

- A = ALD(yr const.)
- W= Wetland (yr const.)
- V = Vertical Flow (yr const.)
- C = Coal refuse removal (yr const.)
- U= Under construction

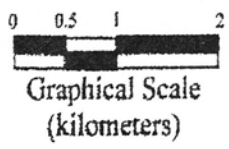


Figure 1

significance.

Fig. 16. Epilithic algal densities on rocks at the sites.

Fig. 17. Epipelagic algae densities at the sites.

Fig. 18. Epilithic algal richness (number of species) at the sites.

Fig. 19. Epipelagic algal richness (number of species) at the sites.

Fig. 20. Mean density of macroinvertebrates at the sites ± 1 SE.

Fig. 21. Macroinvertebrate richness (number of genera) at the sites.

Change in pH at Sites From Fall 1999-Fall 2001

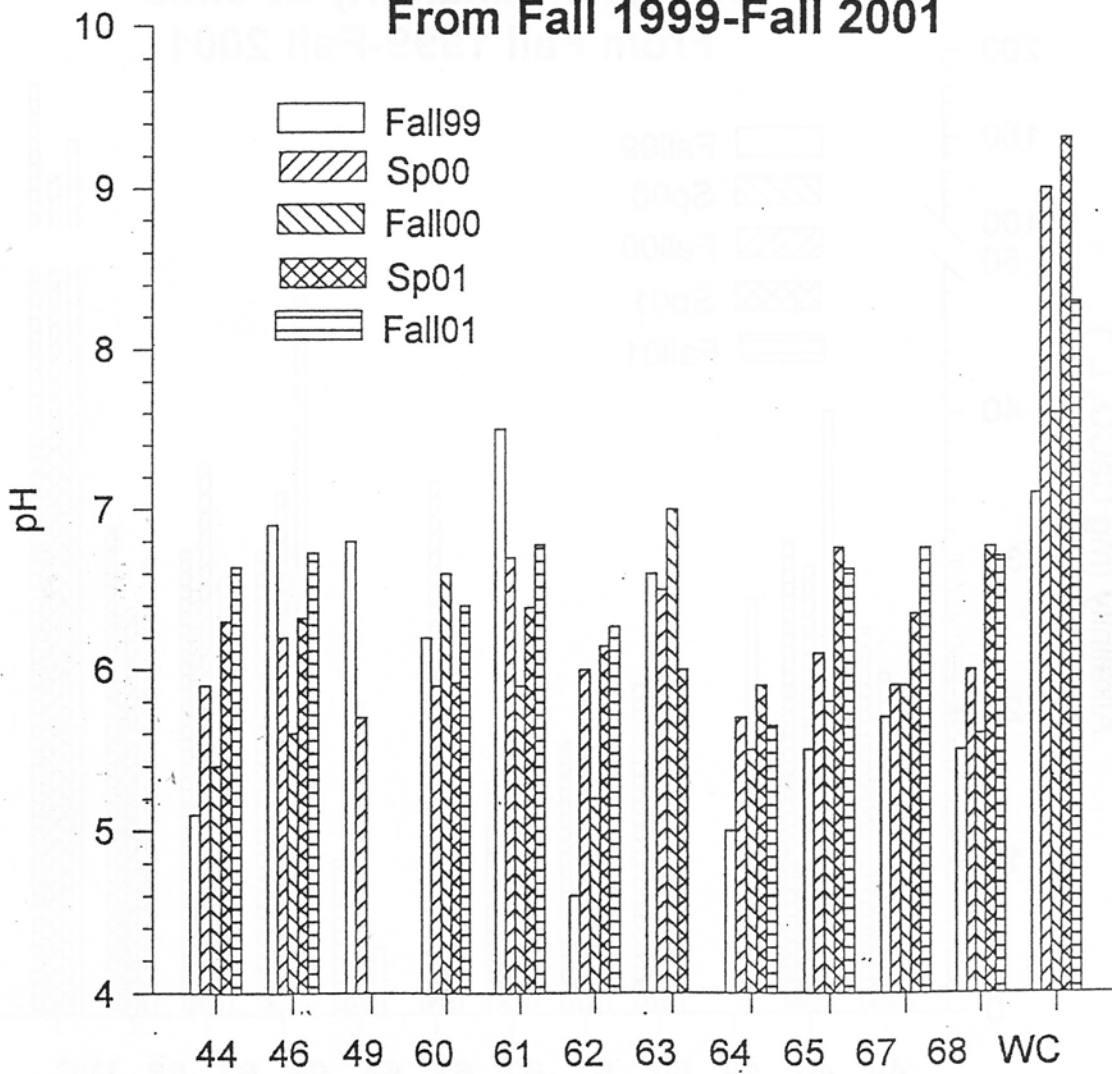


Figure 2

Change in Alkalinity at Sites From Fall 1999-Fall 2001

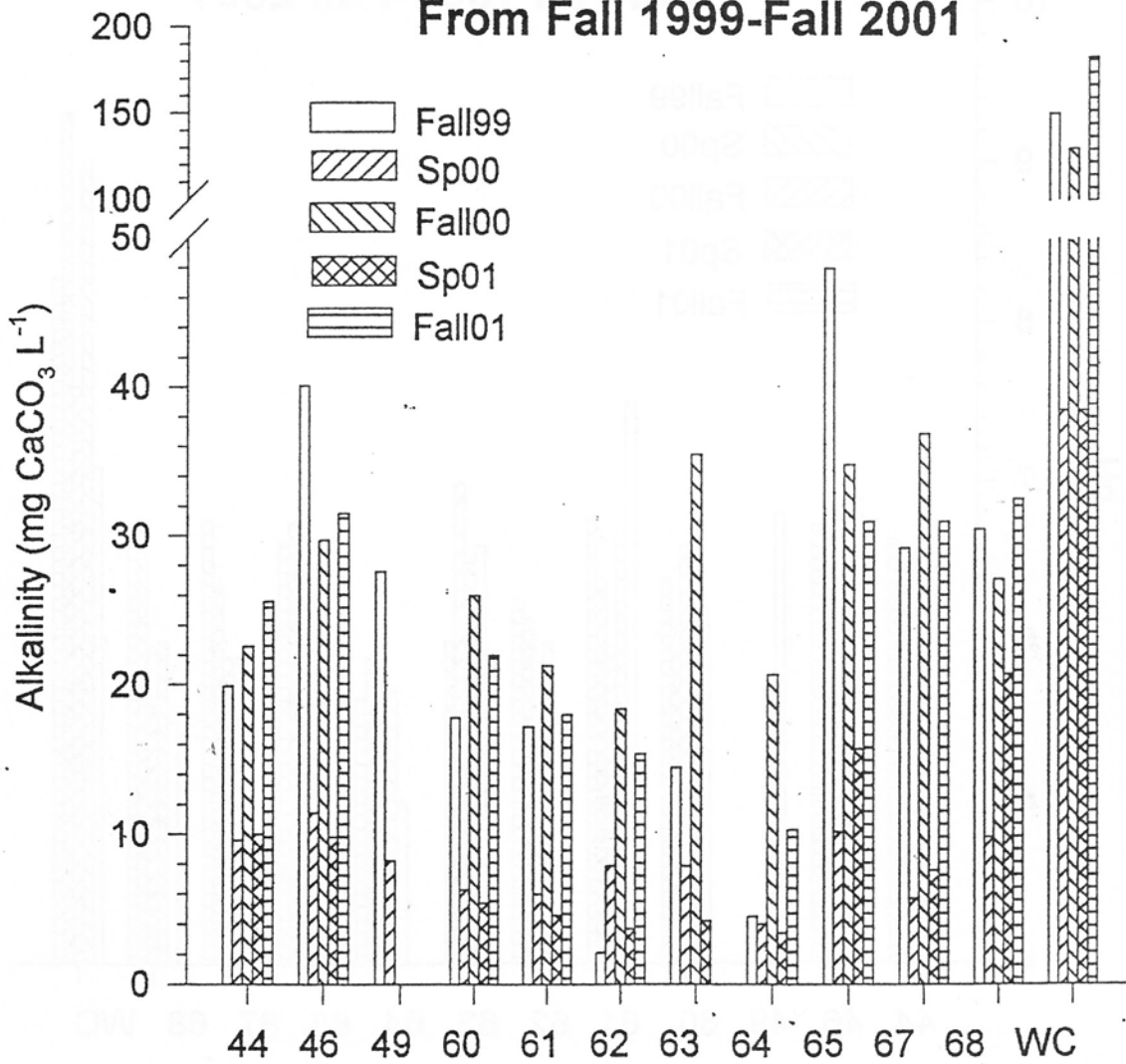


Figure 3

