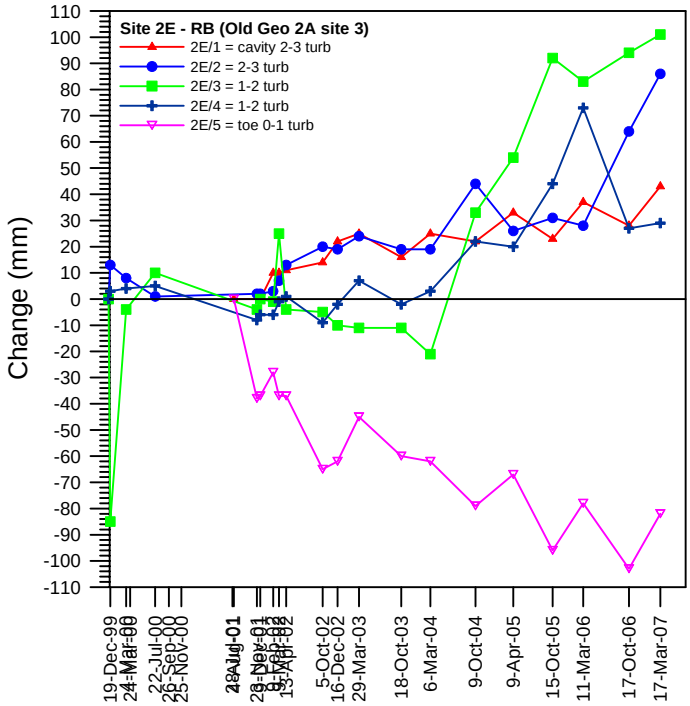

Figure 4-12. Erosion pin graph, site 2E

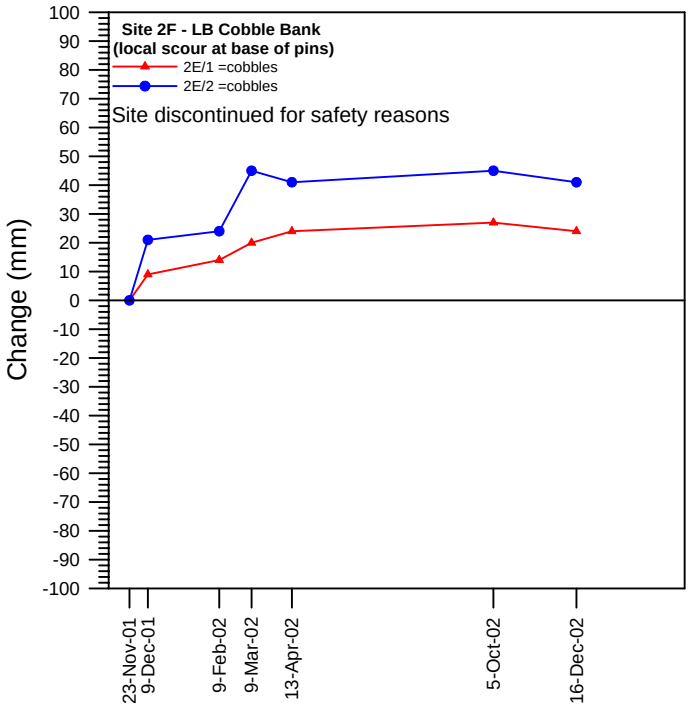

Figure 4-13. Erosion pin graph, site 2F

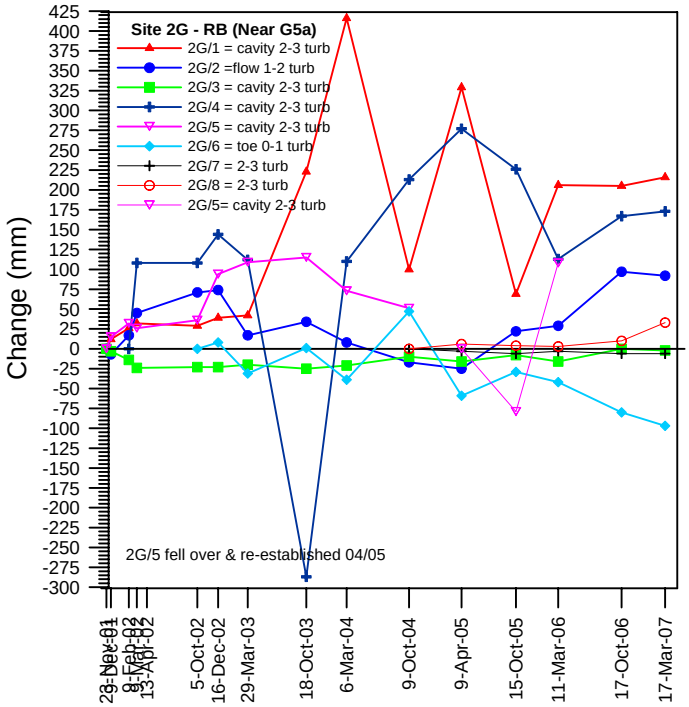

Figure 4-14. Erosion pin graph, site 2G

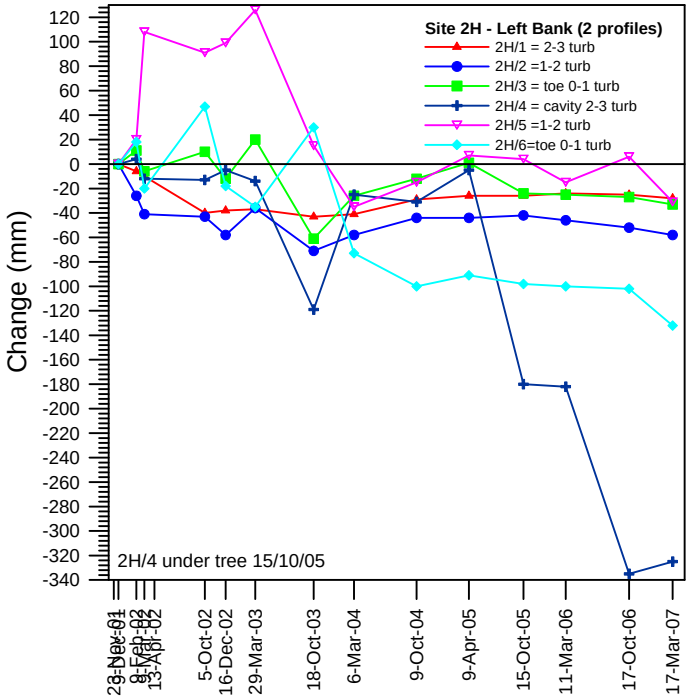

Figure 4-15. Erosion pin graph, site 2H

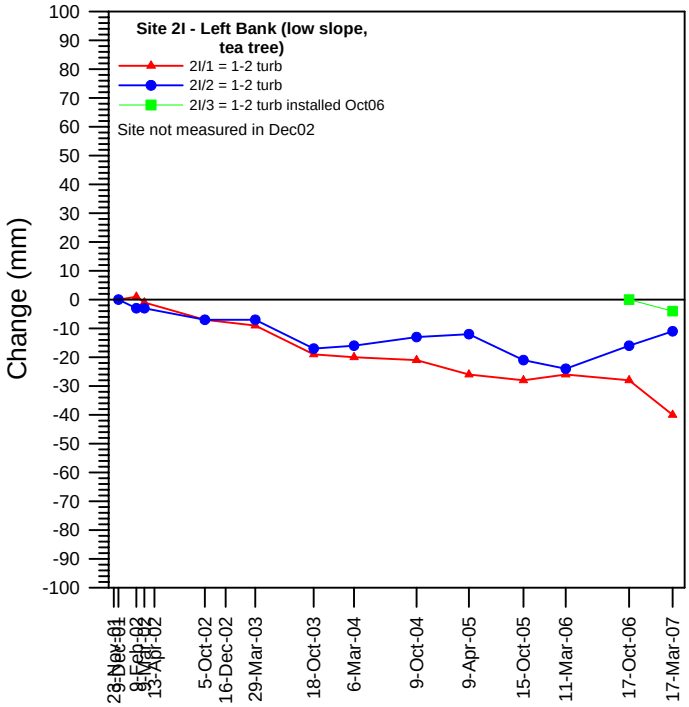

Figure 4-16. Erosion pin graph, site 2I

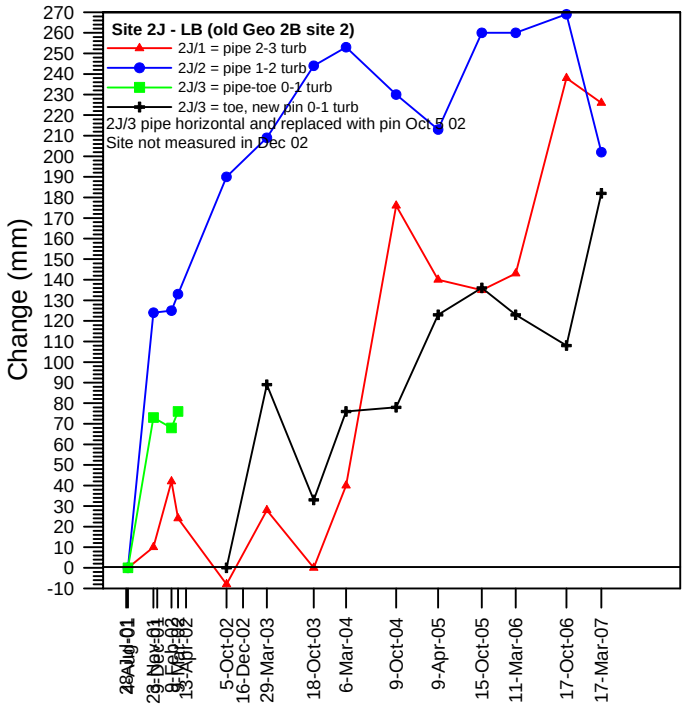

Figure 4-17. Erosion pin graph, site 2J

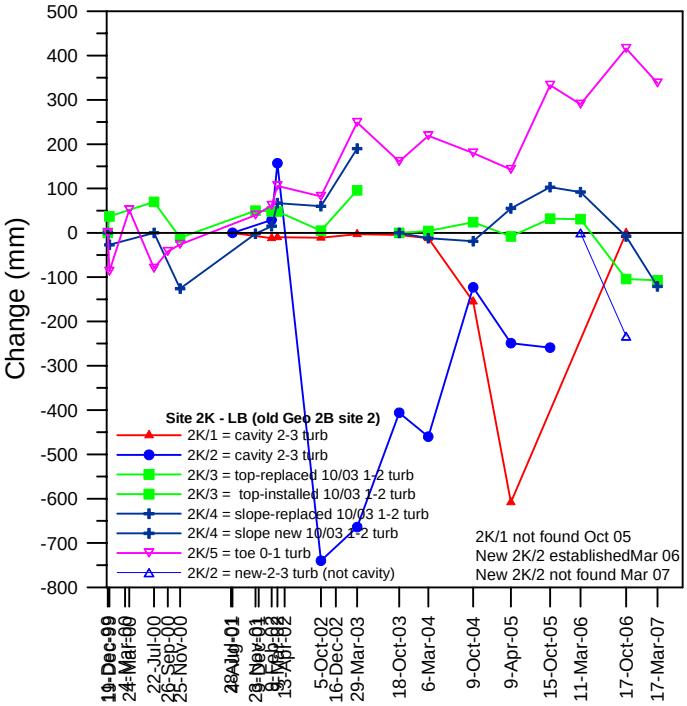

Figure 4-18. Erosion pin graph, site 2K

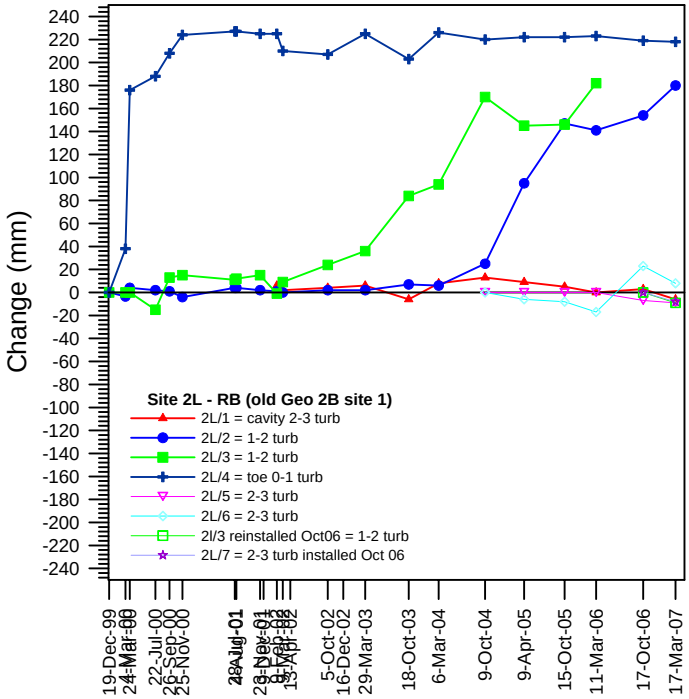

Figure 4-19. Erosion pin graph, site 2L

A4.4 Zone 3

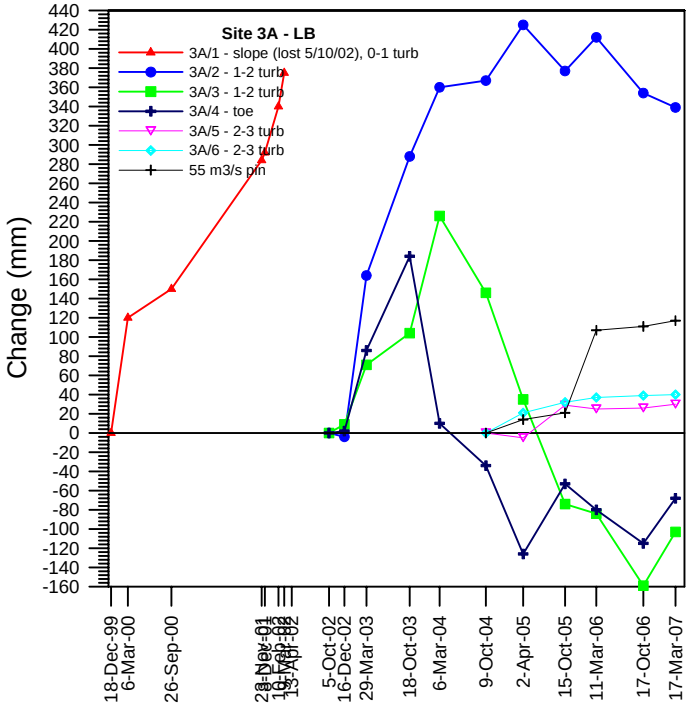

Figure 4-20. Erosion pin graph, site 3A

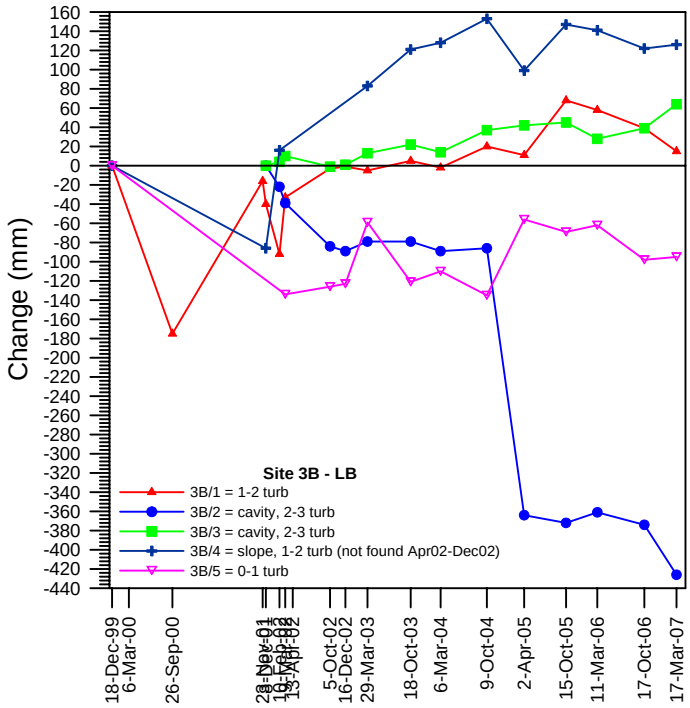

Figure 4-21. Erosion pin graph, site 3B

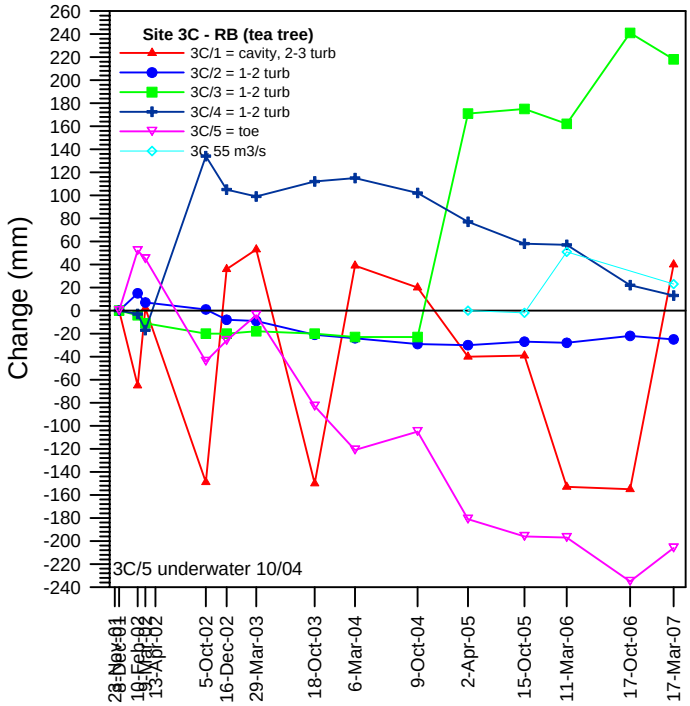

Figure 4-22. Erosion pin graph, site 3C

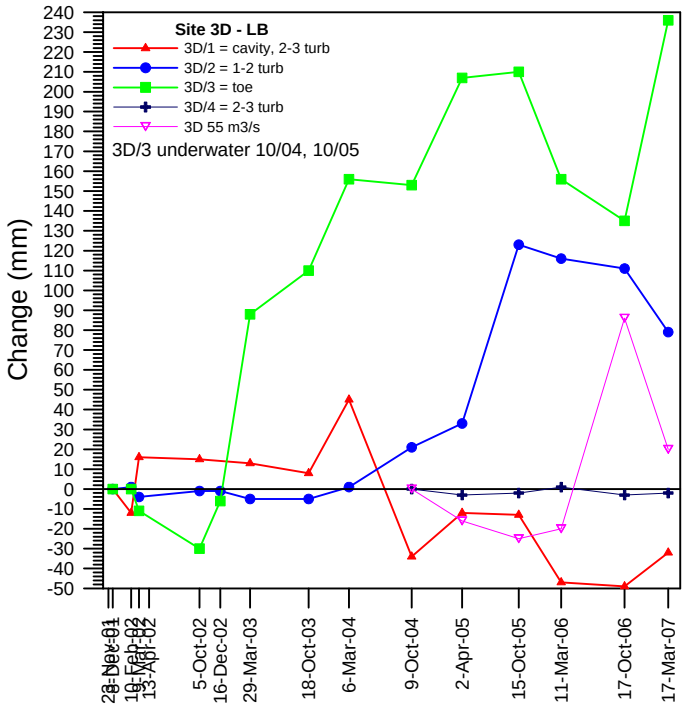

Figure 4-23. Erosion pin graph, site 3D

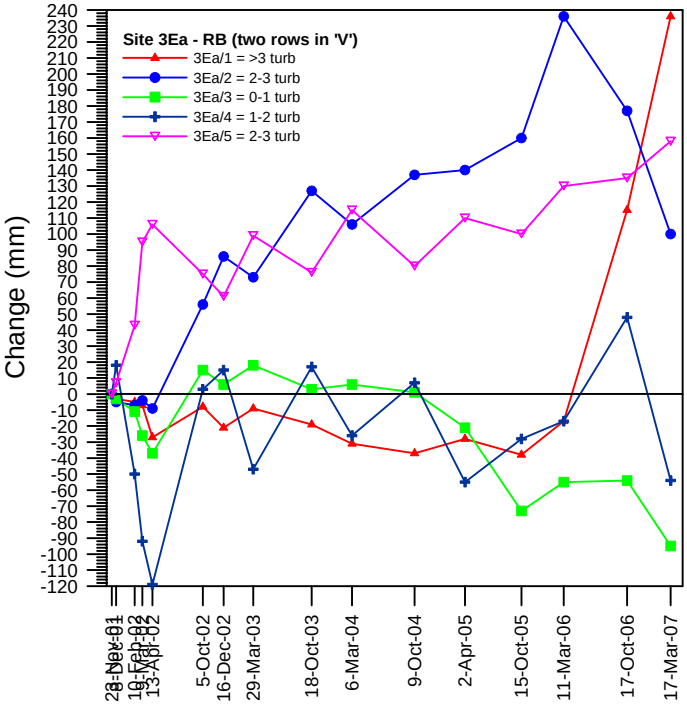

Figure 4-24, Erosion pin graph, site 3Ea

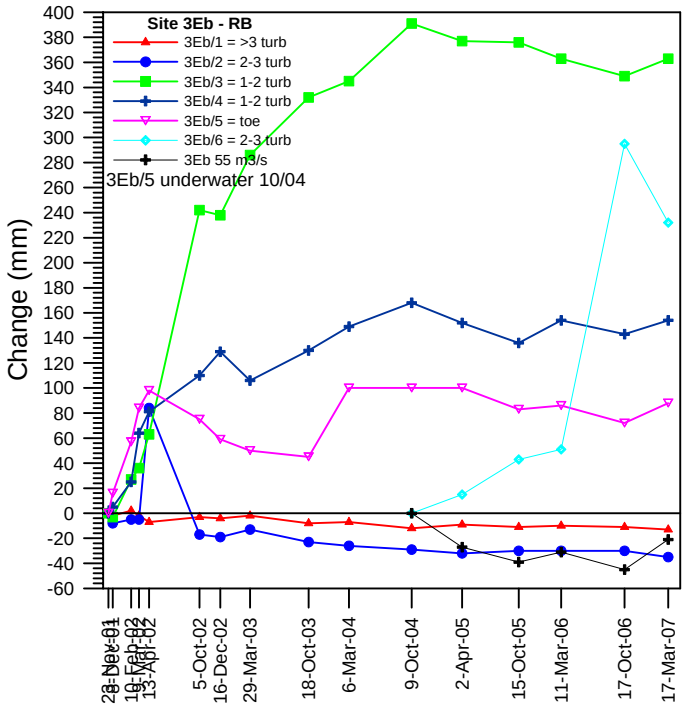

Figure 4-25. Erosion pin graph, site 3Eb

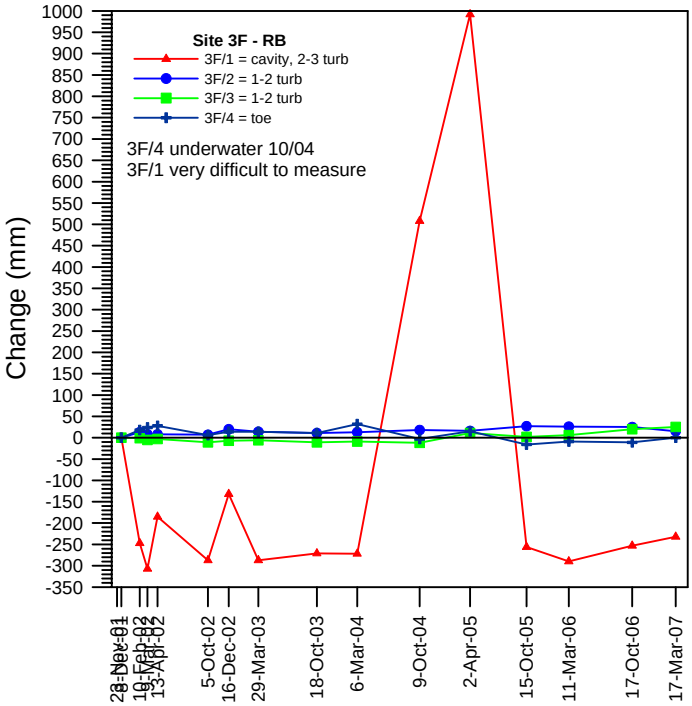

Figure 4-26. Erosion pin graph, site 3F

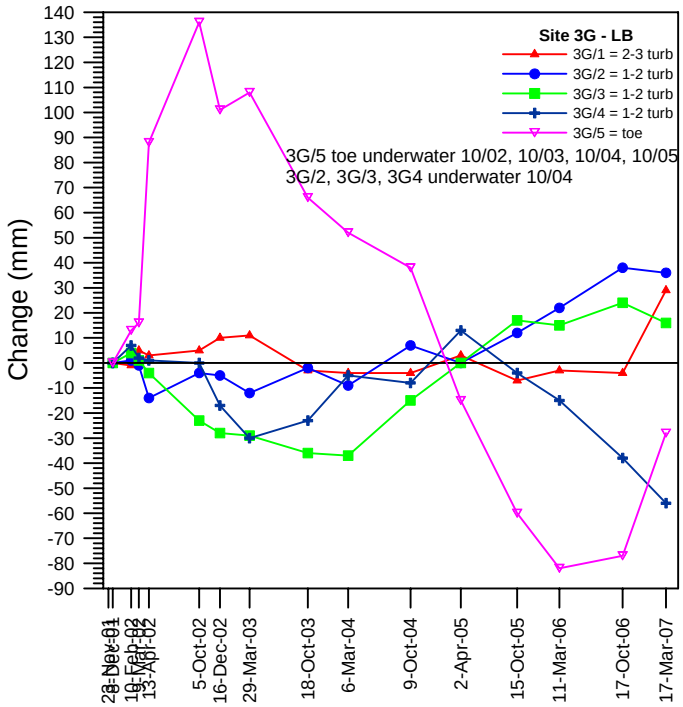

Figure 4-27. Erosion pin graph, site 3G

A4.5 Zone 4

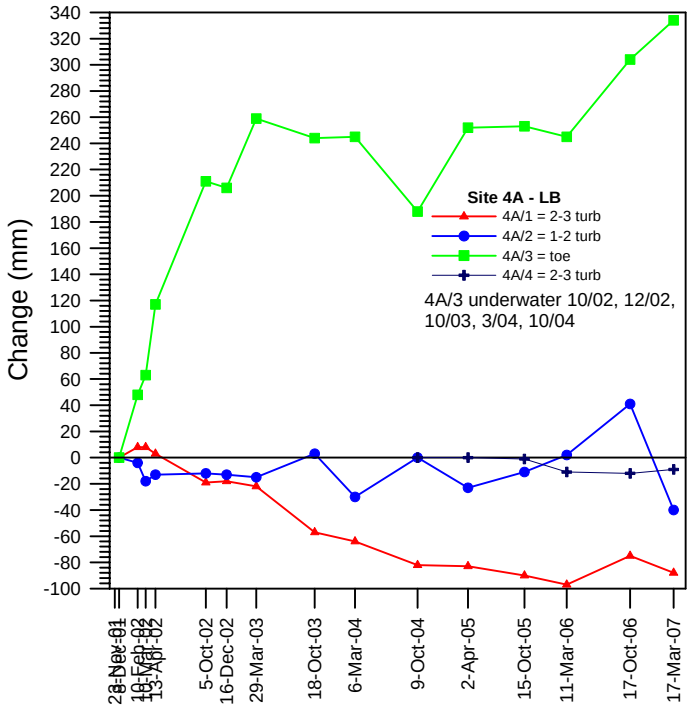

Figure 4-28. Erosion pin graph, site 4A

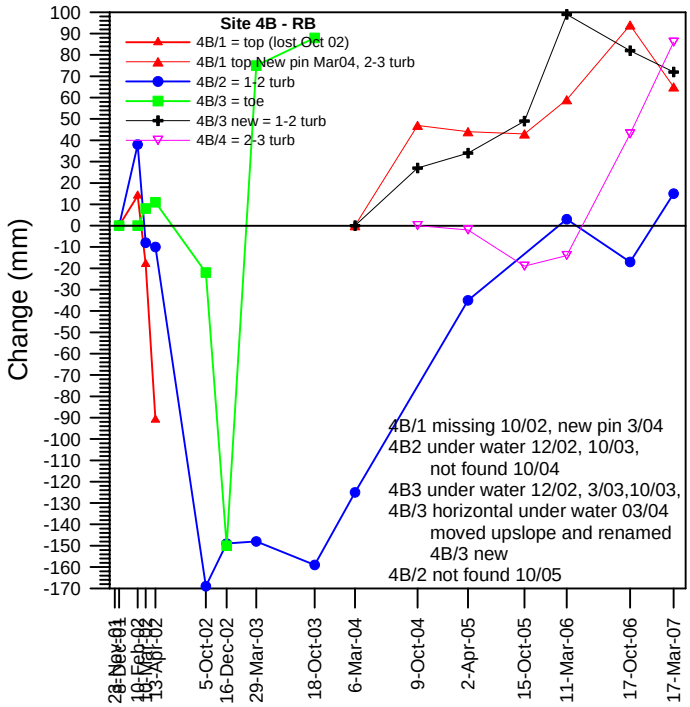

Figure 4-29, Erosion pin graph, site 4B

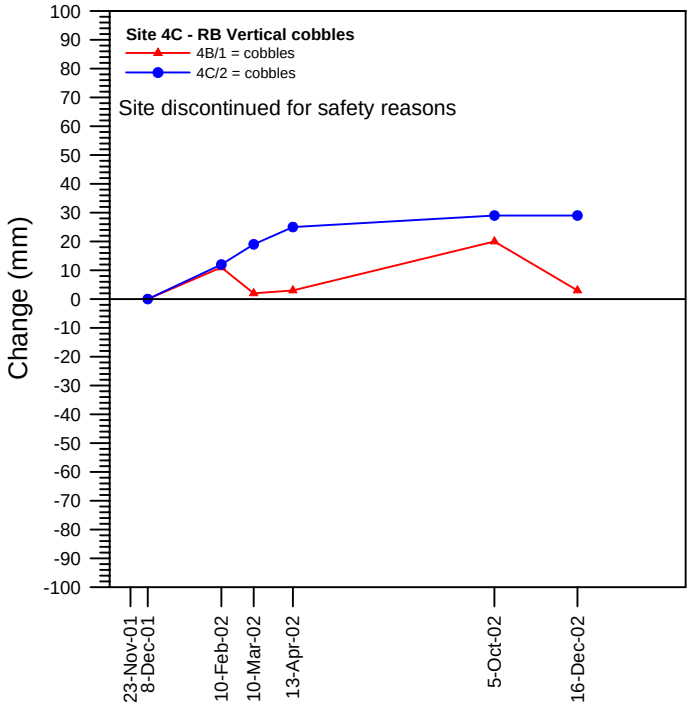

Figure 4-30. Erosion pin graph, site 4C

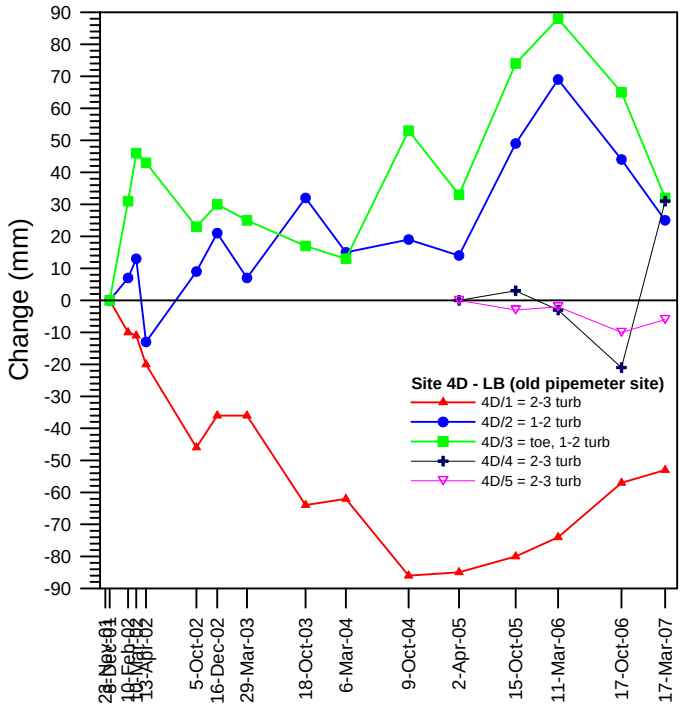

Figure 4-31. Erosion pin graph, site 4D

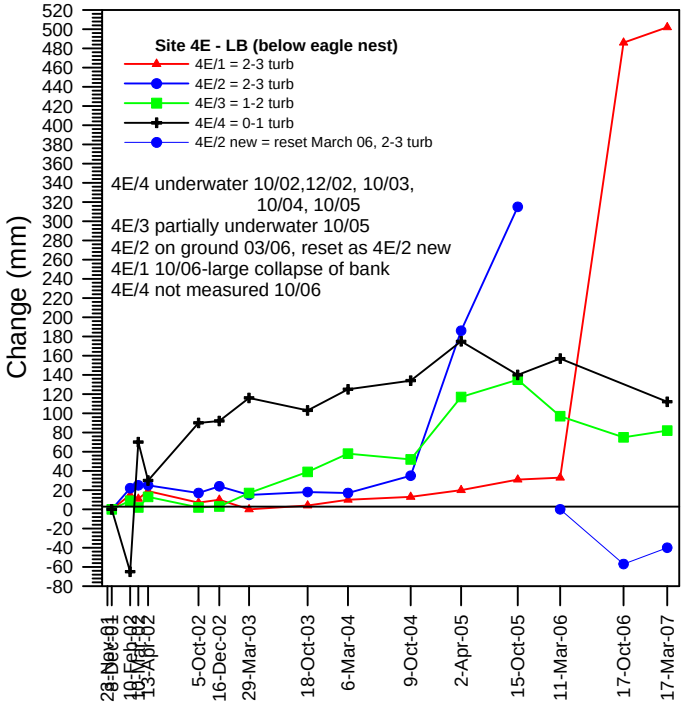

Figure 4-32. Erosion pin graph, site 4E

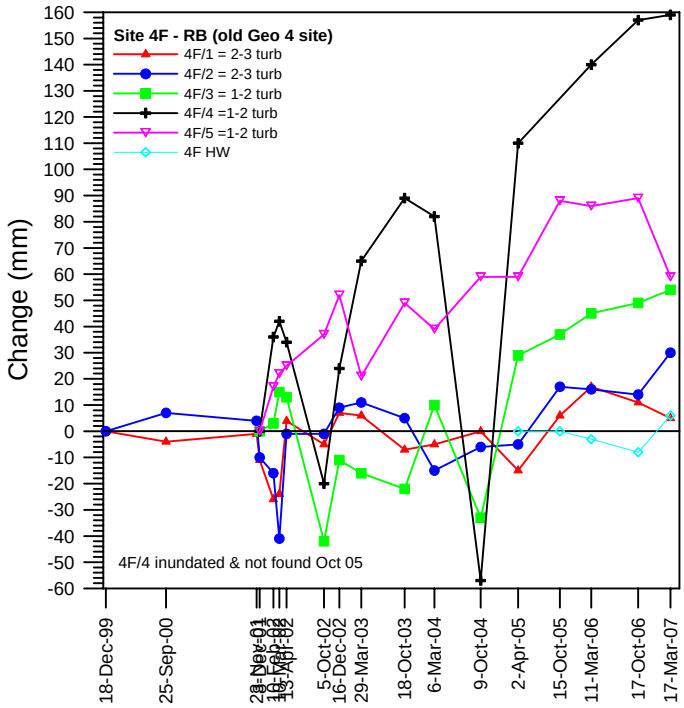

Figure 4-33. Erosion pin graph, site 4F

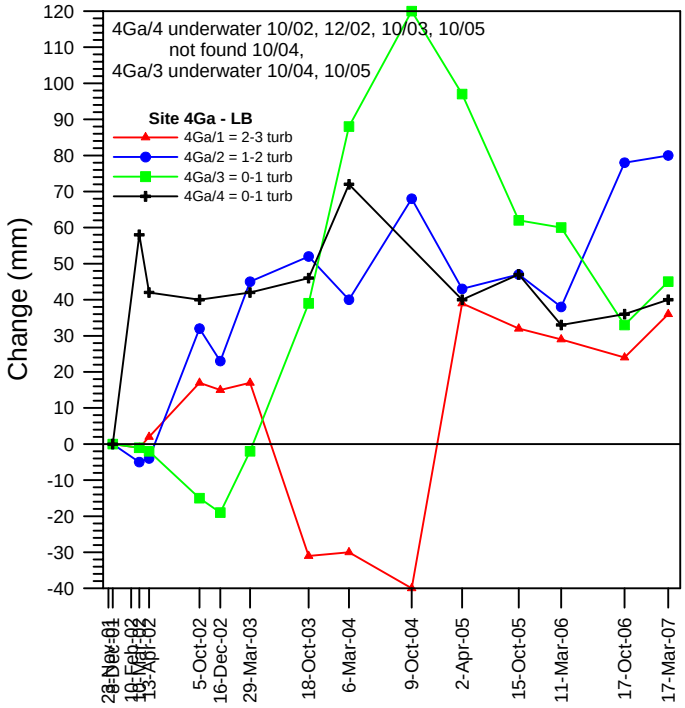

Figure 4-34. Erosion pin graph, site 4Ga

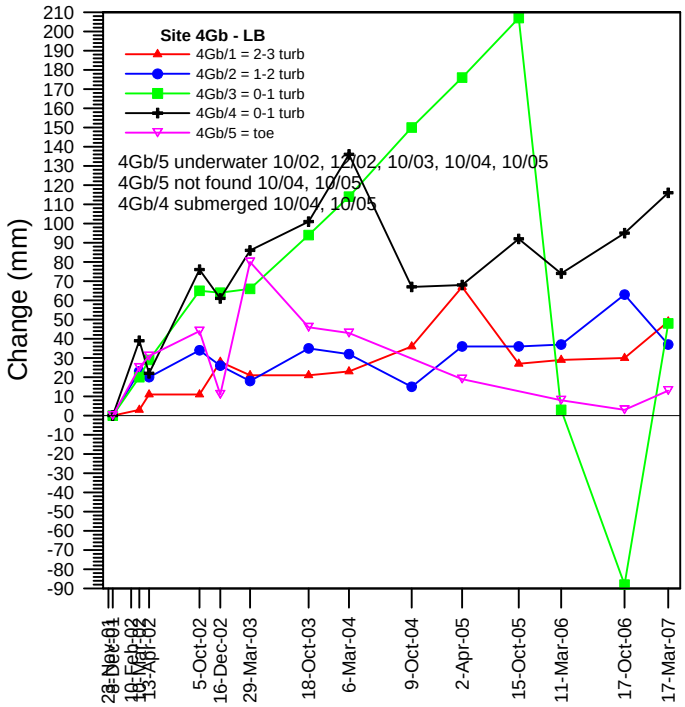

Figure 4-35. Erosion pin graph, site 4Gb

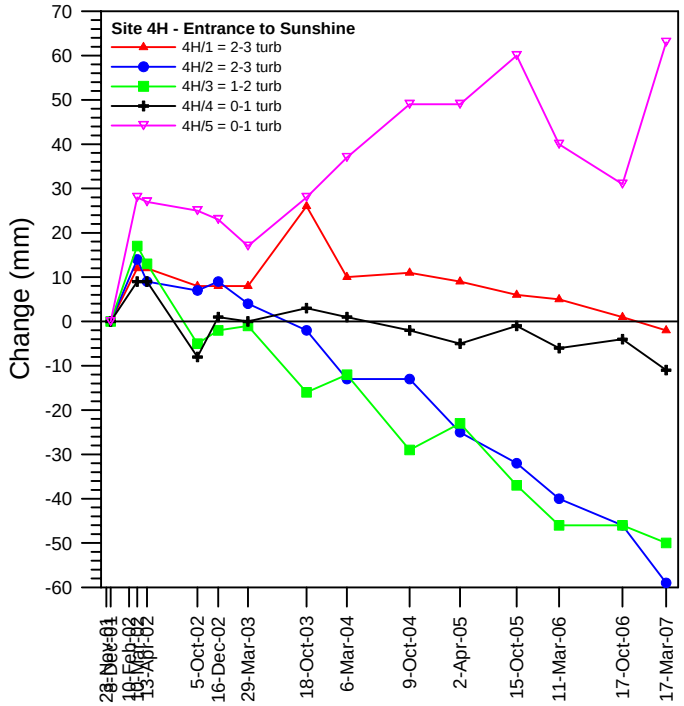

Figure 4-36. Erosion pin graph, site 4H

A4.6 Zone 5

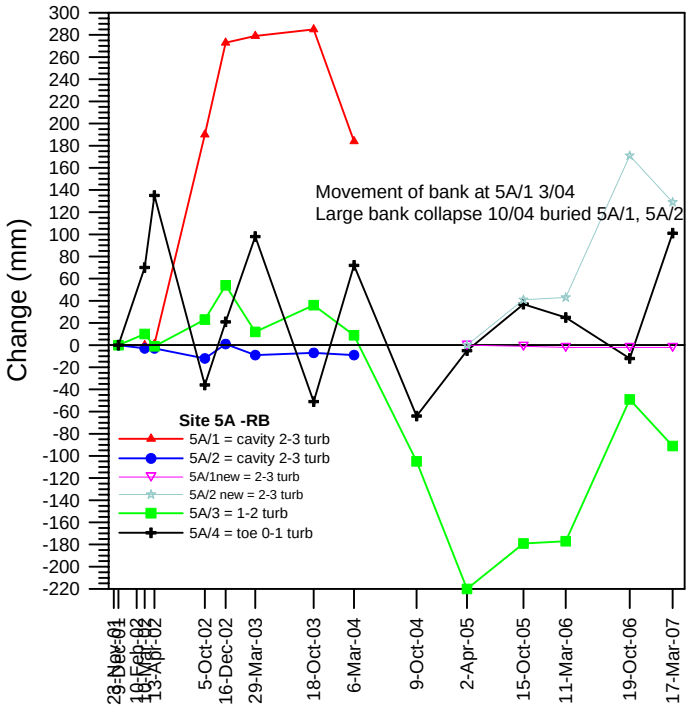

Figure 4-37. Erosion pin graph, site 5A

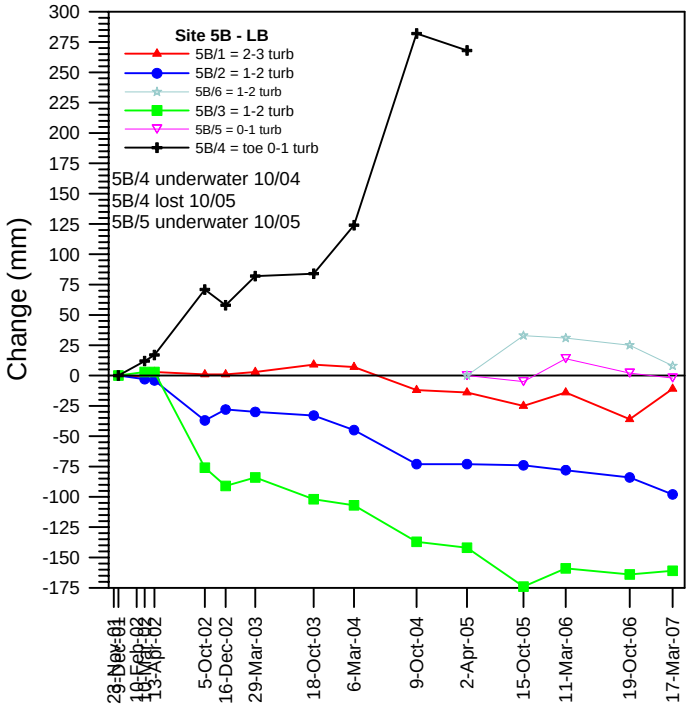

Figure 4-38. Erosion pin graph, site 5B

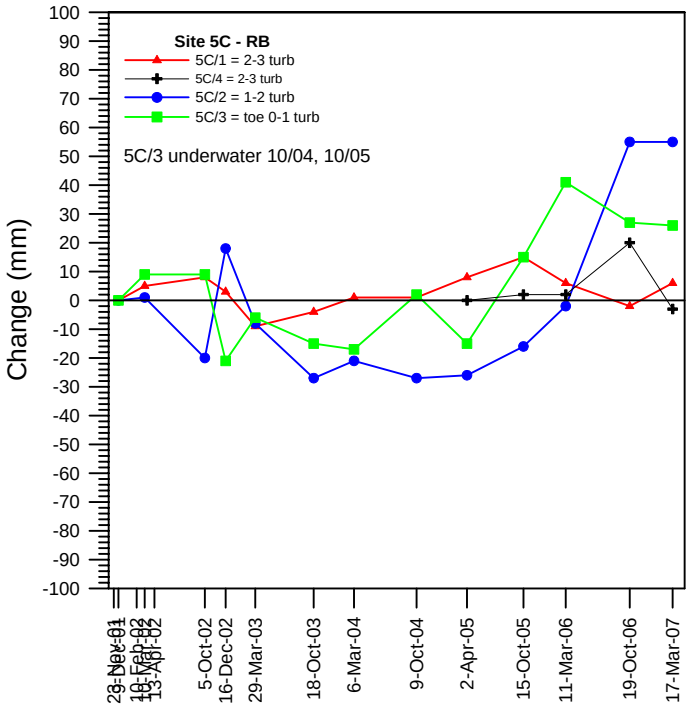

Figure 4-39. Erosion pin graph, site 5C

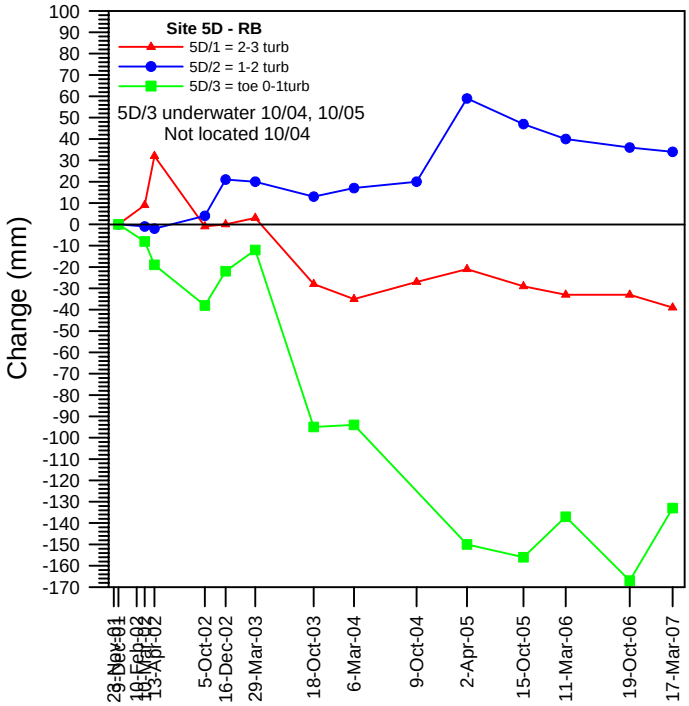

Figure 4-40. Erosion pin graph, site 5D

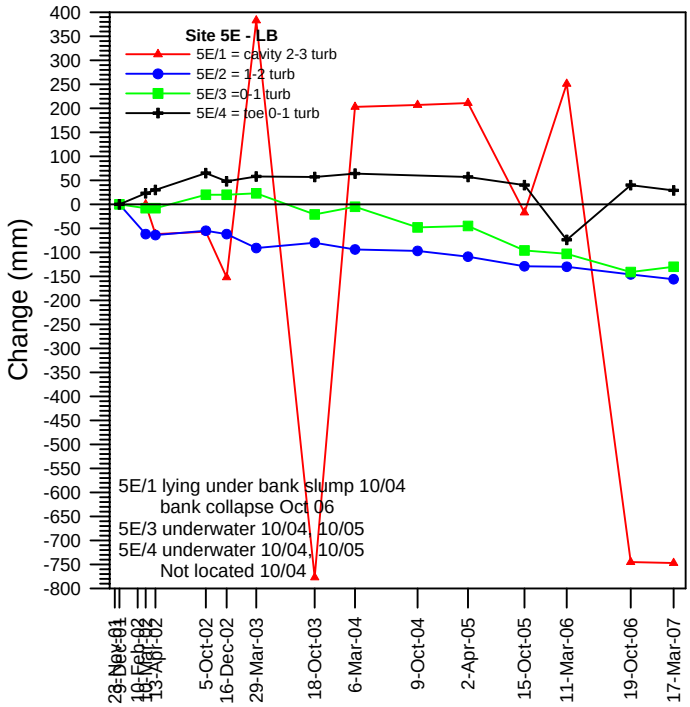

Figure 4-41. Erosion pin graph, site 5E