Changes in pH at Site 68 from 1995-2001

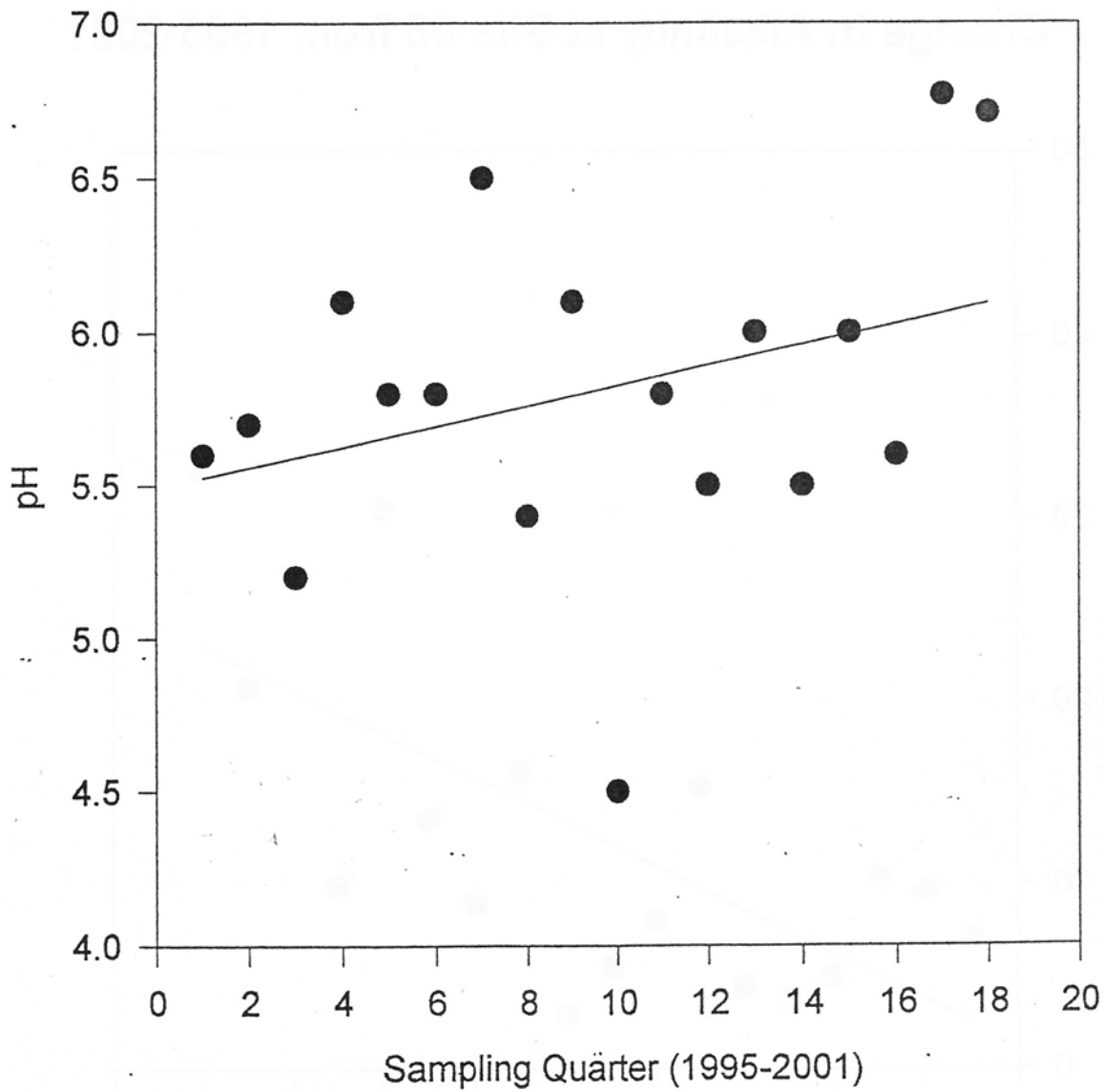


Figure 4

Change in Alkalinity at Site 68 from 1995-2001

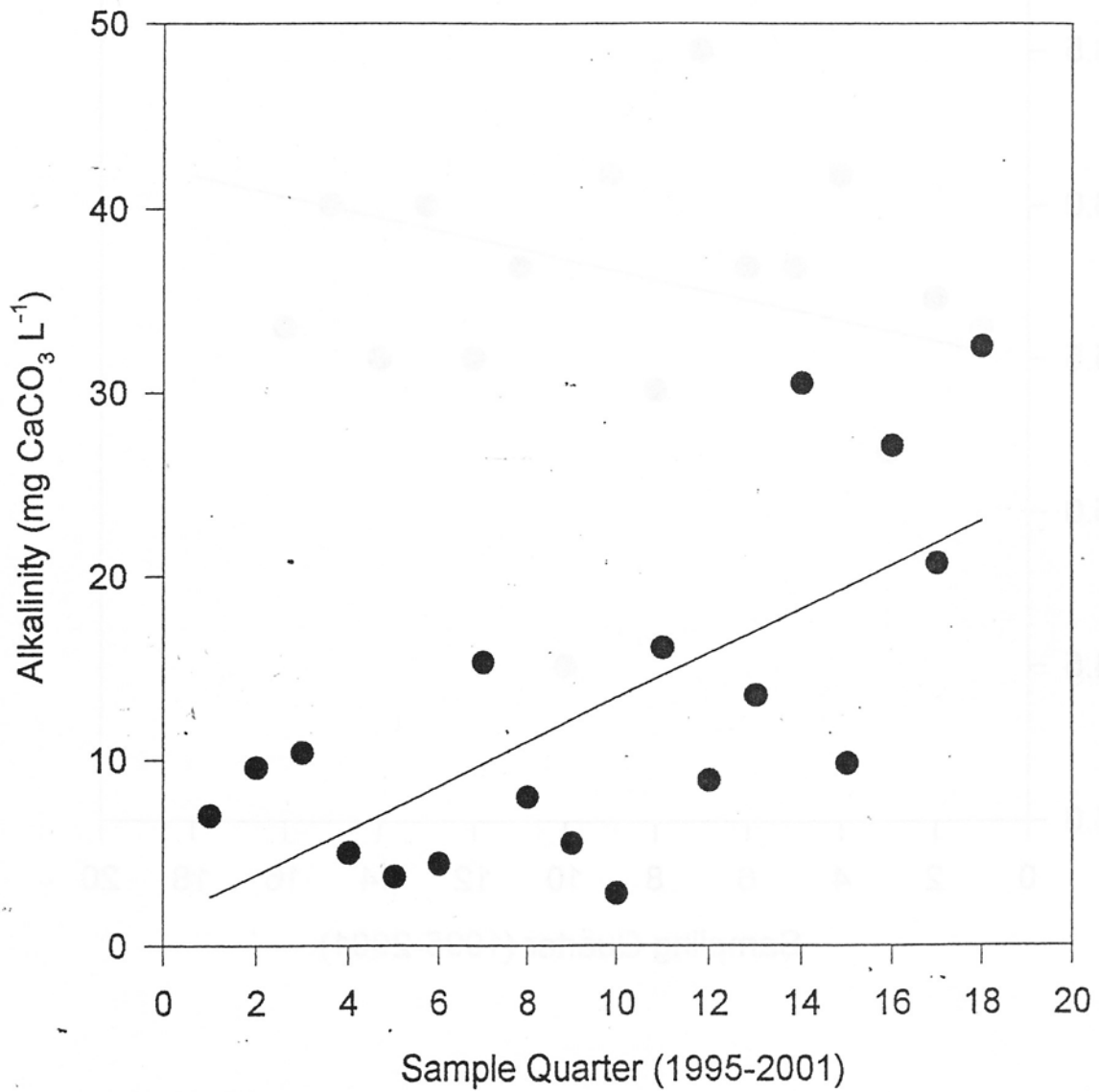


Figure 5

Changes in pH at Site 65 from 1995-2001

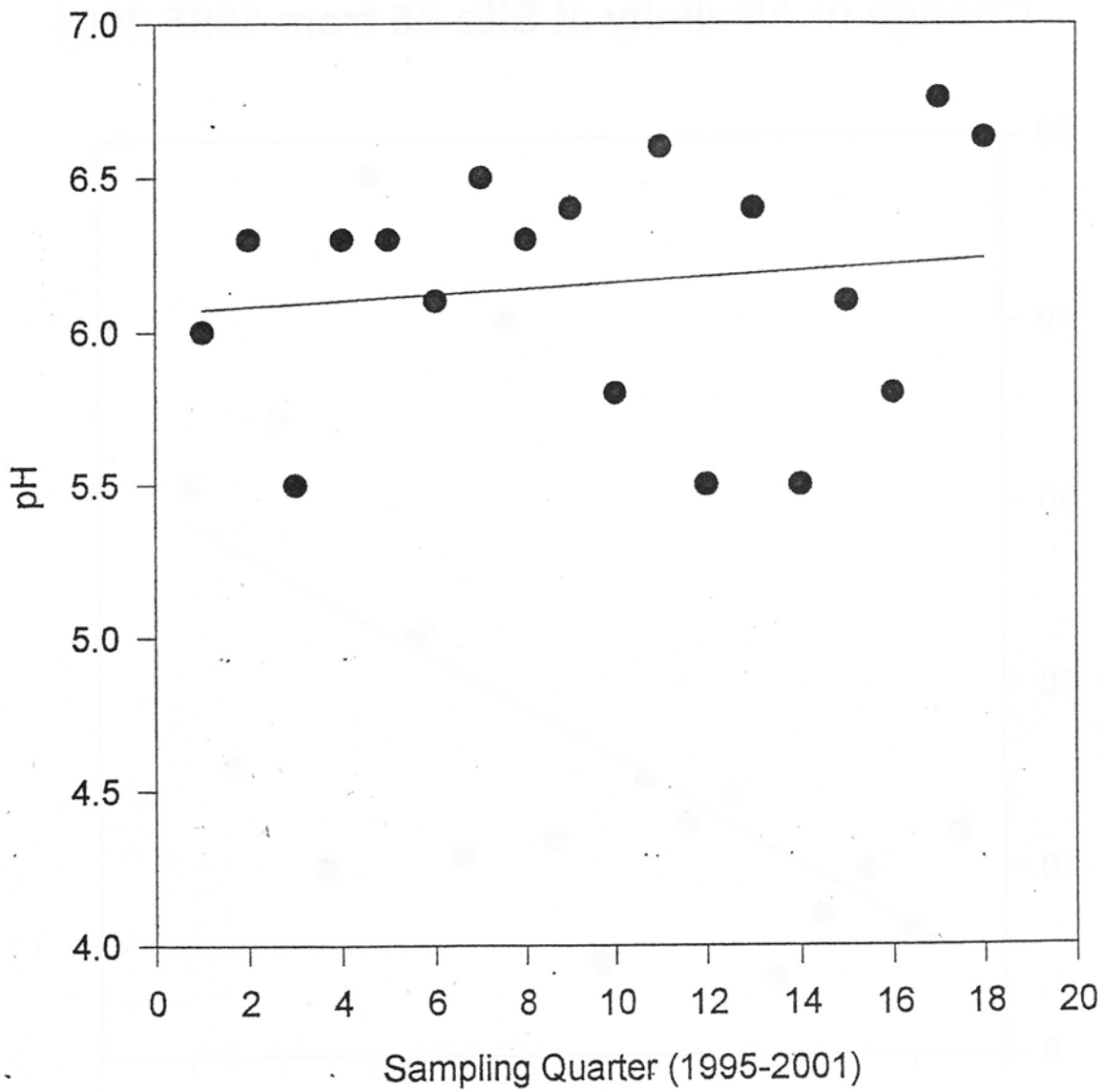


Figure 6

Change in Alkalinity at Site 65 from 1995-2001

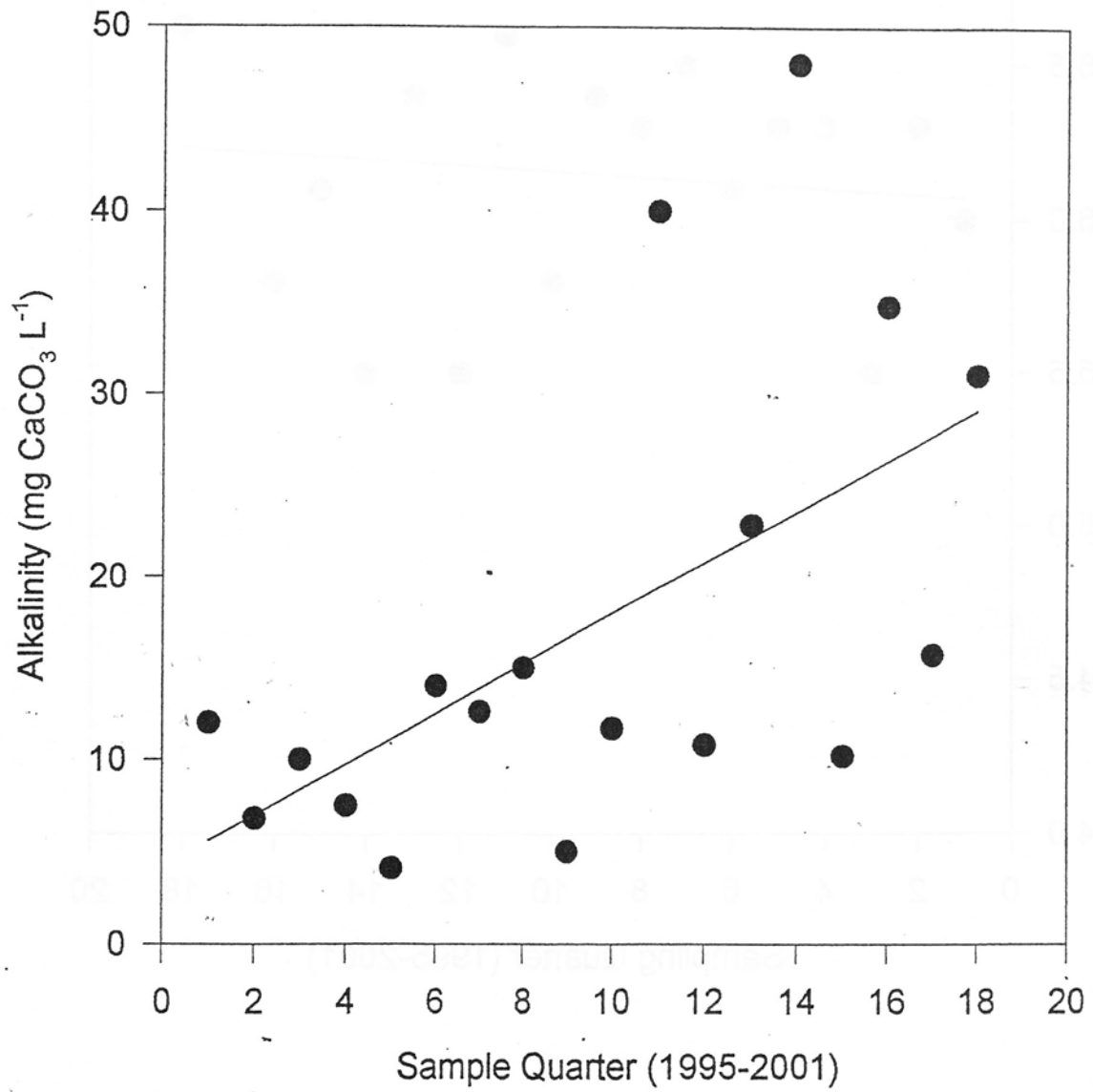


Figure 7

Changes in pH at Site 67 from 1995-2001

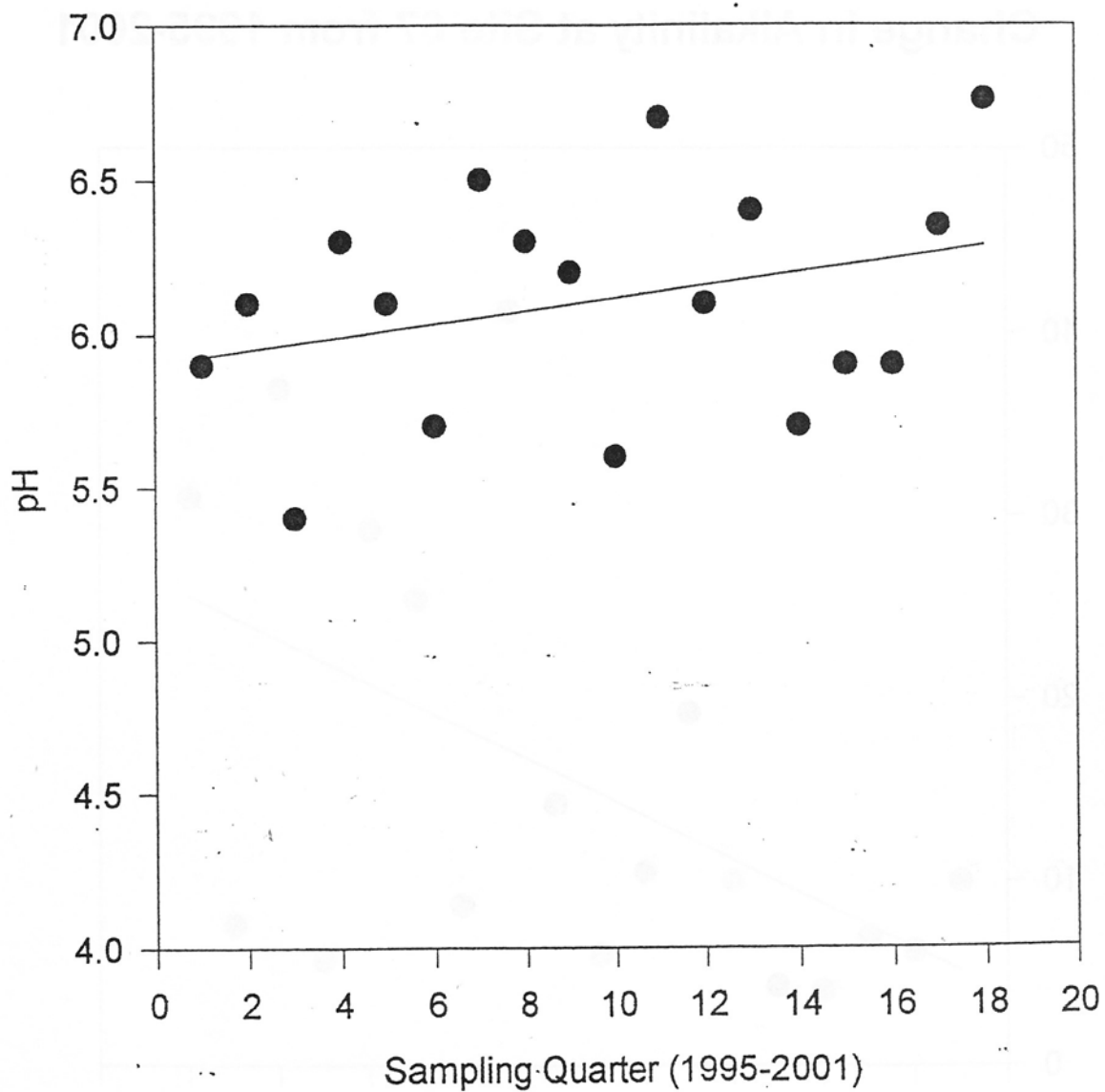


Figure 8

Change in Alkalinity at Site 67 from 1995-2001

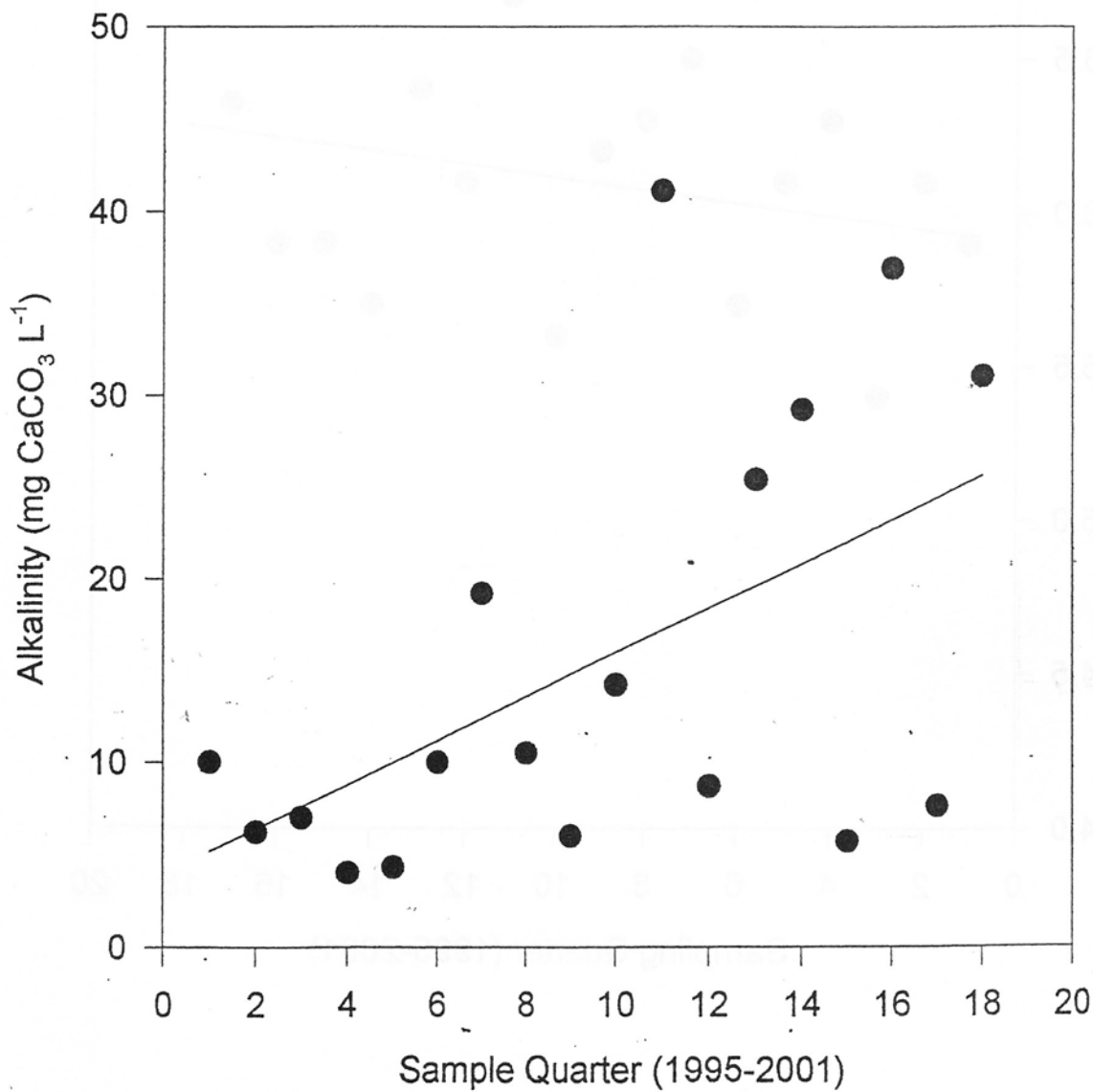