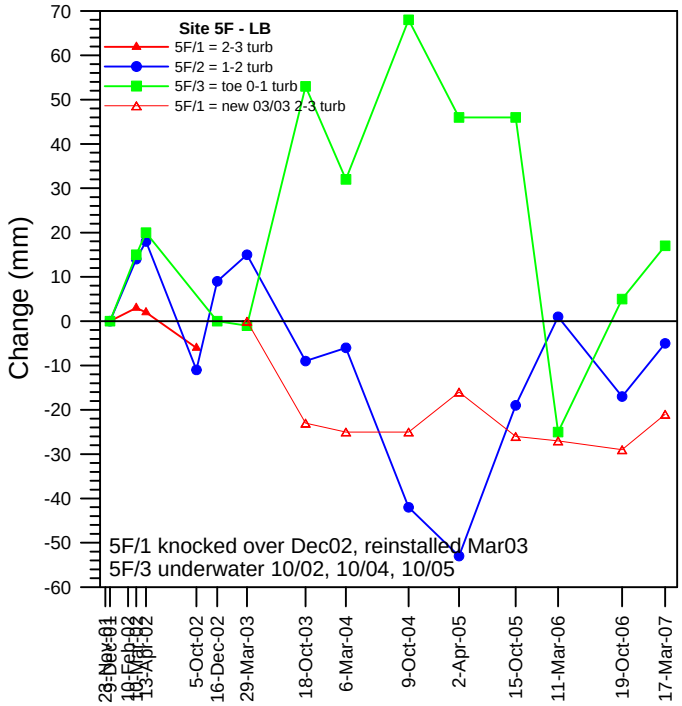

Figure 4-42. Erosion pin graph, site 5F

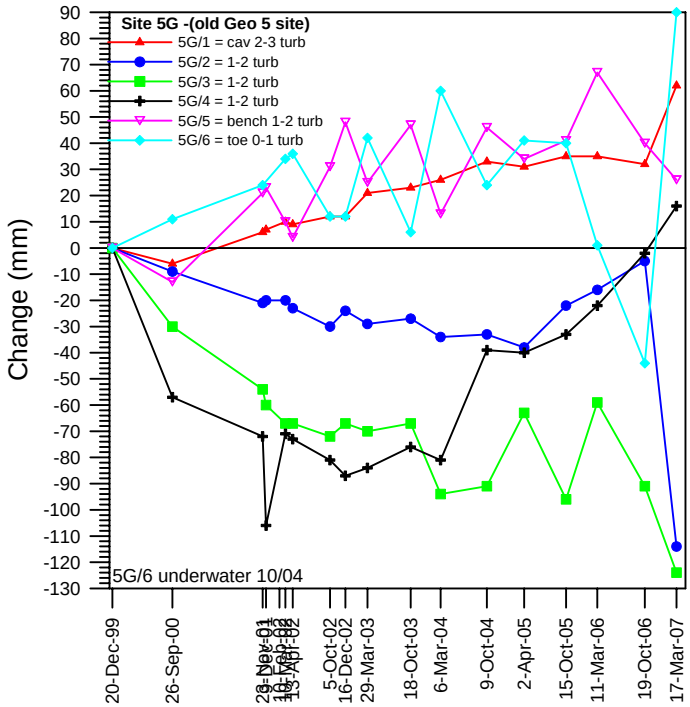

Figure 4-43. Erosion pin graph, site 5G

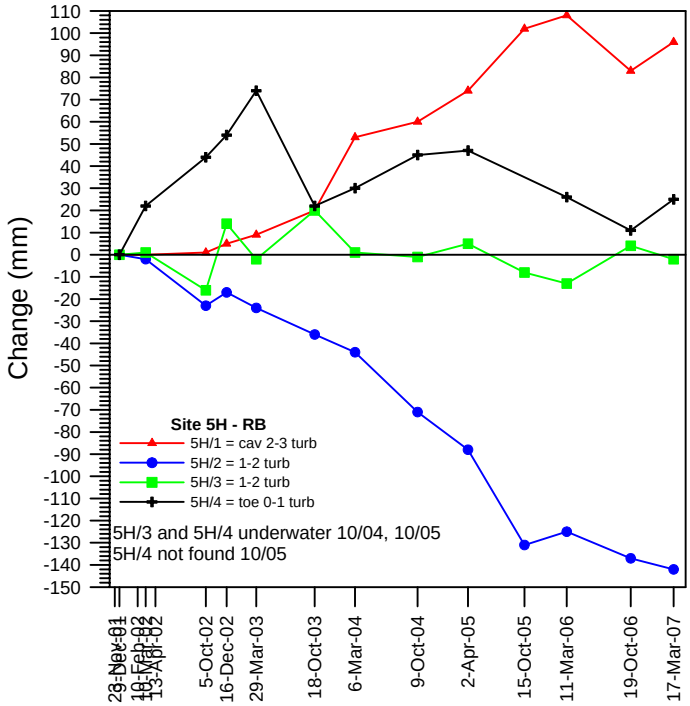

Figure 4-44. Erosion pin graph, site 5H

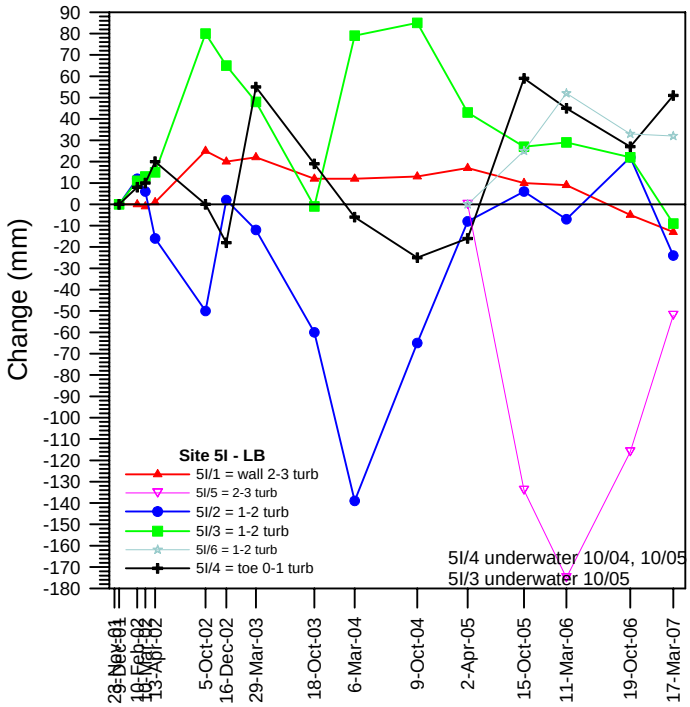

Figure 4-45. Erosion pin graph, site 5I

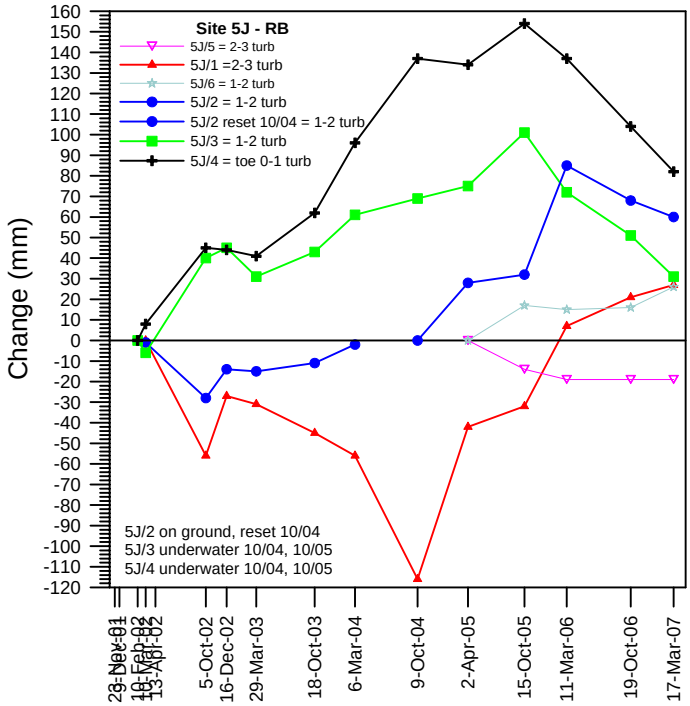

Figure 4-46. Erosion pin graph, site 5J

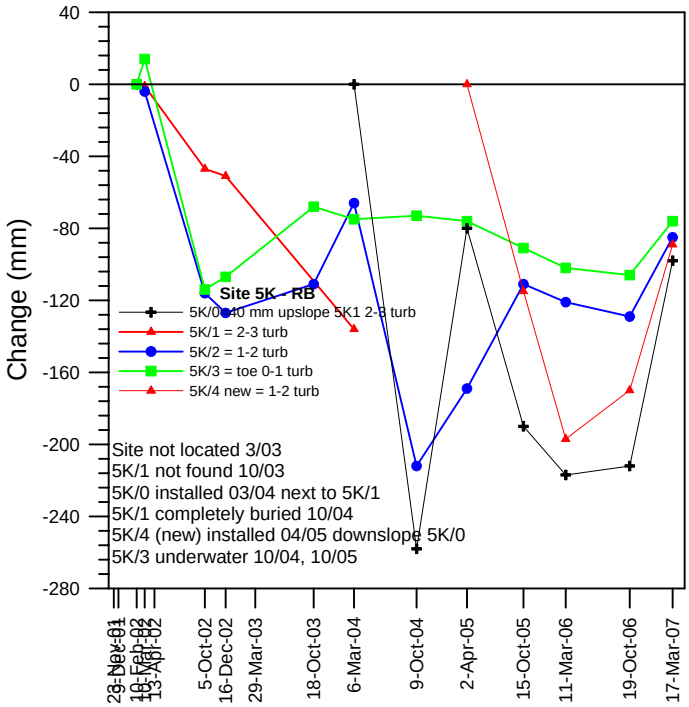

Figure 4-47. Erosion pin graph, site 5K

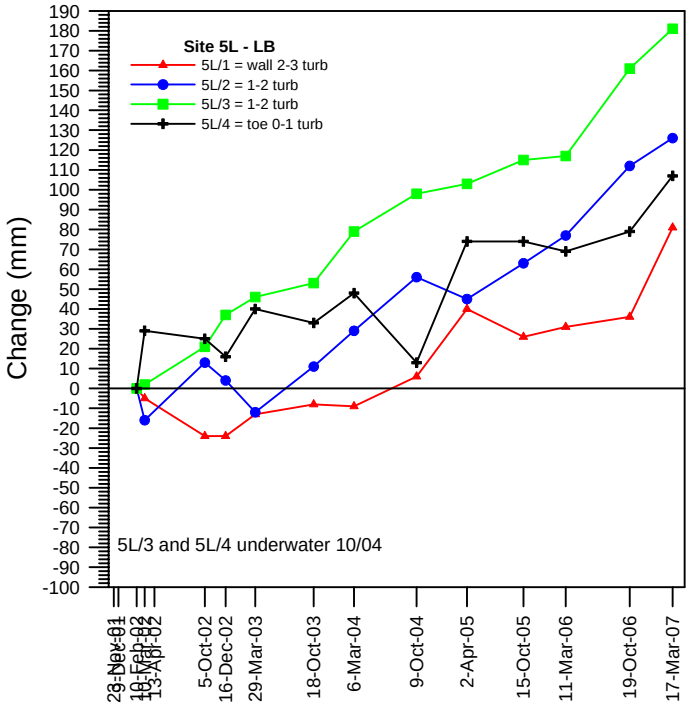

Figure 4-48. Erosion pin graph, site 5L

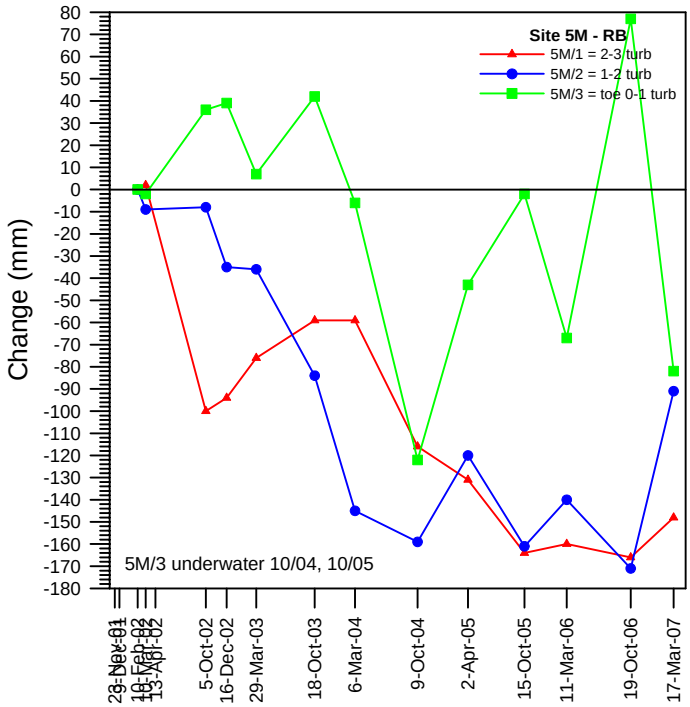

Figure 4-49. Erosion pin graph, site 5M

A5. Photo-monitoring sites

A5.1 Zone 1

Photo 5-1. Zone 1, site 1 - 9 March 2002 (left), 29 March 2003 (right)

Photo 5-2. Zone 1, site 1 - 6 March 2004. 2 April 2005 is missing.

Photo 5-3. Zone 1, site 1 - 11 March 2006 (left), 17 March 2007 (right)


Photo 5-4. Zone 1, site 2 - 9 March 2002 (left), 29 March 2003 (right)


Photo 5-5. Zone 1, site 2 - 6 March 2004 (left), 3 April 2005 (right)


Photo 5-6. Zone 1, site 2 - 11 March 2006 (left), 17 March 2007 (right)

Photo 5-7. Zone 1, site 3 - 9 March 2002 (left), 29 March 2003 (right)

Photo 5-8. Zone 1, site 3 - 6 March 2004 (left), 3 April 2005 (right)

Photo 5-9. Zone 1, site 3 - 11 March 2006 (left), 17 March 2007 (right)


Photo 5-10. Zone 1, site 4 - 9 March 2002 (left), 29 March 2003 (right)


Photo 5-11. Zone 1, site 4 - 6 March 2004 (left), 3 April 2005 (right)


Photo 5-12. Zone 1, site 4 - 11 March 2006 (left), 17 March 2007 (right)

Photo 5-13. Zone 1, site 4b - 9 March 2002 (left), 29 March 2003 (right). October 2002 shown below.

Photo 5-14. Zone 1, site 4b - October 2002 (left) - note vegetation at base which is absent in March 2003. 6 March 2004 (right)


Photo 5-15. Zone 1, site 4b - 3 April 2005 (left), 11 March 2006 (right)

Photo 5-16. Zone 1, site 4b - 17 March 2007

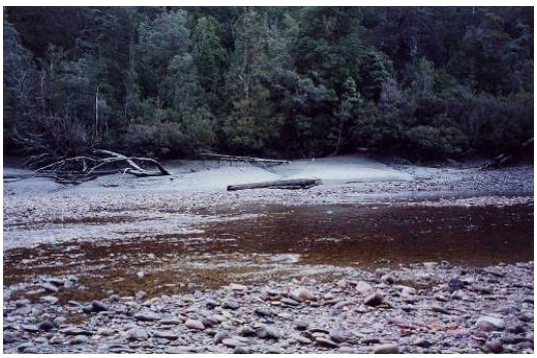


Photo 5-17. Zone 1, site 5 - 9 March 2002 (left), 29 March 2003 (right)

Photo 5-18. Zone 1, site 5 - 6 March 2004 (left), 3 April 2005 (right)

Photo 5-19. Zone 1, site 5 - 11 March 2006 (left), 17 March 2007 (right)

A5.2 Zone 2

Photo 5-20. Zone 2, site 1a - 9 March 2002 (left), 29 March 2003 (right)


Photo 5-21. Zone 2, site 1a - 6 March 2004 (left), 3 April 2005 (right)


Photo 5-22. Zone 2, site 1a - March 2006 (left), 17 March 2007 (right)


Photo 5-23. Zone 2, site 1b - 9 March 2002 (left), 29 March 2003 (right)

Photo 5-24. Zone 2, site 1b - 6 March 2004 (left), 3 April 2005 (right)

Photo 5-25. Zone 2, site 1b - 11 March 2006 (left), 17 March 2007 (right)

Photo 5-26. Zone 2, site new 1 - 11 March 2006 (left), 17 March 2007

Photo 5-27. Zone 2, site new 2 - 6 March 2004 (left), 9 April 2005 (right)

Photo 5-28. Zone 2, site new 2 - 11 March 2006 (left), 17 March 2007 (right)

Photo 5-29. Zone 2, site 2a - 9 March 2002 (left), 29 March 2003 (right)


Photo 5-30. Zone 2, site 2a - 6 March 2004 {downstream end} (left), 9 April 2005 (right)


Photo 5-31. Zone 2, site 2a - 11 March 2006 (left), 17 March 2007 (right)

Photo 5-32. Zone 2, site 2b - 9 March 2002 (left), 29 March 2003 (right)

Photo 5-33. Zone 2, site 2b - 6 March 2004. Not taken April 2005.

Photo 5-34. Zone 2, site 2b - 11 March 2006 (left), 17 March 2007 (right)

Photo 5-35. Zone 2, site 3 - 9 March 2002 (left), 29 March 2003 (right)

Photo 5-36. Zone 2, site 3 - 11 March 2006 (left), 17 March 2007 (right)

Photo 5-37. Zone 2, site 4 - 9 March 2002 (left), 29 March 2003 (right)

Photo 5-38. Zone 2, site 4 - 6 March 2004 (left), 9 April 2005 (right)

Photo 5-39. Zone 2, site 4 - 11 March 2006 (left), 17 March 2007 (right)

Photo 5-40. Zone 2, site 5 - 9 March 2002 (left), 29 March 2003 (right)

Photo 5-41. Zone 2, site 5 - 6 March 2004 (left), 9 April 2005 (right)

Photo 5-42. Zone 2, site 5 - 11 March 2006 (left), 17 March 2007 (right)

Photo 5-43. Zone 2, site 6 - 9 March 2002 (left), 29 March 2003 (right)

Photo 5-44. Zone 2, site 6 - 6 March 2004 (left), 9 April 2005 (right)

Photo 5-45. Zone 2, site 6 - 11 March 2006 (left), 17 March 2007 (right)

Photo 5-46. Zone 2, site new 3 - 17 October 2006 (left), 17 March 2007 (right)

Photo 5-47. Zone 2, site 7 - 9 March 2002 (left), 29 March 2003 (right)

Photo 5-48. Zone 2, site 7 - 6 March 2004 (left), 9 April 2005 (right)

Photo 5-49. Zone 2, site 7 - 11 March 2006 (left), 17 March 2007 (right)

Photo 5-50. Zone 2, site 8 - 9 March 2002 (left), 29 March 2003 (right)

Photo 5-51. Zone 2, site 8 - 6 March 2004 (left), 9 April 2005 (right)

Photo 5-52. Zone 2, site 8 - 11 March 2006 (left), 17 March 2007 (right)

Photo 5-53. Zone 2, site 9 - 9 March 2002 (left), 29 March 2003 (right)


Photo 5-54. Zone 2, site 9 - 6 March 2004 (left), 9 April 2005 (right)


Photo 5-55. Zone 2, site 9 - 11 March 2006 (left), 17 March 2007 (right)

Photo 5-56. Zone 2, site 10 - 9 March 2002 (left), 29 March 2003 (right)

Photo not obtained in March 2004.

Photo 5-57. Zone 2, site 10 - 9 April 2005 (left), 11 March 2006 (right)