Figure 9

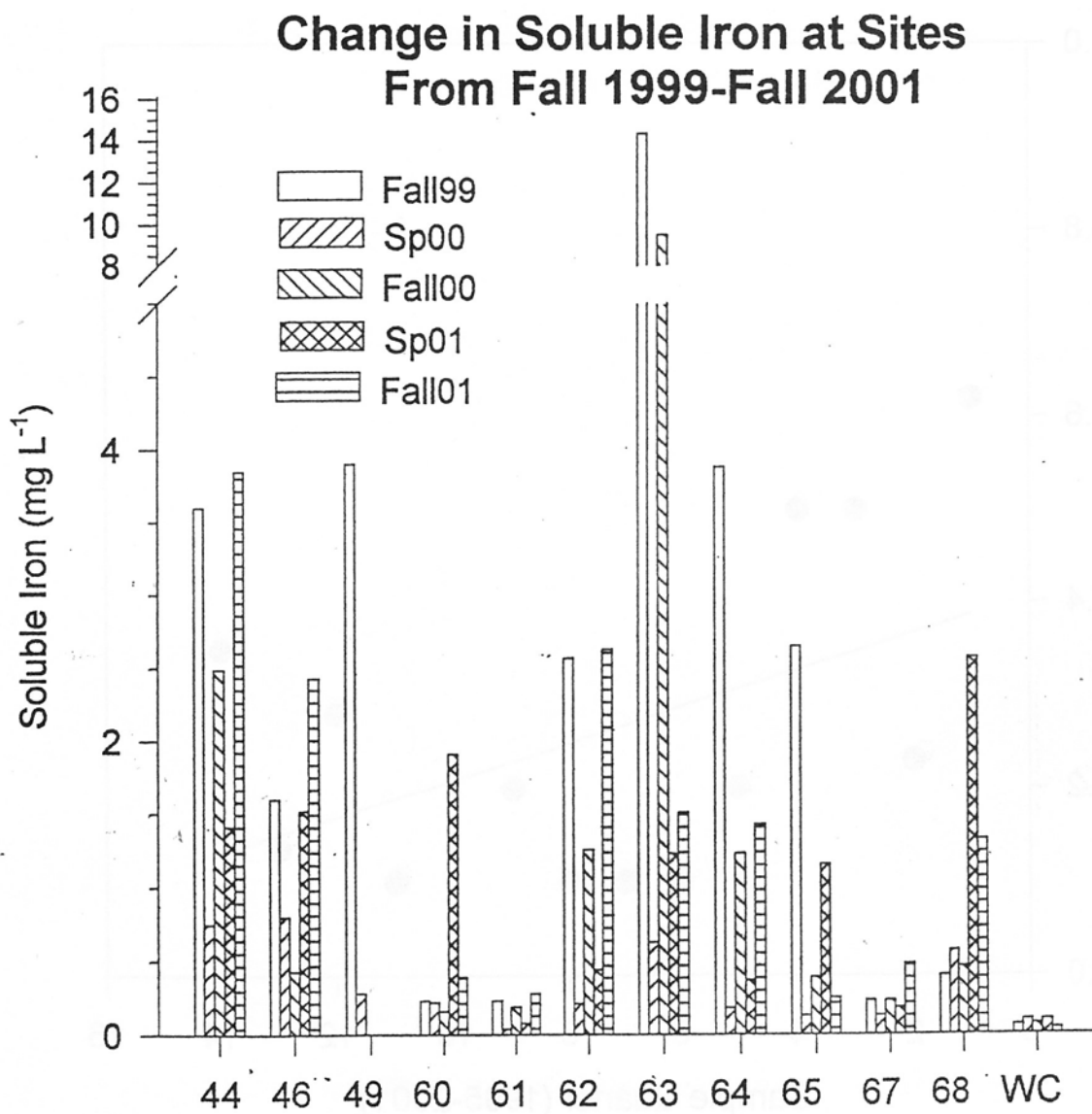


Figure 10

Changes in Soluble Fe at Site 67 from 1995-2001

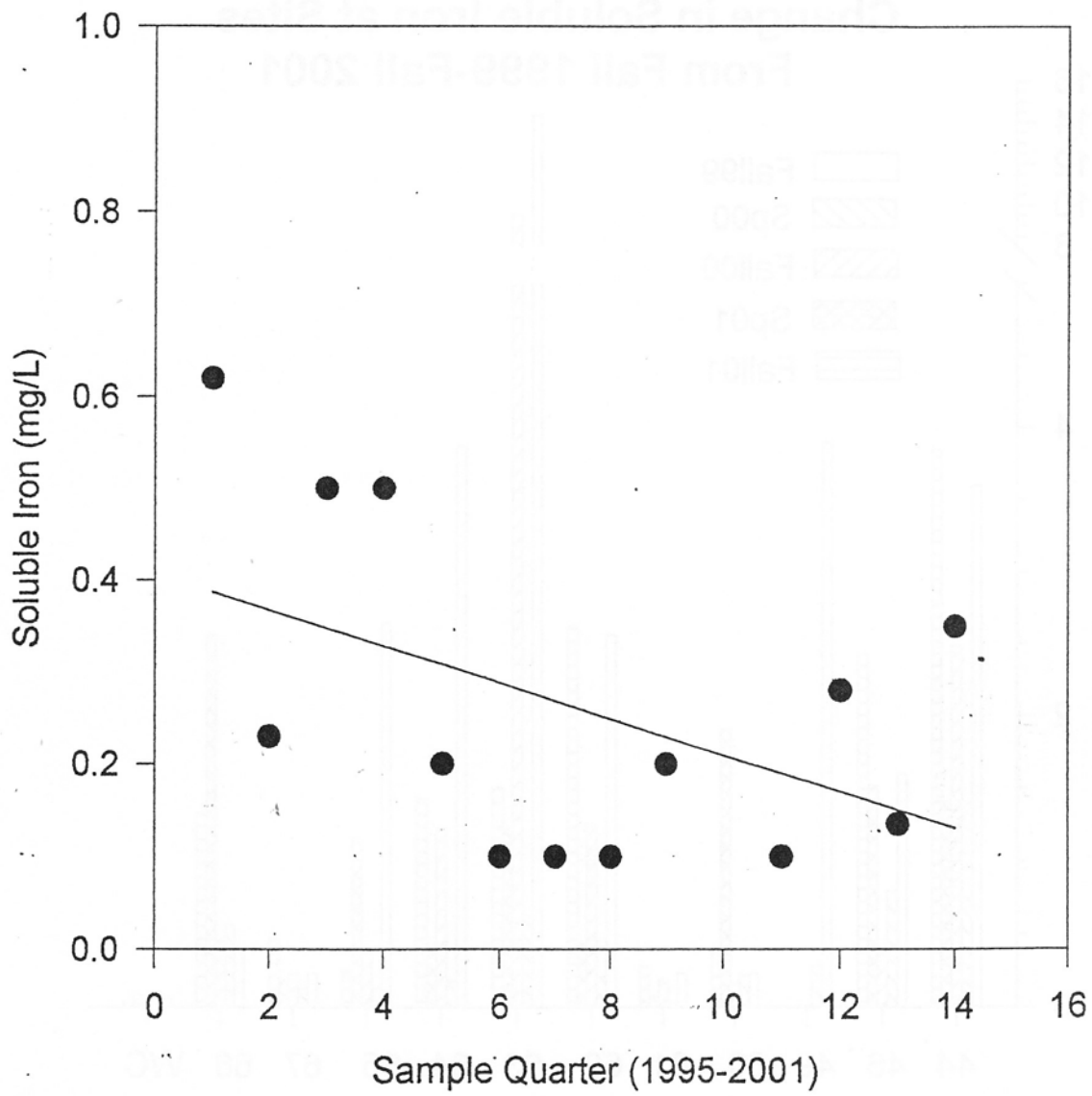


Figure 11

Changes in Soluble Fe at Site 65 from 1995-2001

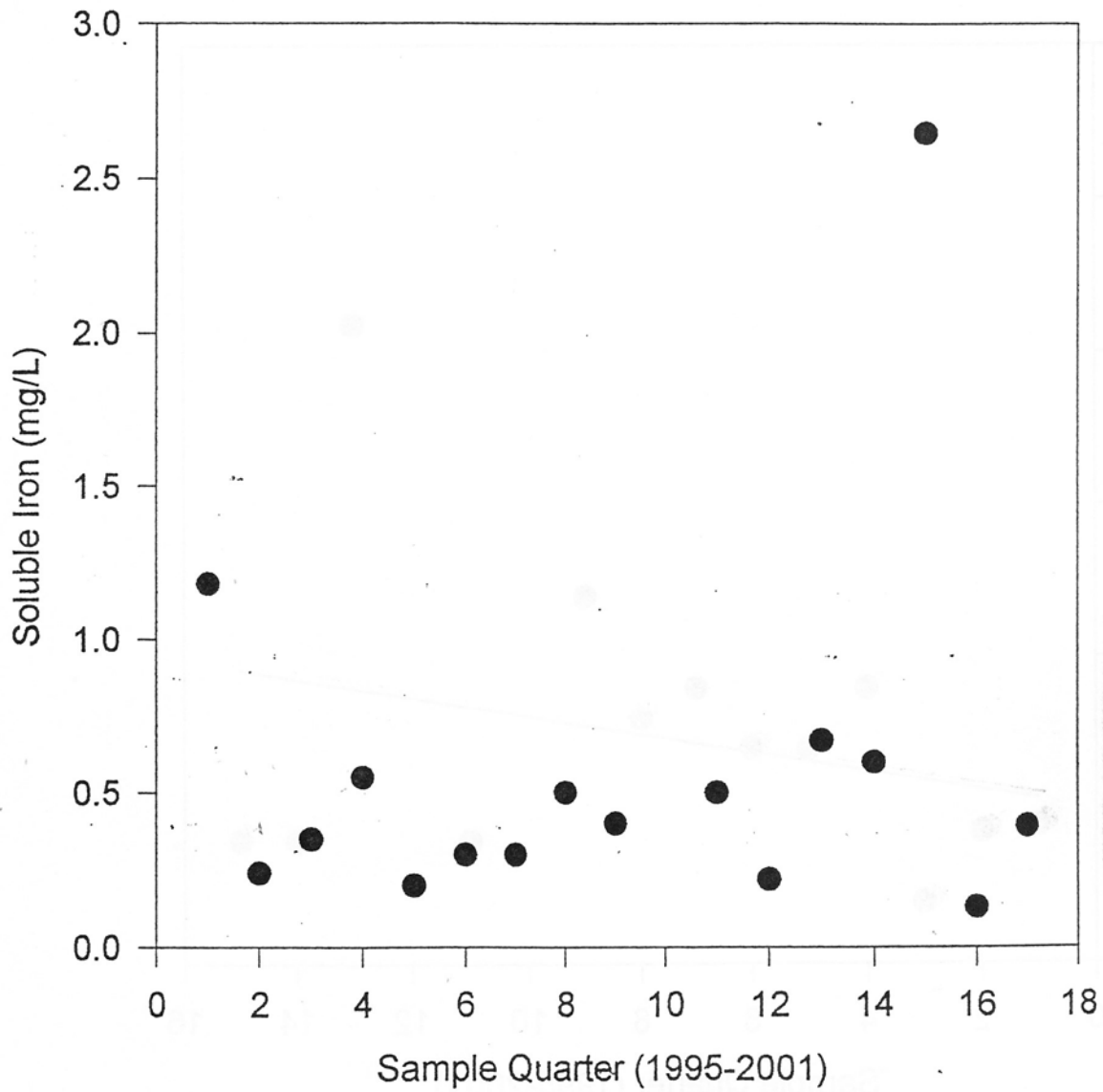


Figure 12