Photo 5-58. Zone 2, site 10 - 17 March 2007

Photo 5-59. Zone 2, site 11 - 9 March 2002 (left), 9 April 2005 (right). No suitable photo obtained March 2003 or March 2004.

Photo 5-60. Zone 2, site 11 - 11 March 2006 (left), 17 March 2007 (right)

A5.3 Zone 3

Photo 5-61. Zone 3, site 1 - 9 March 2002 (left), 29 March 2003 (right)

Photo 5-62. Zone 3, site 1 - 6 March 2004 (left), 2 April 2005 (right)


Photo 5-63. Zone 3, site 1 - 11 March 2006 (left), 17 March 2007 (right)


Photo 5-64. Zone 3, site 2 - 9 March 2002 (left), 29 March 2003 (right)


Photo 5-65. Zone 3, site 2 - 6 March 2004 (left), 2 April 2005 (right). Photo not taken 11 March 2006.

Photo 5-66. Zone 3, site 2 - 17 March 2007

Photo 5-67. Zone 3, site 3 - 9 March 2002 (left), 29 March 2003 (right)

Photo 5-68. Zone 3, site 3 - 6 March 2004 (left), 2 April 2005 (right)

Photo 5-69. Zone 3, site 3 - 11 March 2006 (left), 17 March 2007 (right)

Photo 5-70. Zone 3, site 4 - 9 March 2002 (left), 29 March 2003 (right)

Photo 5-71. Zone 3, site 4 - 6 March 2004 (left), 2 April 2005 (right)

Photo 5-72. Zone 3, site 4 - 11 March 2006 (left), 17 March 2007 (right)

Photo 5-73. Zone 3, site 5 - 9 March 2002 (left), 29 March 2003 (right)

Photo 5-74. Zone 3, site 5 - 6 March 2004 (left), 2 April 2005 (right)

Photo 5-75. Zone 3, site 5 - 11 March 2006 (left), 17 March 2007 (right)

A5.4 Zone 4

Photo 5-76. Zone 4, site 1 - 10 March 2002 (left), 29 March 2003 (right)

Photo 5-77. Zone 4, site 1 - 6 March 2004 (left), 2 April 2005 (right)

Photo 5-78. Zone 4, site 1 - 11 March 2006 (left), 17 March 2007 (right)

Photo 5-79. Zone 4, site 2 - 10 March 2002 (left), 29 March 2003 (right)

Photo 5-80. Zone 4, site 2 - 6 March 2004 (left), 2 April 2005 (right)

Photo 5-81. Zone 4, site 2 - 11 March 2006 (left), 17 March 2007 (right)

Photo 5-82. Zone 4, site 3 - 10 March 2002 (left), 29 March 2003 (right)

Photo 5-83. Zone 4, site 3 - 6 March 2004 (left), 2 April 2005 (right)

Photo 5-84. Zone 4, site 3 - 11 March 2006 (left), 17 March 2007 (right)

Photo 5-85. Zone 4, site 4a - 10 March 2002 (left), 29 March 2003 (right)

Photo 5-86. Zone 4, site 4a - 6 March 2004 (left), 2 April 2005 (right)

Photo 5-87. Zone 4, site 4a - 11 March 2006 (left), 17 March 2007 (right)

Photo 5-88. Zone 4, site 4b - 10 March 2002 (left), 29 March 2003 (right)

Photo 5-89. Zone 4, site 4b - 6 March 2004 (left), 2 April 2005 (right)

Photo 5-90. Zone 4, site 4b - 11 March 2006 (left), 17 March 2007 (right)

Photo 5-91. Zone 4, site $4c_{1,2,3}$. 10 March 2002

Photo 5-92. Zone 4, site $4c_{1,2,3}$. 29 March 2003

Photo 5-93. Zone 4, site $4c_{1,2,3}$ 6 March 2004

Photo 5-94. Zone 4, site $4c_{1,2,3}$. 2 April 2005

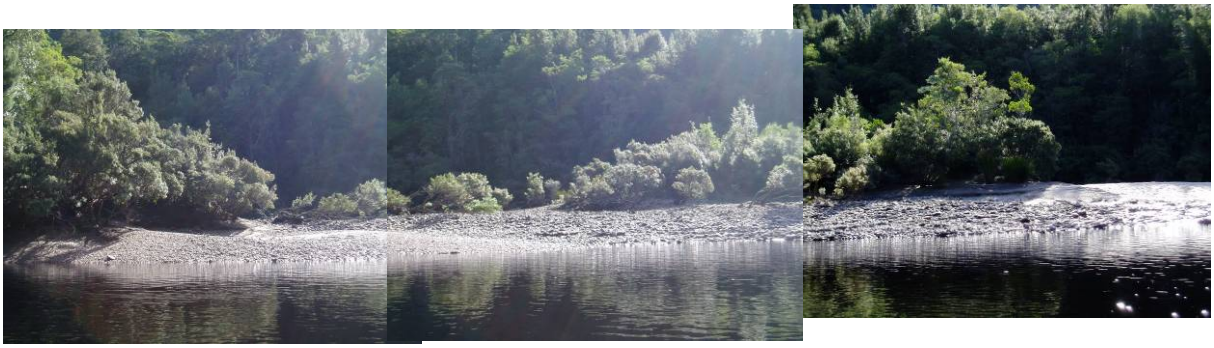

Photo 5-95. Zone 4, site $4c_{1,2,3}$ 11 March 2006

Photo 5-96. Zone 4, site $4c_{1,2,3}$ 17 March 2007

Photo 5-97. Zone 4, site 5a,b. 10 March 2002

Photo 5-98. Zone 4, site 5 - 29 March 2003

Photo 5-99. Zone 4, site 5 - 6 March 2004 (left), 2 April 2005 (right)

Photo 5-100. Zone 4, site 5 - 11 March 2006

Photo 5-101. Zone 4, site 5 - 17 March 2007

Photo 5-102. Zone 4, site 6 - 10 March 2002 (left), 29 March 2003 (right)

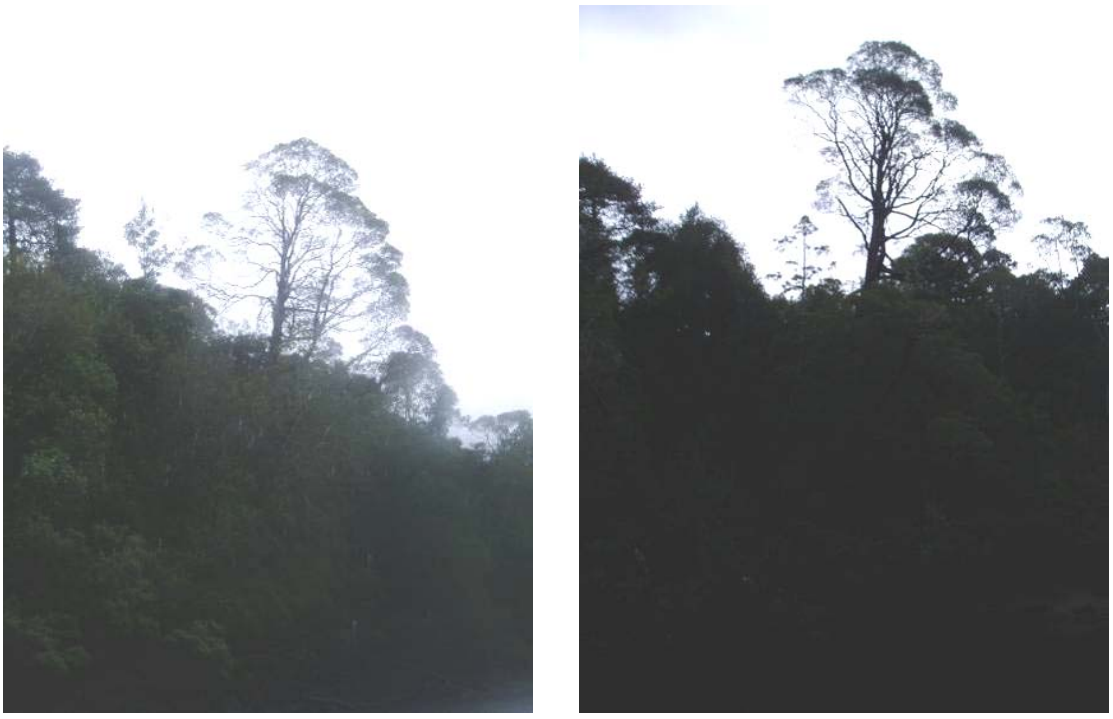

Photo 5-103. Zone 4, site 6 - 6 March 2004 (left), 2 April 2005 (right)

Photo 5-104. Zone 4, site 6 - 11 March 2006 (left), 17 March 2007 (right)

Photo 5-105. Zone 4, site 7 - 10 March 2002 (left), 29 March 2003 (right)

Photo 5-106. Zone 4, site 7 - 6 March 2004 (left), 2 April 2005 (right)

Photo 5-107. Zone 4, site 7 - 11 March 2006 (left), 17 March 2007 (right)

Photo 5-108. Zone 4, site 8 - 10 March 2002 (left), 29 March 2003 (right)

Photo 5-109. Zone 4, site 8 - 6 March 2004 (left), 2 April 2005 (right)

Photo 5-110. Zone 4, site 8 - 11 March 2006 (left), 17 March 2007 (right)

A5.5 Zone 5

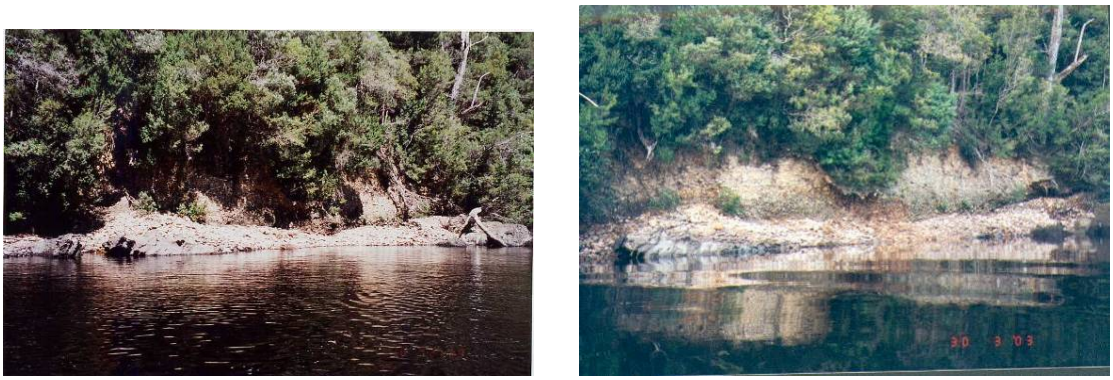

Photo 5-111. Zone 5, site 1 – 10 March 2002 (left), 30 March 2003 (right)


Photo 5-112. Zone 5, site 1 – 6 March 2004 (left), 2 April 2005 (right)


Photo 5-113. Zone 5, site 1 – 11 March 2006 (left), 17 March 2007 (right)

Photo 5-114. Zone 5, site 2 – 10 March 2002 (left), 30 March 2003 (right)

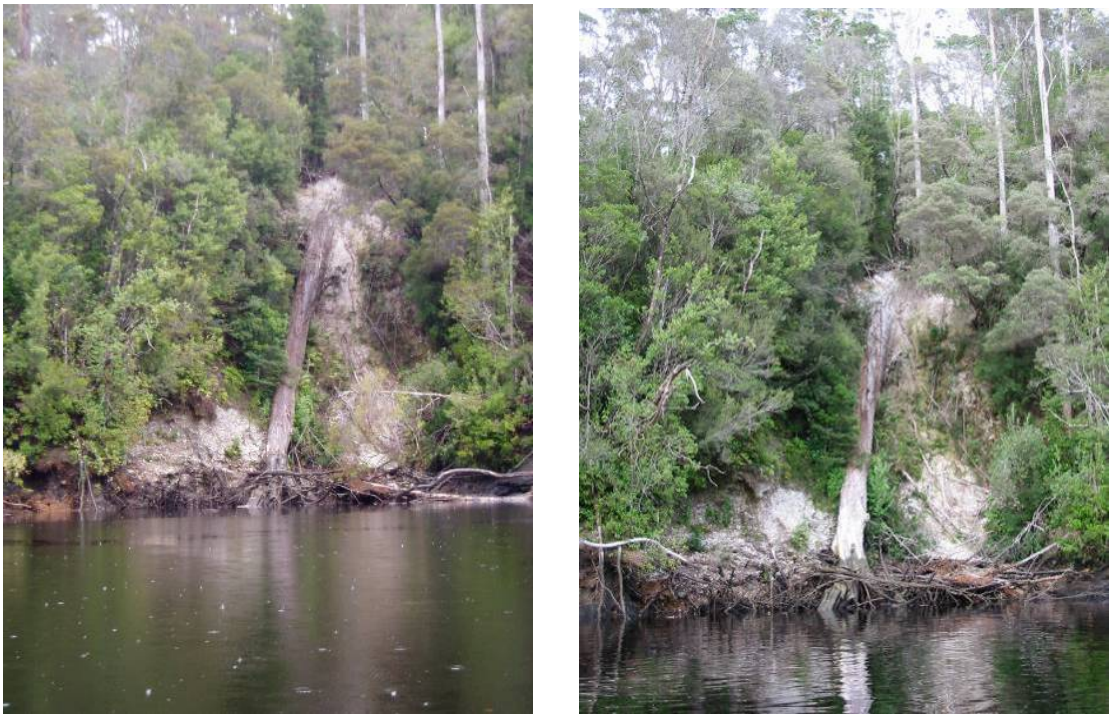

Photo 5-115. Zone 5, site 2 – 6 March 2004 (left), 2 April 2005 (right)

Photo 5-116. Zone 5, site 2 – 11 March 2006 (left), 17 March 2007 (right)

Photo 5-117. Zone 5, site 3 – 10 March 2002 (left), 30 March 2003 (right)

Photo 5-118. Zone 5, site 3 – 6 March 2004 (left), 2 April 2005 (right)

Photo 5-119. Zone 5, site 3 – 11 March 2006 (left), 17 March 2007 (right)


Photo 5-120. Zone 5, site 4 – 10 March 2002 (left), 30 March 2003 (right)


Photo 5-121. Zone 5, site 4 – 6 March 2004 (left), 2 April 2005 (right)


Photo 5-122. Zone 5, site 4 – 11 March 2006 (left), 17 March 2007 (right)

Photo 5-123. Zone 5, site 5 – 10 March 2002 (left), 30 March 2003 (right)

Photo 5-124. Zone 5, site 5 – 6 March 2004 (left), 2 April 2005 (right)

Photo 5-125. Zone 5, site 5 – 11 March 2006 (left), 17 March 2007 (right)

Photo 5-126. Zone 5, site 6 – 10 March 2002 (left), 30 March 2003 (right)

Photo 5-127. Zone 5, site 6 – 6 March 2004 (left), 2 April 2005 (right)

Photo 5-128. Zone 5, site 6 – 11 March 2006 (left), 17 March 2007 (right)

Photo 5-129. Zone 5, site 7 – 10 March 2002 (left), 30 March 2003 (right)

Photo 5-130. Zone 5, site 7 - 10 March 2004 (left), 2 April 2005 (right)

Photo 5-131. Zone 5, site 7 - 11 March 2006 (left), 17 March 2007 (right)

Photo 5-132. Zone 5, site 8 - 10 March 2002 (left), 30 March 2003 (right)

Photo 5-133. Zone 5, site 8 - 6 March 2004 (left), 2 April 2005 (right).

Photo 5-134. Zone 5, site 8 - 11 March 2006 (left), 17 March 2007 (right)

Photo 5-135. Zone 5, site 9 - 10 March 2002 (left), 30 March 2003 (right)

Photo 5-136. Zone 5, site 9 - 6 March 2004 (left), 2 April 2005 (right)

Photo 5-137. Zone 5, site 9 - 11 March 2006 (left), 17 March 2007 (right)

Photo 5-138. Zone 5, site 10 - 10 March 2002 (left), 30 March 2003 (right)

Photo 5-139. Zone 5, site 10 – 6 March 2004 (left), 2 April 2005 (right)

Photo 5-140. Zone 5, site 10 - 11 March 2006 (left), 17 March 2007 (right)

Photo 5-141. Zone 5, site 11- 10 March 2002 (left), 30 March 2003 (right)

Photo 5-142. Zone 5, site 11 - 6 March 2004 (left), 2 April 2005 (right)

Photo 5-143. Zone 5, site 11 - 11 March 2006 (left), 17 March 2007 (right)

Photo 5-144. Zone 5, site 12 - 10 March 2002 (left), 30 March 2003 (right)

Photo 5-145. Zone 5, site 12 - 6 March 2004 (left), 2 April 2005 (right)

Photo 5-146. Zone 5, site 12 - 11 March 2006 (left), 17 March 2007 (right)


Photo 5-147. Zone 5, site 13 - 10 March 2002 (left), 30 March 2003 (right)


Photo 5-148. Zone 5, site 13 - 6 March 2002 (left), 2 April 2005 (right)


Photo 5-149. Zone 5, site 13 - 11 March 2006 (left), 17 March 2007 (right)


Photo 5-150. Zone 5, site 14 - 10 March 2002 (left), and March 2003. Not taken in March 2004 – missed it and went down rapids (too late to return). Same thing happened in April 2005 – very tricky site.


Photo 5-151. Zone 5, site 14 - 11 March 2006 (left), 17 March 2007 (right)


Photo 5-152. Zone 5, site 15 - 10 March 2002 (left), 30 March 2003 (right)

Photo 5-153. Zone 5, site 15 - 6 March 2004 (left), 2 April 2005 (right)

Photo 5-154. Zone 5, site 15 - 11 March 2006 (left), 11 March 2006 (right)

Photo 5-155. Zone 5, site 16 - 10 March 2002 (left), March 30 2003 (right)

Photo 5-156. Zone 5, site 16 - 6 March 2004 (left), 2 April 2005 (right)

Photo 5-157. Zone 5, site 16 - 11 March 2006 (left), 17 March 2007 (right)

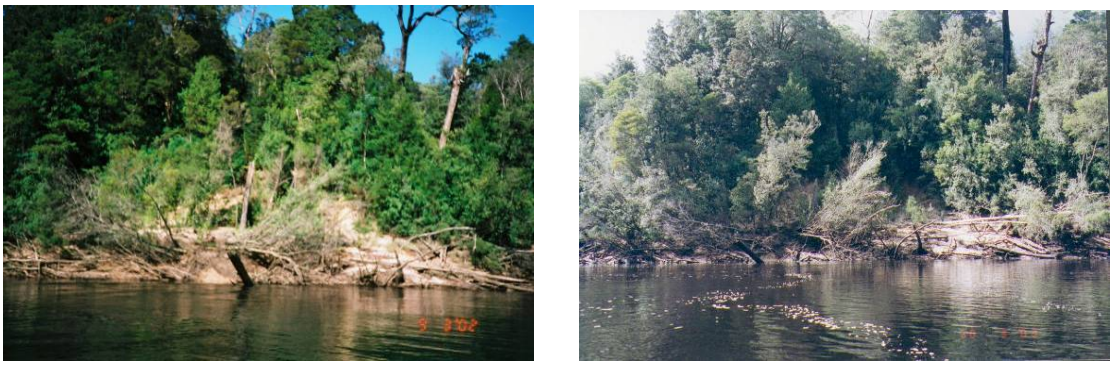

Photo 5-158. Zone 5, site 17 - 9 March 2002 (left), 30 March 2003 (right)


Photo 5-159. Zone 5, site 17 - 6 March 2004 (left), 2 April 2005 (right)


Photo 5-160. Zone 5, site 17 - 11 March 2006 (left), 17 March 2007 (right)


Photo 5-161. Zone 5, site 18 - 9 March 2002 (left), 30 March 2003 (right)


Photo 5-162. Zone 5, site 18 - 6 March 2004 (left), 2 April 2005 (right)


Photo 5-163. Zone 5, site 18 - 11 March 2006 (left), 17 March 2007 (right)


Photo 5-164. Zone 5, site 19 - 9 March 2002 (left), 30 March 2003 (right)

Photo 5-165. Zone 5, site 19 - 6 March 2004 (left), 2 April 2005 (right)

Photo 5-166. Zone 5, site 19 - 11 March 2006 (left), 17 March 2007 (right)

Photo 5-167. Zone 5, site 20 - 9 March 2002 (left), 30 March 2003 (right)

Photo 5-168. Zone 5, site 20 - 6 March 2004 (left), 2 April 2005 (right)

Photo 5-169. Zone 5, site 20 - 11 March 2006

Photo 5-170. Zone 5, site 21 - 30 March 2003 (left), 6 March 2004 (right). Photo not obtained in March 2002, nor in April 2005.