Changes in Soluble Fe at Site 68 from 1995-2001

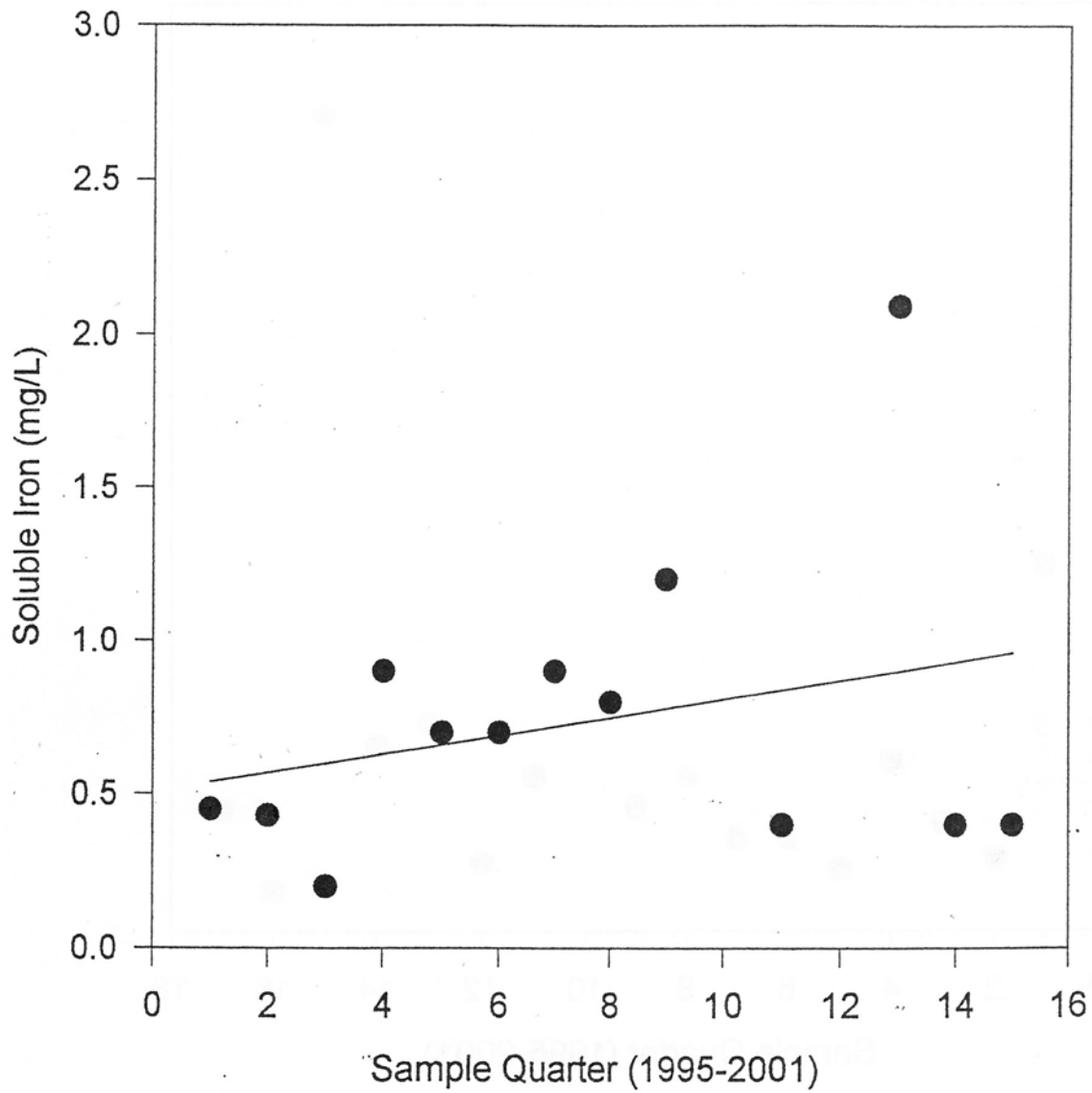


Figure 13

Change in Alkalinity with Discharge at Site 60

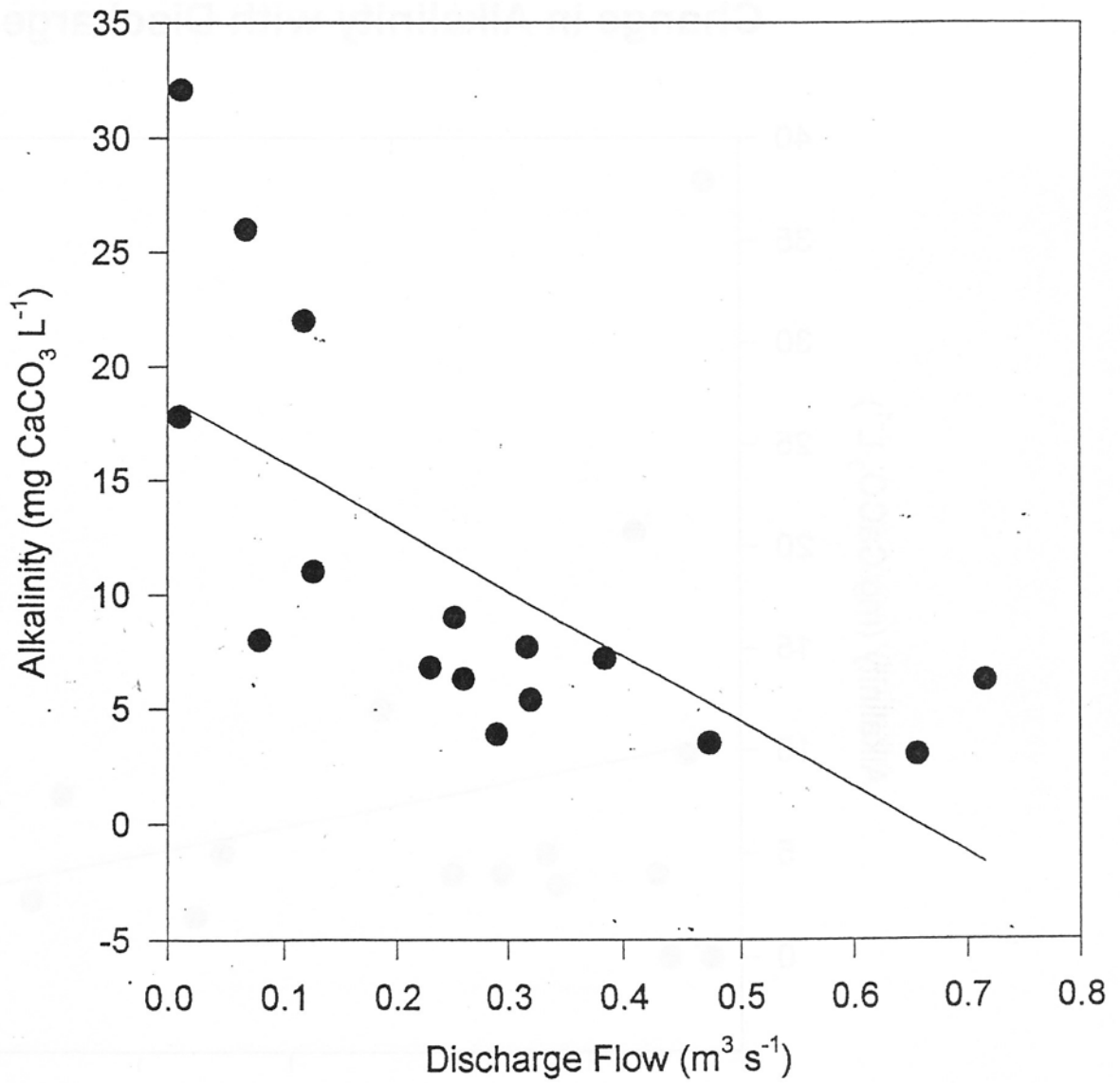


Figure 14

Change in Alkalinity with Discharge at Site 64