Photo 5-171. Zone 5, site 21 - 11 March 2006

A6. Riparian vegetation photo-monitoring

A6.1 Zone 2

A6.1.1 Site 1

Photo 6-1. Zone 2-1, April 2005 (left), May 2006 (right)

Photo 6-2. Zone 2-1, June 2007

A6.1.2 Site 2

Photo 6-3. Zone 2-2, April 2005 (left), May 2006 (right)

Photo 6-4. Zone 2-2, June 2007

A6.1.3 Site 3

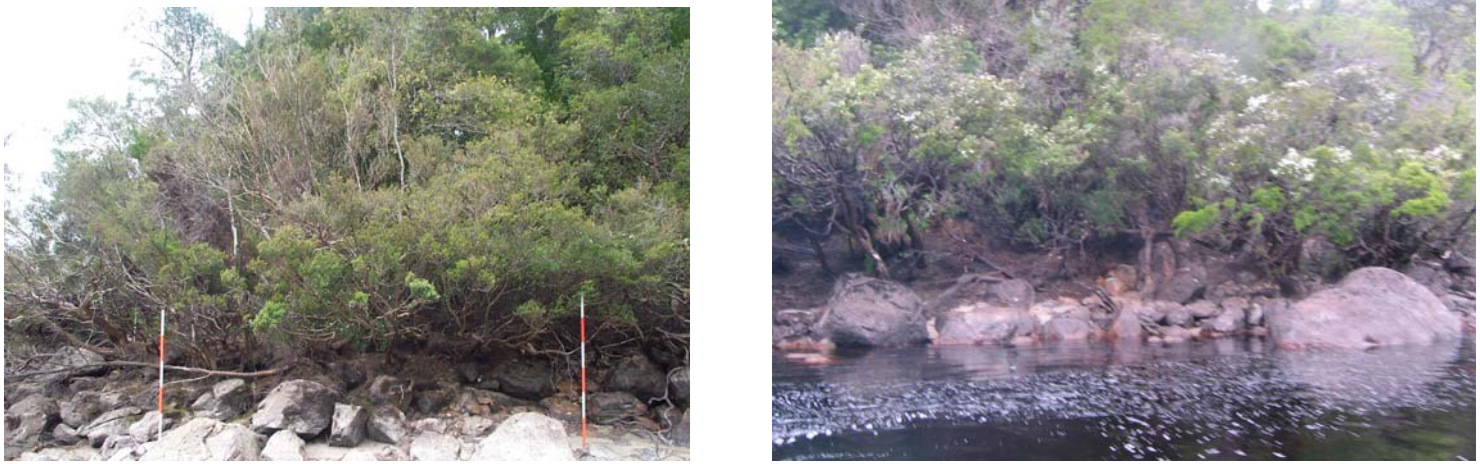

Photo 6-5. Zone 2-3, April 2005 (left), May 2006 (right)

Photo 6-6. Zone 2-3, June 2007

A6.1.4 Site 4

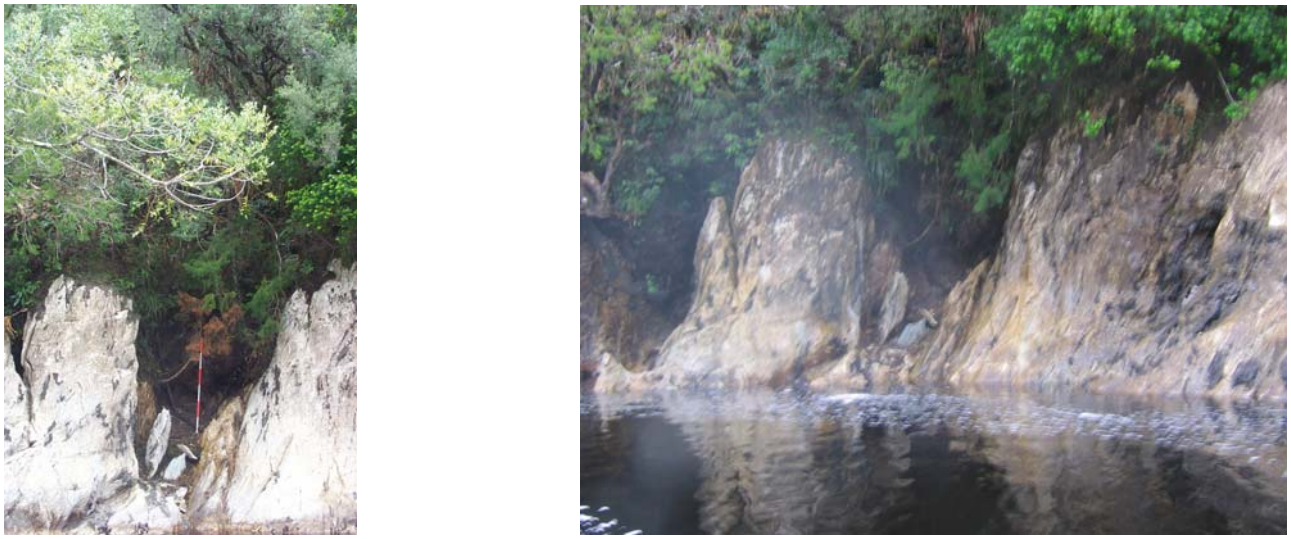

Photo 6-7. Zone 2-4, April 2005 (left), May 2006 (right)

Photo 6-8. Zone 2-4, June 2007

A6.1.5 Site 5

Photo 6-9. Zone 2-5, April 2005 (left), May 2006 (right)

Photo 6-10. Zone 2-5, June 2007

A6.1.6 Site 6

Photo 6-11. Zone 2-6, April 2005 (left), June 2007 (right)

A6.1.7 Site 7

Photo 6-12. Zone 2-7, April 2005 (left), May 2006 (right)

Photo 6-13. Zone 2-7, June 2007

A6.1.8 Site 8

Photo 6-14. Zone 2-8, April 2005 (left), May 2006 (right)

Photo 6-15. Zone 2-8, June 2007

A6.1.9 Site 9

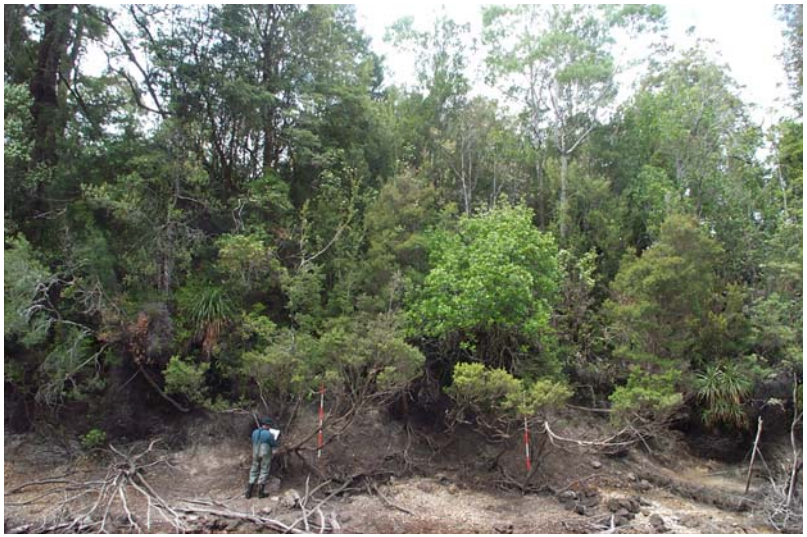

Photo 6-16. Zone 2-9, April 2005 (left), May 2006 (right)

Photo 6-17. Zone 2-9, June 2007

A6.1.10 Site 10

Photo 6-18. Zone 2-10, April 2005 (left), May 2006 (right)

Photo 6-19. Zone 2-10, June 2007

A6.1.11 Site 11

Photo 6-20. Zone 2-11, April 2005 (left), June 2007 (right)

A6.1.12 Site 12

Photo 6-21. Zone 2-12, April 2005 (left), June 2007 (right)

A6.2 Zone 3

A6.2.1 Site 1

Photo 6-22. Zone 3-1, April 2005 (left), May 2006 (right)

Photo 6-23. Zone 3-1, June 2007

A6.2.2 Site 2

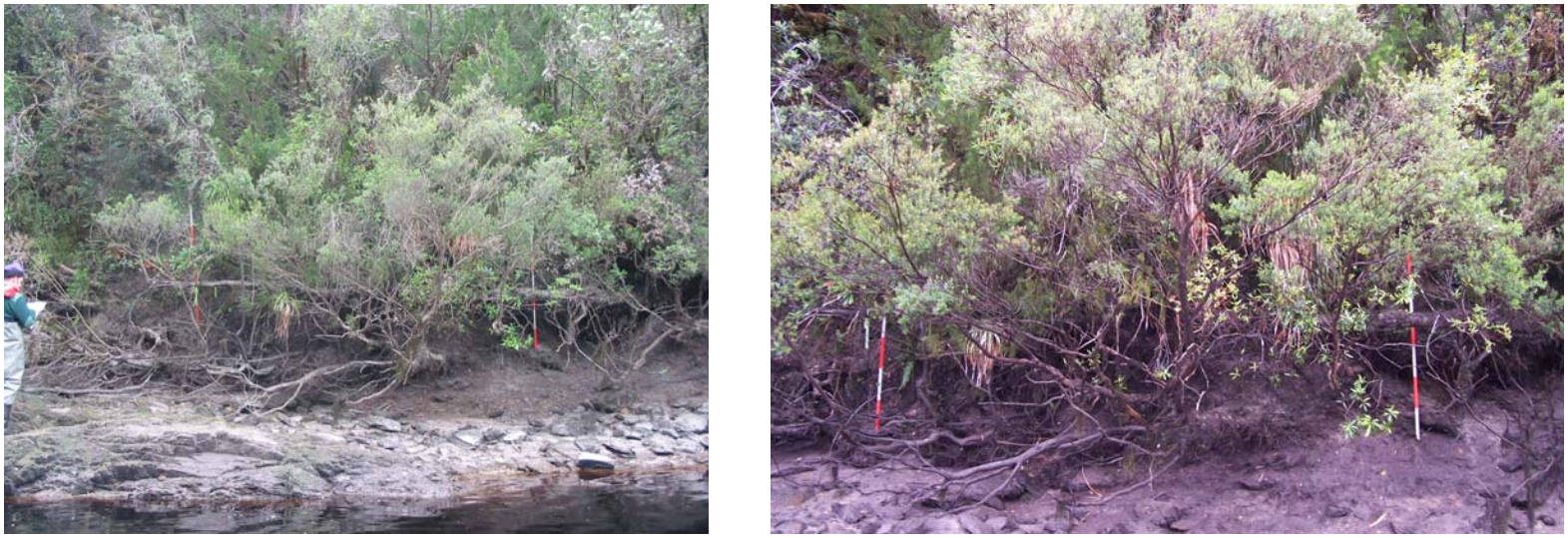

Photo 6-24. Zone 3-2, April 2005 (left), May 2006 (right)

Photo 6-25. Zone 3-2, June 2007

A6.2.3 Site 3

Photo 6-26. Zone 3-3, April 2005 (left), May 2006 (right)

Photo 6-27. Zone 3-3, June 2007

A6.2.4 Site 4

Photo 6-28. Zone 3-4, April 2005 (left), May 2006 (right)

Photo 6-29. Zone 3-4, June 2007

A6.2.5 Site 5

Photo 6-30. Zone 3-5, April 2005 (left), May 2006 (right)

Photo 6-31. Zone 3-5, June 2007

A6.2.6 Site 6

Photo 6-32. Zone 3-6, April 2005 (left), May 2006 (right)

Photo 6-33. Zone 3-6, June 2007

A6.2.7 Site 7

Photo 6-34. Zone 3-7, April 2005 (left), May 2006 (right)

Photo 6-35. Zone 3-7, June 2007

A6.2.8 Site 8

Photo 6-36. Zone 3-8, April 2005 (left), May 2006 (right)

Photo 6-37. Zone 3-8, June 2007

A6.3 Zone 4

A6.3.1 Site 1

Photo 6-38. Zone 4-1, April 2005 (left), May 2006 (right)

Photo 6-39. Zone 4-1, June 2007

A6.3.2 Site 2

Photo 6-40. Zone 4-2, April 2005 (left), May 2006 (right)

Photo 6-41. Zone 4-2, June 2007

A6.3.3 Site 3

Photo 6-42. Zone 4-3, April 2005 (left), May 2006 (right)

Photo 6-43. Zone 4-3, June 2007

A6.3.4 Site 4

Photo 6-44. Zone 4-4, April 2005 (left), May 2006 (right)

Photo 6-45. Zone 4-4, June 2007

A6.3.5 Site 5

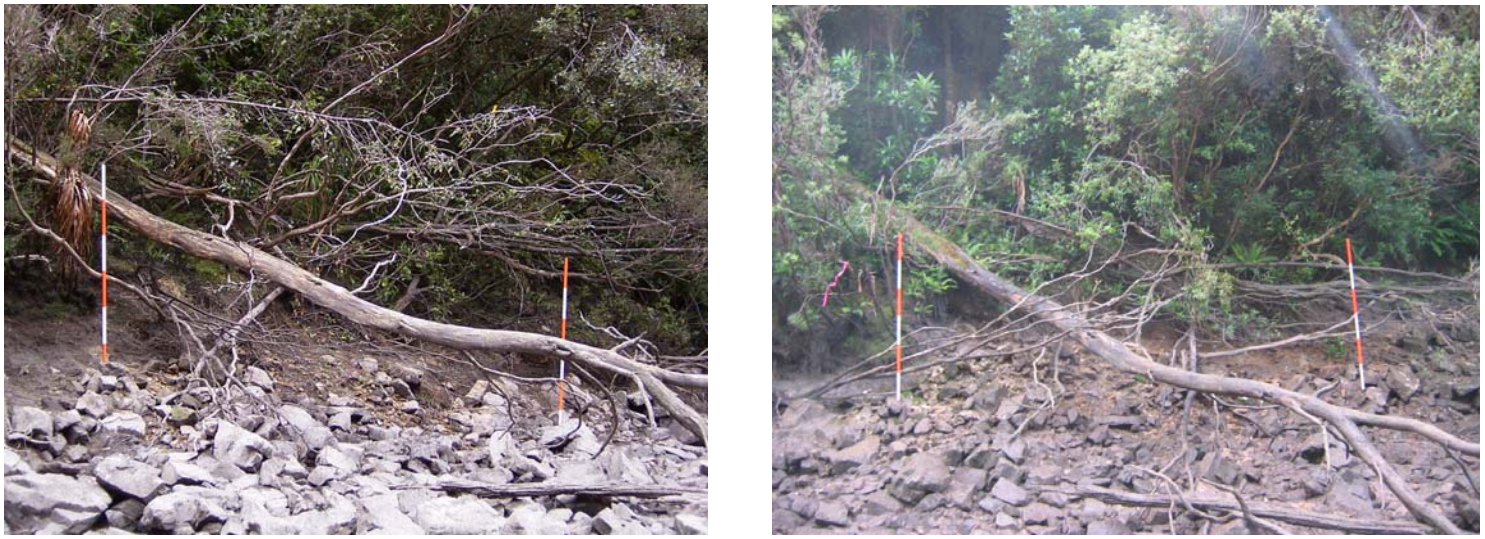

Photo 6-46. Zone 4-5, April 2005 (left), May 2006 (right)

Photo 6-47. Zone 4-5, June 2007

A6.3.6 Site 6

Photo 6-48. Zone 4-6, April 2005 (left), May 2006 (right)

Photo 6-49. Zone 4-6, June 2007

A6.3.7 Site 7

Photo 6-50. Zone 4-7, April 2005 (left), May 2006 (right)

Photo 6-51. Zone 4-7, June 2007

A6.4 Zone 5

A6.4.1 Site 1

Photo 6-52. Zone 5-1, April 2005

A6.4.2 Site 2

Photo 6-53. Zone 5-2, April 2005

A6.4.3 Site 3

Photo 6-54. Zone 5-3, April 2005 (left) , May 2006 (right)

Photo 6-55. Zone 5-3, June 2007

A6.4.4 Site 4

Photo 6-56. Zone 5-4, April 2005 (left), May 2006 (right)

Photo 6-57. Zone 5-4, June 2007

A6.4.5 Site 5

Photo 6-58. Zone 5-5, April 2005 (left), May 2006 (right)

Photo 6-59. Zone 5-5, June 2007

A6.4.6 Site 6

Photo 6-60. Zone 5-6, April 2005 (left) , May 2006 (right)

Photo 6-61. Zone 5-6, June 2007

A6.4.7 Site 7

Photo 6-62. Zone 5-7, April 2005 (left), May 2006 (right)

Photo 6-63. Zone 5-7, June 2007

A6.4.8 Site 8

Photo 6-64. Zone 5-8, April 2005 (left), May 2006 (right)

Photo 6-65. Zone 5-8, June 2007

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A7. Fish – relative abundance from test and reference zones (2001-07)

A7.1 Catch per unit effort (fish per 1200 shock times)

Brown trout river zones

Zone	Dec-01	Apr-02	Dec-02	Mar-03	Nov-03	Apr-04	Dec-04	Apr-05	Dec-05	Apr-06	Dec-06	May-07
1	0.74	0.2	0.25	0.2	0.56	0.24	0.19	0.24	2.51	0.97	0.22	0.74
2	5.34	2.11	2.58	3.48	1.7	2.17	2.06	1.34	1.39	4.71	5.89	1.12
3	7.5	1.62	1.59	3.47	13.45	2.3	3.67	2.1	3.71	1.37	4.14	0.92
4	3.24	2.26	0.77	2.62	3.12	2.18	4.3	0	2.27	0.57	0.65	0.33
5	2.08	0.94	1.81	0.95	1.48	0.9	1.67	0.39	0	0.2	0.73	0.75
7	1.91	2.51	0	0	4.96	0	0	na	2.01	0.86	2.29	1.92
8	6.12	8.05	3.73	5.46	6.43	3.6	1.16	1.39	4.34	2.7	4.54	3.67
9	0	0	0	0.45	0	0.45	0	0	0.44	0	0.94	0.00
13-14	11.26	4.36	1.99	5.67	1.67	4.71	2.23	5.04	5.36	8.35	3.18	6.84

Brown trout tributaries

Zone	Dec-01	Apr-02	Dec-02	Mar-03	Nov-03	Apr-04	Dec-04	Apr-05	Dec-05	Apr-06	Dec-06	May-07
1	1.29	3.15	1.3	0.97	0.94	1.05	0.33	0	0	1.1	1.46	0.00
2	3.77	2.15	3.87	3.17	4.85	2.34	3.76	5.7	3.43	1.73	0.54	1.69
3	8.98	10.58	5.22	14.44	13.82	8.21	6.5	15.59	9.37	8.27	6.25	11.24
4	7.93	5.3	3.2	8.47	1.74	8.02	6.01	5.68	2.65	3.94	4.25	6.25
5	-	-	-	-	-	-	-	-	-	-		
7	-	-	-	-	-	-	-	-	-	-		
8	5.62	5.43	2.38	2.42	2.89	5.35	3.49	2.27	2.3	3.8	1.23	1.30
9	-	-	-	-	-	-	-	-	-	-		
13-14	-	-	-	-	-	-	-	-	-	-		

Pouched lampreys in river zones

Zone	Dec-01	Apr-02	Dec-02	Mar-03	Nov-03	Apr-04	Dec-04	Apr-05	Dec-05	Apr-06	Dec-06	May-07
Zone 1 river	0	0	0	0	0	0	0	0	0	0	0.00	0.00
Zone 2 river	0	0	0	0.13	0	0	0	1	0	0	0.79	0.96
Zone 3 river	0	4.55	0.64	5.12	1.75	0	0.77	2.1	0	0.78	1.13	4.12
Zone 4 river	0	1.29	0	2.94	4.52	0	0	2.27	0	0	5.18	12.81
Zone 5 river	1.66	2.11	0.23	2.46	0	0.54	0.74	1.94	0	1.76	3.39	3.01
Zone 7 river	0	2.74	0	1.9	0	0	0	-	0	2.59	0.00	0.96
Zone 8 river	0	0	0	2.57	1.69	1.2	0.23	0.7	0.48	1.72	2.15	4.72
Zone 9	0	1.25	0	4.5	1.31	0	0	0.48	0	1.58	0.00	0.00
Zone 13-14	0	1.03	1.14	6.86	5.84	0.29	2.78	2.21	2.14	1.45	1.27	2.56

Eels in river zones

Zone	Dec-01	Apr-02	Dec-02	Mar-03	Nov-03	Apr-04	Dec-04	Apr-05	Dec-05	Apr-06	Dec-06	May-07
Zone 1 river	2.22	0.2	0.25	0.61	0.19	0.24	0	0.24	0	0	0.00	0.00
Zone 2 river	0.38	0	1.13	0.13	0	0	0	0	0	0	0.00	0.00
Zone 3 river	1.99	0.97	2.86	0.73	0.97	0.26	2.12	1.53	0.37	0.2	3.01	1.37
Zone 4 river	4.05	3.56	0	0.33	2.18	1.86	4.66	1.95	0.38	1.13	7.78	3.94
Zone 5 river	5.19	6.32	2.26	7.57	3.89	1.25	3.52	2.91	0.23	0.78	1.94	2.64
Zone 7	0.38	4.52	1.92	0.95	12.93	0	2.79	-	0	0	1.53	0.96
Zone 8	1.06	3.58	1.98	0.96	1.29	0.72	3.25	0.46	1.93	0.49	1.43	1.31
Zone 9	1.86	2.19	2.8	3.15	4.81	0.45	8.73	0.48	0	1.58	1.41	3.22
Zone 13-14	0.88	0.77	0.28	2.39	0.28	0.29	1.11	0	1.34	0.36	0.32	0.00

Galaxiids in river zones

Zone	Species	Dec-01	Apr-02	Dec-02	Mar-03	Nov-03	Apr-04	Dec-04	Apr-05	Dec-05	Apr-06	Dec-06	May-07
1 river	*G. brevipinnis*	0	0	0	0.61	0	0	0	0	0	0	0	0
2 river	All (galaxiids and sandys)	0	0	0	0	0	0	0	0	0	0	0	0
3 river	*G. brevipinnis*	0	0	0	0	0	0	0	0.19	0	0	0	0
	P. urvillii	0	0	0	0	0	0	0.19	0	0	0	0	0.15
4 river	*G. truttaceus*	0.81	0.64	0.77	0	0	0	4.3	7.79	0	6.8	1.3	2.96
	P. urvillii	0	0	0	0.33	0	0.62	0.36	0.65	0.38	0.57	0	0.33
	G. brevipinnis	0	0	0	0	0.31	0	1.08	0	0	0	0	0
	G. maculatus	0	0	0	0	0	0	0.72	0	0	0.57	0.32	0
5 river	*G. brevipinnis*	0	0.47	2.71	0.76	4.26	0	12.03	5.04	2.49	0	1.7	0
	G. maculatus	0.42	2.34	0.45	0.57	12.77	5.19	10.18	0	0.45	0	0.48	0.19
	G. truttaceus	4.98	3.98	3.39	3.03	7.22	1.61	17.39	6.21	0.68	2.55	4.12	4.52
	P. urvillii	2.91	2.34	1.81	0.76	2.23	1.79	4.44	0.58	1.36	1.37	3.88	2.45

Galaxiids in tributaries

Zone	Species	Dec-01	Apr-02	Dec-02	Mar-03	Nov-03	Apr-04	Dec-04	Apr-05	Dec-05	Apr-06	Dec-06	May-07
1 tribs	*G. brevipinnis*	8.07	1.75	1.3	2.6	3.12	0.35	3.93	0	0	0	0.49	1.62
2 tribs	All (galaxiids and sandys)	0	0	0	0	0	0	0	0	0	0	0	0
3 tribs	*G. truttaceus*	0	0.12	0	0	0	0	0	0	0	0	0.25	0
	P. urvillii	0.18	0	0	0	0	0	0.19	0	0	0	0	0
4 tribs	*G. brevipinnis*	0.28	0	0.38	0	0	0.19	0	0	0.22	0	0	0
	G. truttaceus	4.53	1.56	2.26	2.52	0.35	1.53	1.46	2.35	4.64	0.94	1.42	1.51
	P. urvillii	0.28	0.31	0	0.9	0.17	0	0	0.2	0.88	0.38	0	0.57
	G. maculatus	0	0	0	0	0.17	0	0	0	0	0	0	0

Galaxiids in reference zones

Zone	Species	Dec-01	Apr-02	Dec-02	Mar-03	Nov-03	Apr-04	Dec-04	Apr-05	Dec-05	Apr-06	Dec-06	May-07
7 river	*G. brevipinnis*	3.43	0	3.83	0	5.96	0	12.08	-	1.01	0	4.59	0
	G. maculatus	0	1.51	2.88	0	0.99	0	0	-	0	0.86	0	0
	G. truttaceus	1.91	2.51	8.63	3.8	4.96	0	5.58	-	4.03	0.86	0	0.96
	P. urvillii	1.91	3.01	0.96	2.85	3.97	4	2.79	-	3.02	4.32	5.35	2.89
8 river	*G. brevipinnis*	1.33	0	1.54	0	2.25	0	2.32	0	0.24	0	1.67	
	G. truttaceus	0.53	0.45	0.44	0	0.32	0	1.39	0.23	0	0	0.48	0.26
	P. urvillii	0.27	0.45	0.44	1.29	0.32	0	0.23	0	0.48	0.49	0.48	0.79
9 river	*G. brevipinnis*	0	0.31	0.4	0	0.44	0.45	0	0	0	0	0	1.84
	G. maculatus	1.86	0	7.6	0.45	2.19	0.45	1.09	0	1.31	0	3.77	0
	G. truttaceus	1.24	3.12	7.6	5.41	7.44	4.96	4.37	0.95	3.05	10.28	17.45	11.06
	P. urvillii	9.31	12.49	6.8	12.16	9.19	5.86	7.64	6.67	6.1	11.87	13.67	15.2
13-14	*G. brevipinnis*	0.44	0	4.55	0.6	0	0.29	4.17	0	0	0	0.32	0
	G. maculatus	1.32	1.03	0	2.98	0.28	3.24	0.83	0	0	1.09	1.59	0
	G. truttaceus	3.31	5.9	7.68	6.27	6.12	1.18	16.98	14.18	7.23	5.81	22.59	4.84
	P. urvillii	1.55	1.28	0.28	1.19	0	0.59	0.56	4.1	4.29	5.44	4.45	2.28
	N. cleaveri	0	0	0	0	0.28	0.29	1.39	0	0	0	12.73	0.57
	P. maraena	0	0	0	0	0	0	0.28	0	0	0	0	0

Zone	Species	Dec-01	Apr-02	Dec-02	Mar-03	Nov-03	Apr-04	Dec-04	Apr-05	Dec-05	Apr-06	Dec-06	May-07
8 tribs (Frank.	*G. brevipinnis*	1.61	1.28	2.86	4.54	1.28	1.19	0.95	0.32	0	0.63	1.54	0.65
	G. truttaceus	4.02	2.87	1.43	0.6	7	2.08	2.53	4.22	1.31	4.12	5.84	4.56

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A8. Formal trigger levels

A8.1 Fluvial geomorphology

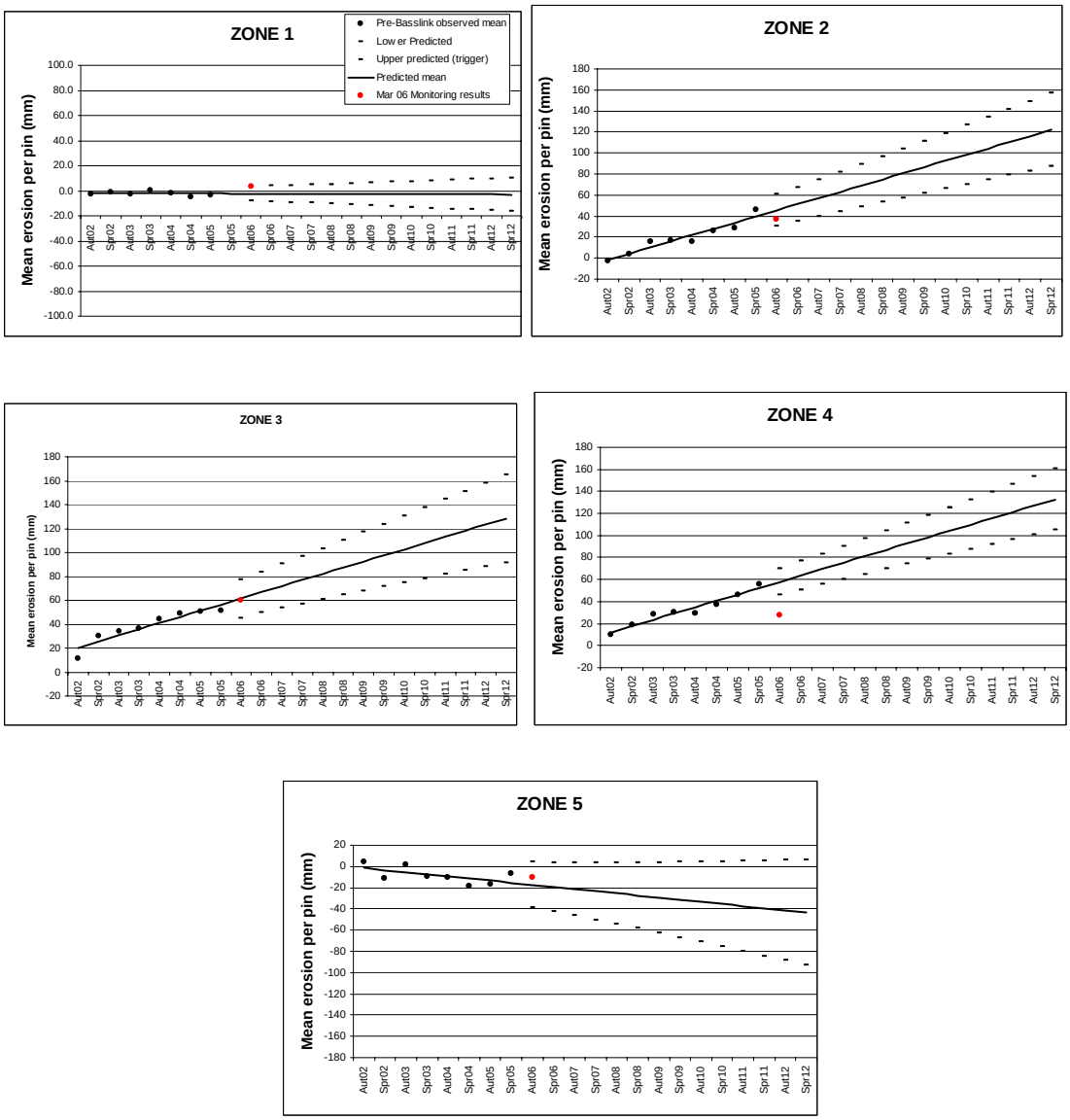

Figure 8-1. Graphical depiction of trigger values, showing linear trend fit to pre-Basslink monitoring results extended 6-years into the future, along with the 95 percentile confidence limits. The upper limit in each graph are the trigger values for that zone. Also shown are the March 2006 monitoring results. Note upper and lower limit of erosion scales differ, but each axis depicts 200 mm.

Table 8-1. Summary of trigger values for each zone for years March 2007-March 2012 shown as cumulative values relative to spring 2001. Values indicate maximum erosion in mm expected based on present trends. All values in mm.

Year	Zone 1 (mm)	Zone 2 (mm)	Zone 3 (mm)	Zone 4	Zone 5 (mm)
March 2007	4	75	90	83	4
March 2008	5	89	103	97	3
March 2009	6	104	117	111	4
March 2010	7	119	131	125	4
March 2011	9	134	144	139	5
March 2012	10	149	158	153	6

Table 8-2. Summary of trigger values for each zone for years March 2007-March 2012 shown as annual rates. Values indicate maximum erosion in mm expected based on present trends. All values in mm.

Year	Zone 1 (mm)	Zone 2 (mm)	Zone 3 (mm)	Zone 4	Zone 5 (mm)
March 2007	0.9	14.9	18.1	16.7	0.7
March 2008	0.8	13.9	16.1	15.1	0.5
March 2009	0.9	14.0	15.8	15.0	0.5
March 2010	0.9	14.1	15.5	14.9	0.5
March 2011	0.9	14.2	15.3	14.8	0.5
March 2012	0.9	14.3	15.2	14.7	0.6

A8.2 Riparian vegetation

A8.2.1 Community composition

Table 8-3. Mean values and 95% confidence interval range for Bray Curtis similarity index for all zones based on annual similarity values calculated on presence-absence data

Zone	Quadrat	Mean	Confidence interval range
2	Above	73.89	64.39 - 80.08
	Low	65.11	61.79 - 68.76
	High	66.04	57.43 - 74.79
3	Above	53.94	51.95 - 55.17
	Low	59.99	52.43 - 66.41
	High	59.05	56.42 - 62.45
4	Above	41.37	37.86 - 45.52
	Low	38.01	36.13 - 40.32
	High	35.98	35.59 - 36.39
5	Above	59.10	53.31 - 66.35
	Low	61.55	57.33 - 65.51
	High	59.40	57.18 - 61.08

A8.2.2 Species/taxa richness

Table 8-4. 95% confidence intervals for species richness values for each zone and quadrat type calculated from pre-Basslink data

Zone	Quadrat type	Pre Basslink Mean	Confidence interval range
2	Above	3.50	3.06 - 3.94
	Low	2.88	1.92 - 3.83
	High	3.33	2.72 - 3.94
3	Above	5.92	4.94 - 6.89
	Low	2.50	1.70 - 3.30
	High	4.63	3.84 - 5.41
4	Above	8.15	6.48 - 9.83
	Low	4.54	3.47 - 5.61
	High	5.58	4.56 - 6.59
5	Above	5.38	3.89 - 6.86
	Low	2.42	1.69 - 3.14
	High	6.46	4.68 - 8.24

A8.2.3 Species/taxa evenness

Table 8-5. 95% confidence intervals for species evenness values for each zone and quadrat type calculated from pre-Basslink data

Zone	Quadrat type	Pre – Basslink Mean	Confidence interval range
2	Above	0.69	0.58 - 0.79
	Low	0.53	0.35 - 0.70
	High	0.62	0.49 - 0.76
3	Above	0.70	0.61 - 0.78
	Low	0.36	0.19 - 0.53
	High	0.62	0.50 - 0.74
4	Above	0.62	0.51 - 0.73
	Low	0.57	0.42 - 0.71
	High	0.58	0.47 - 0.70
5	Above	0.43	0.30 - 0.56
	Low	0.31	0.15 - 0.47
	High	0.52	0.38 - 0.65

A8.2.4 Ecologically significant species

Table 8-6. Confidence intervals for per cent cover values for ecologically significant species for each zone and quadrat type calculated from pre-Basslink data

Zone	Quadrat	Species	Pre – Basslink Mean	Confidence interval range
2	Above	*Acradenia franklinii*	4.13	1.79 - 6.46
		Lagarostrobos franklinii	0.00	0.00 - 0.00
		Leptospermum riparium	0.00	0.00 - 0.00
	Low	*Acradenia franklinii*	0.08	0.00 - 0.25
		Lagarostrobos franklinii	0.63	0.10 - 1.15
		Leptospermum riparium	0.00	0.00 - 0.00
	High	*Acradenia franklinii*	0.58	0.02 - 1.15
		Lagarostrobos franklinii	0.00	0.00 - 0.00
		Leptospermum riparium	0.00	0.00 - 0.00
3	Above	*Acradenia franklinii*	0.58	0.16 - 1.01
		Lagarostrobos franklinii	0.08	0.00 - 0.20
		Leptospermum riparium	0.00	0.00 - 0.00
	Low	*Acradenia franklinii*	0.67	0.00 - 1.89
		Lagarostrobos franklinii	0.67	0.03 - 1.30
		Leptospermum riparium	0.00	0.00 - 0.00
	High	*Acradenia franklinii*	0.71	0.00 - 1.59
		Lagarostrobos franklinii	0.50	0.03 - 0.97
		Leptospermum riparium	0.00	0.00 - 0.00
4	Above	*Acradenia franklinii*	0.12	0.00 - 0.28
		Lagarostrobos franklinii	0.00	0.00 - 0.00
		Leptospermum riparium	2.50	0.85 - 4.15
	Low	*Acradenia franklinii*	0.00	0.00 - 0.01
		Lagarostrobos franklinii	0.00	0.00 - 0.00
		Leptospermum riparium	3.81	1.00 - 6.62
	High	*Acradenia franklinii*	0.35	0.00 - 0.77
		Lagarostrobos franklinii	0.00	0.00 - 0.00
		Leptospermum riparium	3.96	1.13 - 6.79
5	Above	*Acradenia franklinii*	2.50	0.00 - 5.21
		Lagarostrobos franklinii	0.00	0.00 - 0.00
		Leptospermum riparium	0.04	0.00 - 0.12
	Low	*Acradenia franklinii*	0.17	0.00 - 0.49
		Lagarostrobos franklinii	0.00	0.00 - 0.00
		Leptospermum riparium	0.25	0.00 - 0.54
	High	*Acradenia franklinii*	0.00	0.00 - 0.01
		Lagarostrobos franklinii	0.00	0.00 - 0.00
		Leptospermum riparium	0.67	0.00 - 1.67

Table 8-7. Confidence intervals for the sum of density values for ecologically significant species for each zone and total for Gordon River calculated from pre-Basslink data. The 20% change to trigger further investigation (a category 1 response) for is shown for total values.

Species	Zone				Total	20% change
	2	3	4	5		
Acradenia frankliniae <5	0	13	4	0	17	3.4
Acradenia frankliniae <10	1	1	1	0	3	0.6
Lagarostrobos franklinii <5	1	2	0	2	5	1
Lagarostrobos franklinii <20	0	0	1	0	1	0.2
Lagarostrobos franklinii >20	0	2	0	0	2	0.4
Leptospermum riparium <5	0	0	11	10	21	4.2
Leptospermum riparium <10	0	0	1	2	3	0.6
Leptospermum riparium <20	0	2	1	1	4	0.8
Leptospermum riparium >20	0	1	1	0	2	0.4

A8.2.5 Community structure

A8.2.5.1 Ground cover and vegetation cover data

Table 8-8. The range within which 95 % of values are likely to lie for means of ratios for selected ground cover variables based on monitoring for one year, two years and three years in the post-Basslink period. Note that seasonal figures are not provided because monitoring occurs only once per year.

Post-Basslink	Ratio (% above 3-turbines+1) to (% between 2- and 3-turbines+1)					
	1 year		2 year mean		3 year mean	
	Lower	Upper	Lower	Upper	Lower	Upper
% bare ground:	0.2	0.9	0.2	0.8	0.2	0.7
% bryophyte	1.1	6.1	1.3	5.0	1.4	4.7
% fern	0.5	3.1	0.6	2.5	0.6	2.3
% shrub	0.6	2.0	0.7	1.8	0.7	1.7
% total vegetation	1.0	3.2	1.1	2.8	1.2	2.6
Post-Basslink	**Ratio (% above 3-turbines+1) to (% between 1- and 2-turbines+1)**					
	1 year		2 year mean		3 year mean	
	Lower	Upper	Lower	Upper	Lower	Upper
% bare ground:	0.1	0.7	0.1	0.5	0.1	0.5
% bryophyte	3.3	9.9	3.7	8.8	3.9	8.3
% fern	1.1	7.8	1.4	6.3	1.5	5.8
% shrub	0.6	4.5	0.7	3.6	0.8	3.3
% total vegetation	3.0	11.6	3.5	10.0	3.7	9.4

A8.2.6 Ecological processes

A8.2.6.1 Seedling trigger values

Table 8-9. The range within which 95 % of values are likely to lie for means of ratios for seedlings <5cm based on monitoring in the pre-Basslink period including data collected in December 2005.

Number of seedlings less than 5 cm: Ratio of ABOVE quadrats to HIGH quadrats						
Post-Basslink	1 year		2 year mean		3 year mean	
Whole of River	Lower	Upper	Lower	Upper	Lower	Upper
Autumn	0.76	1.80	0.84	1.63	0.87	1.57
Summer	0.72	2.35	0.93	2.06	0.87	1.76
To 1st time in year	0.86	1.78	0.98	1.56	1.01	1.51
To 2nd time in year	0.94	1.62	1.00	1.53	1.02	1.49
Zone 2						
Autumn	0.45	3.08	0.56	2.48	0.61	2.27
Summer	0.25	6.80	0.51	4.70	0.43	3.03
To 1st time in year	0.51	3.03	0.70	2.20	0.77	2.01
To 2nd time in year	0.64	2.42	0.74	2.08	0.79	1.96
Zone 3						
Autumn	0.56	4.32	0.70	3.43	0.77	3.13
Summer	0.27	6.24	0.53	4.38	0.45	2.88
To 1st time in year	0.58	3.49	0.80	2.52	0.88	2.30
To 2nd time in year	0.73	2.77	0.85	2.39	0.90	2.24
Zone 4						
Autumn	0.10	6.94	0.16	4.31	0.20	3.55
Summer	0.40	2.62	0.59	2.12	0.54	1.65
To 1st time in year	0.31	2.78	0.46	1.87	0.51	1.67
To 2nd time in year	0.41	2.10	0.49	1.74	0.53	1.62
Zone 5						
Autumn	0.42	2.86	0.52	2.30	0.57	2.11
Summer	0.31	7.40	0.60	5.17	0.51	3.38
To 1st time in year	0.50	3.36	0.70	2.38	0.77	2.16
To 2nd time in year	0.63	2.63	0.74	2.24	0.79	2.10

Table 8-10. The range within which 95 % of values are likely to lie for means of ratios for total number of seedlings in all size classes based on monitoring for pre-Basslink period including data collected in December 2005.

Total number of seedlings: Ratio of ABOVE quadrats to HIGH quadrats						
Post-Basslink	1 year		2 year mean		3 year mean	
Whole of River	Lower	Upper	Lower	Upper	Lower	Upper
Autumn	0.69	2.08	0.78	1.84	0.82	1.75
Summer	0.36	6.87	0.68	4.93	0.58	3.33
To 1st time in year	0.60	3.12	0.81	2.32	0.88	2.13
To 2nd time in year	0.74	2.53	0.85	2.20	0.90	2.08
Zone 2						
Autumn	0.34	4.12	0.45	3.11	0.50	2.77
Summer	0.13	13.06	0.34	7.75	0.27	4.18
To 1st time in year	0.36	4.18	0.57	2.69	0.64	2.38
To 2nd time in year	0.50	3.06	0.61	2.50	0.66	2.30
Zone 3						
Autumn	0.61	4.31	0.77	3.46	0.84	3.16
Summer	0.23	6.57	0.46	4.49	0.38	2.86
To 1st time in year	0.53	3.75	0.75	2.63	0.83	2.38
To 2nd time in year	0.68	2.92	0.80	2.48	0.85	2.32
Zone 4						
Autumn	0.11	6.02	0.17	3.84	0.21	3.20
Summer	0.39	2.58	0.59	2.09	0.53	1.62
To 1st time in year	0.32	2.61	0.46	1.78	0.51	1.60
To 2nd time in year	0.41	1.99	0.49	1.67	0.53	1.55
Zone 5						
Autumn	0.57	2.36	0.67	2.01	0.71	1.88
Summer	0.31	9.23	0.64	6.30	0.53	4.01
To 1st time in year	0.54	3.72	0.76	2.62	0.84	2.38
To 2nd time in year	0.69	2.91	0.81	2.47	0.86	2.31

A8.3 Macroinvertebrates

Table 8-11. Trigger values for benthic macroinvertebrate community structure variables, for whole–of–river, zones, seasons and sites, for each year of a three–year monitoring cycle. Seasonal values are shown only where statistically significant differences.

Variable Alpha	Post–Basslink	Trigger bounds (lower)		
		1 year	2 years	3 years
Bray Curtis (abundance) alpha 0.05	Whole–of–River			
	Av (all times)	21.4	22.6	23.1
	Zone group 1			
	Av (all times)	9.0	10.8	11.5
	Spring	0.9	5.4	5.7
	Autumn	13.8	14.8	15.3
	Zone group 2			
	Av (all times)	27.1	29.3	30.1
	Spring	34.8	36.4	36.5
	Autumn	17.7	21.0	22.3
	Sites			
	Site 42	23.1	25.7	26.7
	Site 48	25.0	27.6	28.6
	Site 57	32.1	33.4	33.9
	Site 60	16.0	21.1	23.2
	Site 63	18.5	21.1	22.2
	Site 69	0.0	2.5	4.1
	Site 72	15.5	17.4	18.2
	Site 74	9.0	10.8	11.5
O/Erk Alpha 0.05	Whole–of–River			
	Av (all times)	0.71	0.75	0.76
	Spring	0.84	0.86	0.86
	Autumn	0.62	0.66	0.67
	Zone group 1			
	Av (all times)	0.57	0.60	0.61
	Zone group 2			
	Av (all times)	0.81	0.85	0.87
	Sites			
	Site 42	0.80	0.84	0.86
	Site 48	0.76	0.82	0.84
	Site 57	0.82	0.86	0.88
	Site 60	0.64	0.71	0.75
	Site 63	0.71	0.78	0.80
	Site 69	0.56	0.61	0.63
	Site 72	0.66	0.70	0.71
	Site 74	0.45	0.50	0.53
	Site 75	0.46	0.49	0.50

Table 8-12. Trigger values for benthic macroinvertebrate community composition variables, for whole–of–river, zones, seasons and sites, for each year of a three year monitoring cycle. Seasonal values are shown only where statistically significant differences between seasonal pre–Basslink values were detected. Alpha levels indicated.

Variable Alpha	Post–Basslink	Trigger bounds (lower)		
		1 year	2 years	3 years
Bray Curtis (pres/abs data) alpha 0.05	**Whole–of–River**			
	Av (all times)	30.8	32.2	32.8
	Zone group 1			
	Av (all times)	13.3	16.4	17.7
	Zone group 2			
	Av (all times)	28.3	30.2	31.0
	Sites			
	Site 42	30.7	33.8	35.0
	Site 48	39.5	41.7	42.5
	Site 57	38.2	40.3	41.1
	Site 60	29.0	33.5	35.3
	Site 63	28.8	33.1	34.9
	Site 69	0.9	6.9	9.3
	Site 72	20.6	23.8	25.2
	Site 74	13.7	16.8	18.1
O/Epa Alpha 0.05	**Whole–of–River**			
	Av (all times)	0.74	0.78	0.80
	Spring	0.72	0.76	0.76
	Autumn	0.86	0.89	0.91
	Zone group 1			
	Av (all times)	0.60	0.63	0.65
	Zone group 2			
	Av (all times)	0.86	0.92	0.94
	Sites			
	Site 42	0.75	0.82	0.85
	Site 48	0.88	0.93	0.95
	Site 57	0.77	0.85	0.89
	Site 60	0.72	0.80	0.83
	Site 63	0.68	0.77	0.80
	Site 69	0.58	0.63	0.65
	Site 72	0.62	0.68	0.70
	Site 74	0.54	0.59	0.61
	Site 75	0.37	0.41	0.42

Table 8-13. Trigger values for benthic macroinvertebrate taxonomic richness variables, for whole–of–river, zones, seasons and sites, for each year of a three–year monitoring cycle. Seasonal values are shown only where statistically significant differences.

Variable Alpha	Post–Basslink	Trigger bounds (lower)		
		1 year	2 years	3 years
Number of families alpha 0.05	**Whole–of–River**			
	Av (all times)	12	12	13
	Spring	11	12	12
	Autumn	13	13	13
	Zone group 1			
	Av (all times)	7	8	8
	Zone group 2			
	Av (all times)	15	15	16
	Sites			
	Site 42	12	13	13
	Site 48	14	14	15
	Site 57	14	15	15
	Site 60	11	12	13
	Site 63	12	13	14
	Site 69	6	7	7
	Site 72	8	9	9
	Site 74	8	9	9
	Site 75	3	4	4
NEPT Sp. Alpha 0.05	**Whole–of–River**			
	Av (all times)	6.0	6.5	6.8
	Zone group 1			
	Av (all times)	3.1	3.6	3.9
	Zone group 2			
	Av (all times)	8.1	8.9	9.3
	Sites			
	Site 42	7.3	8.3	8.7
	Site 48	6.7	7.5	7.8
	Site 57	6.5	7.5	8.0
	Site 60	3.9	5.1	5.8
	Site 63	6.0	7.4	8.1
	Site 69	2.7	3.4	3.7
	Site 72	3.4	4.3	4.7
	Site 74	3.2	3.7	4.0
	Site 75	1.3	1.7	1.9

Table 8-14. Trigger values for benthic macroinvertebrate ecologically significant species variables, for whole–of–river, zones, seasons and sites, for each year of a three–year monitoring cycle. Seasonal values are shown only where statistically significant.

Variable Alpha	Post–Basslink	Trigger bounds (lower)		
		1 year	2 years	3 years
Proportional abund EPT species alpha 0.1	**Whole–of–River**			
	Av (all times)	0.17	0.19	0.19
	Zone group 1			
	Av (all times)	0.14	0.16	0.16
	Zone group 2			
	Av (all times)	0.11	0.15	0.16
	Sites			
	Site 42	0.13	0.15	0.16
	Site 48	0.04	0.06	0.07
	Site 57	0.02	0.09	0.11
	Site 60	0.07	0.16	0.19
	Site 63	0.22	0.30	0.34
	Site 69	0.07	0.10	0.12
	Site 72	0.10	0.15	0.17
	Site 74	0.09	0.11	0.12
	Site 75	0.07	0.09	0.10
Abundance Ephemeroptera Alpha 0.05	**Whole–of–River**			
	Av (all times)	2.9	3.5	3.8
	Spring	3.7	4.5	4.5
	Autumn	0.4	1.0	1.3
	Zone group 1			
	Av (all times)	0.7	1.0	1.11
	Zone group 2			
	Av (all times)	4.2	5.5	6.1
	Spring	14.2	15.5	15.6
	Autumn	0.5	1.3	1.7
	Sites			
	Site 42	9.9	11.27	11.9
	Site 48	5.1	5.94	6.3
	Site 57	3.0	4.12	4.7
	Site 60	0.2	1.22	1.8
	Site 63	1.6	2.25	2.6
	Site 69	0.0	0.00	0.1
	Site 72	2.2	3.06	3.5
	Site 74	0.0	0.00	0.0
	Site 75	0.0	0.00	0.1

Table 8-15. Trigger values for benthic macroinvertebrate biomass/productivity variables, for whole–of–river, zones, seasons and sites, for each year of a three–year monitoring cycle. Seasonal values are shown only where statistically significant difference.

Variable Alpha	Post–Basslink	Trigger bounds (lower)		
		1 year	2 years	3 years
Total benthic macroinvertebrate density alpha 0.1	**Whole–of–River**			
	Av (all times)	80	88	92
	Zone group 1			
	Av (all times)	26	32	35
	Zone group 2			
	Av (all times)	130	147	155
	Sites			
	Site 42	96	114	122
	Site 48	118	131	137
	Site 57	94	113	123
	Site 60	109	140	156
	Site 63	78	98	107
	Site 69	12	18	21
	Site 72	29	38	42
	Site 74	25	33	37
	Site 75	14	18	21

A8.4 Filamentous algae and moss

Table 8.16. Trigger values for benthic filamentous algae and moss cover (all set at alpha 0.1).

Variable Alpha	Post–Basslink	Trigger bounds (lower)					
		1 year		2 years		3 years	
		Lower	Upper	Lower	Upper	Lower	Upper
Algal cover Alpha 0.1	**Whole–of–river**						
	Av (all times)	0.84	4.48	1.09	3.83	1.20	3.59
	Spring	1.23	5.12	1.58	4.43	1.63	4.04
	Autumn	0.00	7.51	0.06	5.54	0.18	4.87
	Zone group 1						
	Av (all times)	1.82	12.62	2.39	10.35	2.65	9.54
	Spring	4.84	11.44	5.53	10.38	5.62	9.76
	Autumn	0.06	15.33	0.45	11.00	0.64	9.59
	Zone group 2						
	Av (all times)	0.00	1.73	0.10	1.42	0.15	1.31
	Sites						
	Site 42	0.00	5.07	0.23	3.92	0.34	3.52
	Site 48	0.00	3.20	0.01	2.48	0.09	2.23
	Site 57	0.00	1.08	0.00	0.84	0.00	0.75
	Site 60	0.00	1.44	0.00	1.10	0.00	0.97
	Site 63	0.00	15.23	0.07	10.37	0.24	8.83
	Site 69	0.00	10.75	0.18	7.69	0.33	6.69
	Site 72	0.80	5.80	1.10	4.83	1.24	4.48
	Site 74	2.90	45.28	4.19	33.77	4.84	29.93
	Site 75	1.90	32.22	2.85	24.06	3.32	21.33
Moss cover Alpha 0.1	**Whole–of–river**						
	Av (all times)	0.80	2.58	0.95	2.31	1.01	2.20
	Spring	0.46	2.69	0.67	2.30	0.70	2.08
	Autumn	0.67	3.85	0.88	3.30	0.98	3.09
	Zone group 1						
	Av (all times)	1.05	5.16	1.32	4.42	1.45	4.15
	Zone group 2						
	Av (all times)	0.14	1.90	0.27	1.61	0.32	1.49
	Sites						
	Site 42	0.00	3.74	0.00	2.83	0.01	2.51
	Site 48	0.00	3.61	0.08	2.81	0.16	2.53
	Site 57	0.14	1.08	0.22	0.94	0.26	0.89
	Site 60	0.00	2.78	0.08	2.21	0.15	2.00
	Site 63	0.45	3.66	0.65	3.07	0.75	2.85
	Site 69	0.59	4.44	0.83	3.72	0.94	3.45
	Site 72	0.00	2.42	0.00	1.86	0.00	1.65
	Site 74	2.42	19.39	3.20	15.59	3.57	14.24
	Site 75	0.90	7.86	1.27	6.42	1.44	5.90

A8.5 Fish

Table 8-17. Community composition trigger values based on the ratio of native fish to exotic fish species abundance, with lower bounds based on both annual and autumn data and an alpha of 0.15

CPUE ratio natives to exotics		Limits of acceptable change (CPUE)	
Post–Basslink Zones 1 to 5	1 year	2 years	3 years
Annual	0.65	0.72	0.75
Autumn	0.61	0.67	0.69

Table 8-18. Ecologically significant species trigger levels based on native fish relative abundance, with lower bounds based on both annual and autumn data and an alpha of 0.20

CPUE natives		Limits of acceptable change (CPUE)	
Post–Basslink Zones 1 to 5	1 year	2 years	3 years
Annual	2.2	2.5	2.6
Autumn	2.1	2.4	2.5

Table 8-19. Ecologically significant species trigger levels based on exotic fish relative abundance, with upper and lower bounds based on both annual and autumn data and an alpha of 0.10

CPUE exotics	Limits of acceptable change(CPUE)					
Post–Basslink Zones 1-5	1 year		2 years		3 years	
Annual	2.78	5.25	3.01	4.90	3.11	4.76
Autumn	2.88	5.80	3.14	5.38	3.24	5.22

Table 8-20. Ecologically significant species trigger levels based on galaxiid relative abundance, with lower bounds based on both annual and autumn data and an alpha of 0.20

CPUE galaxiids	Limits of acceptable change (CPUE)		
Post–Basslink Zones 1-5	1 year	2 years	3 years
Annual	0.84	1.04	1.13
Autumn	0.67	0.82	0.88

Table 8-21. Biomass/productivity trigger levels based on all species relative abundance, with lower bounds based on both annual and autumn data and an alpha of 0.15

CPUE all species	Limits of acceptable change (CPUE)		
Post–Basslink Zones 1-5	1 year	2 years	3 years
Summer–autumn mean	5.2	5.7	5.9
Autumn	5.2	5.7	5.9