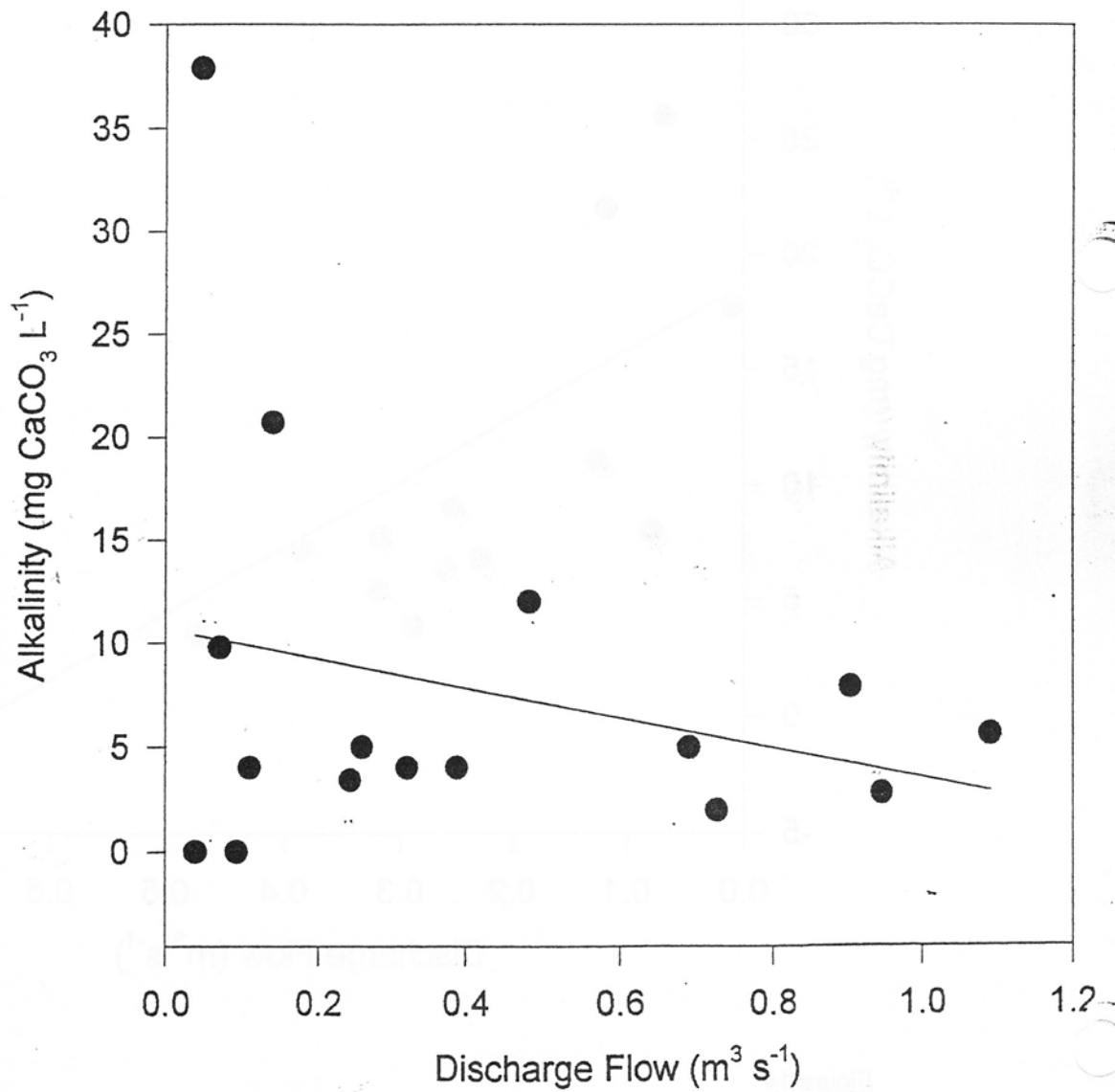


Figure 15

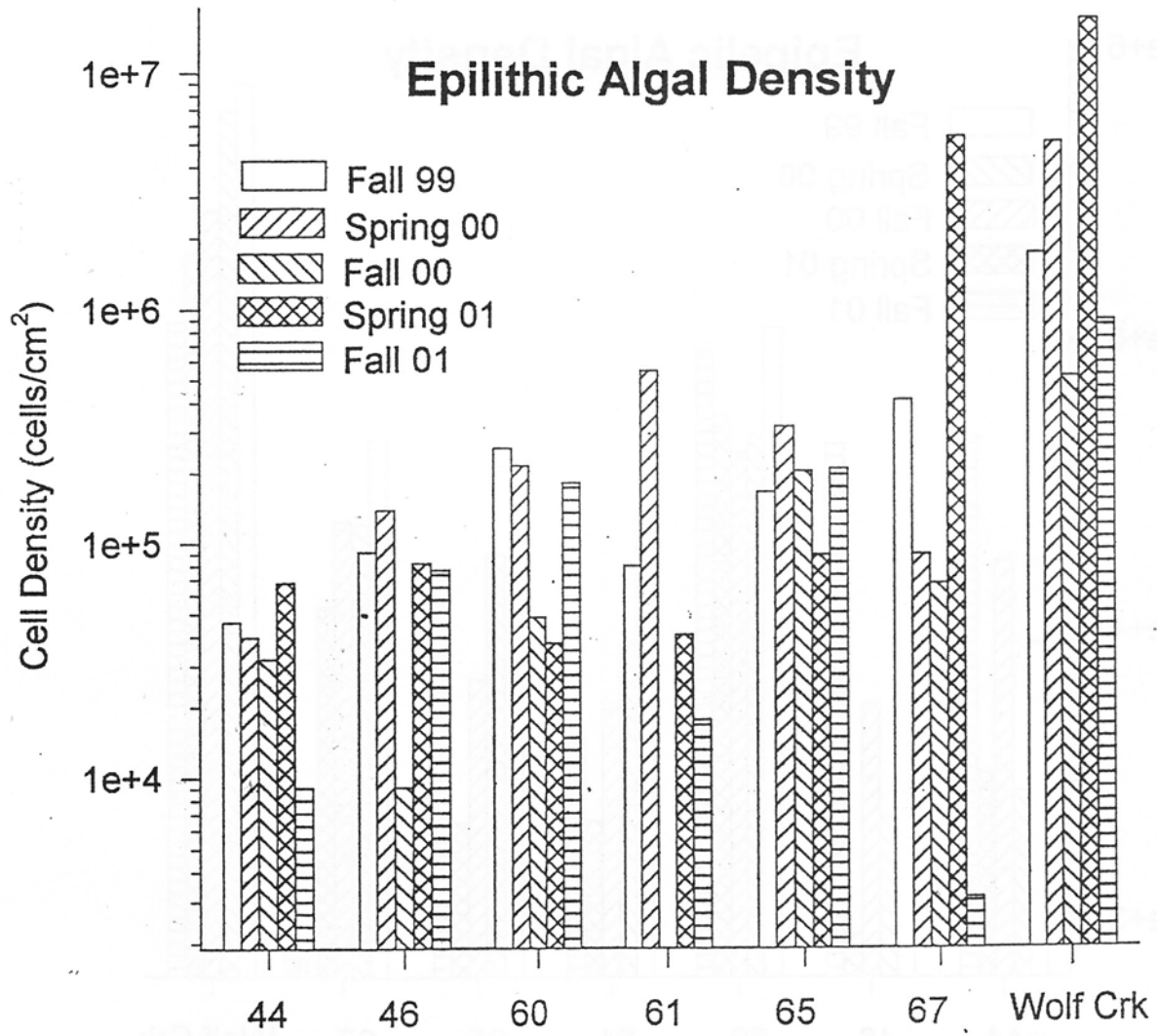


Figure 16

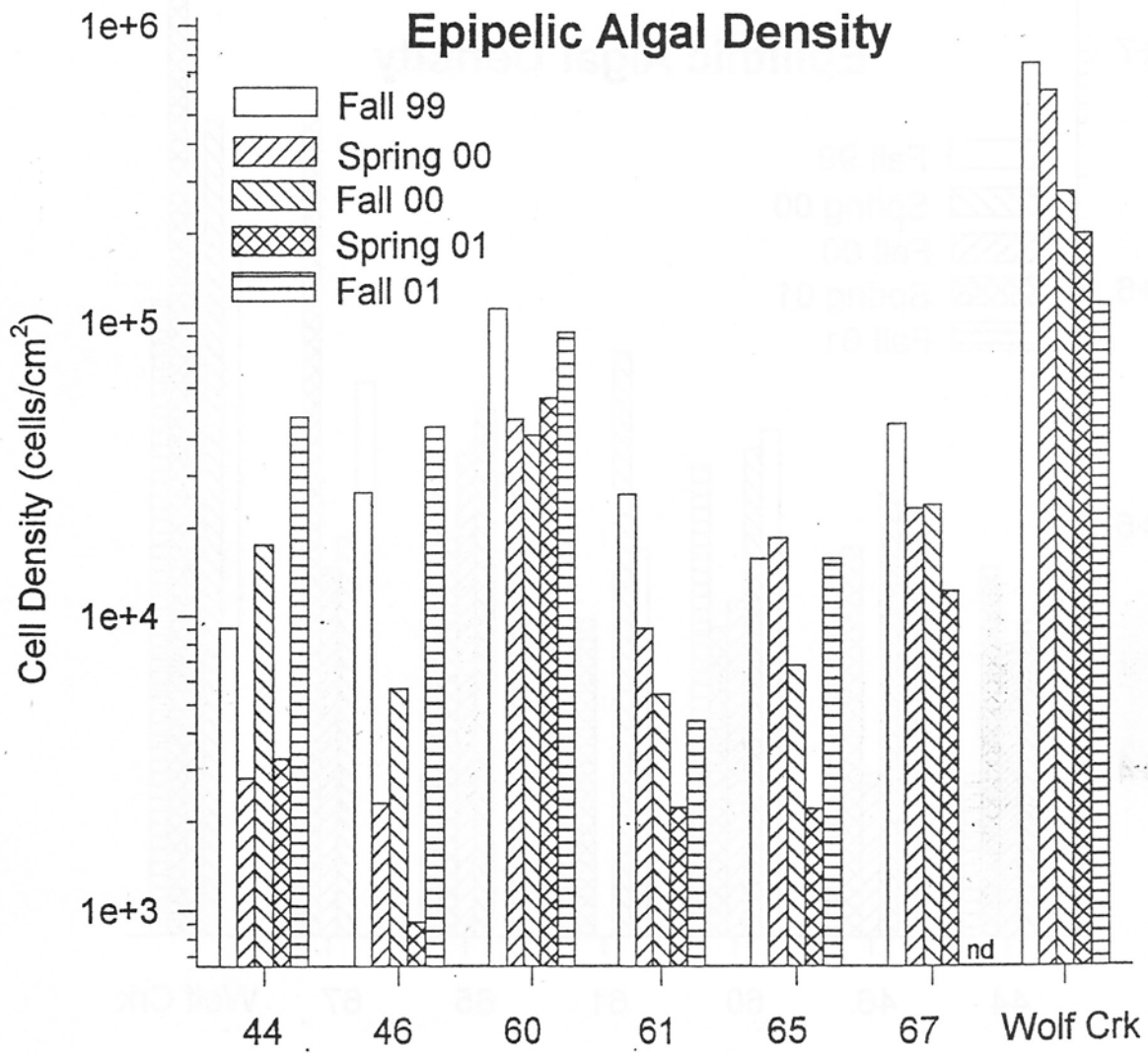


Figure 17

Species Richness for Epilithic Algae

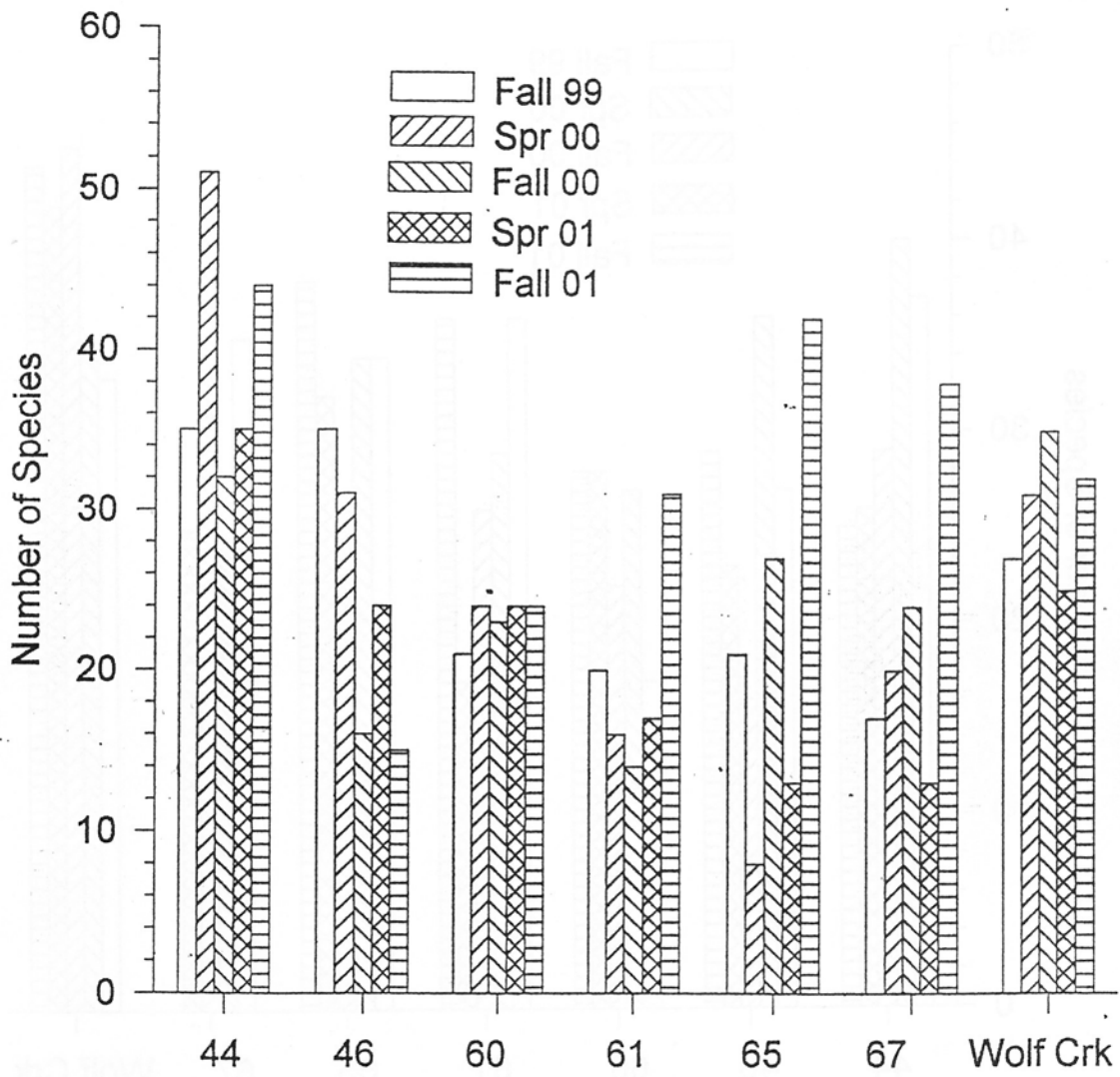


Figure 18

Species Richness for Epipellic Algae

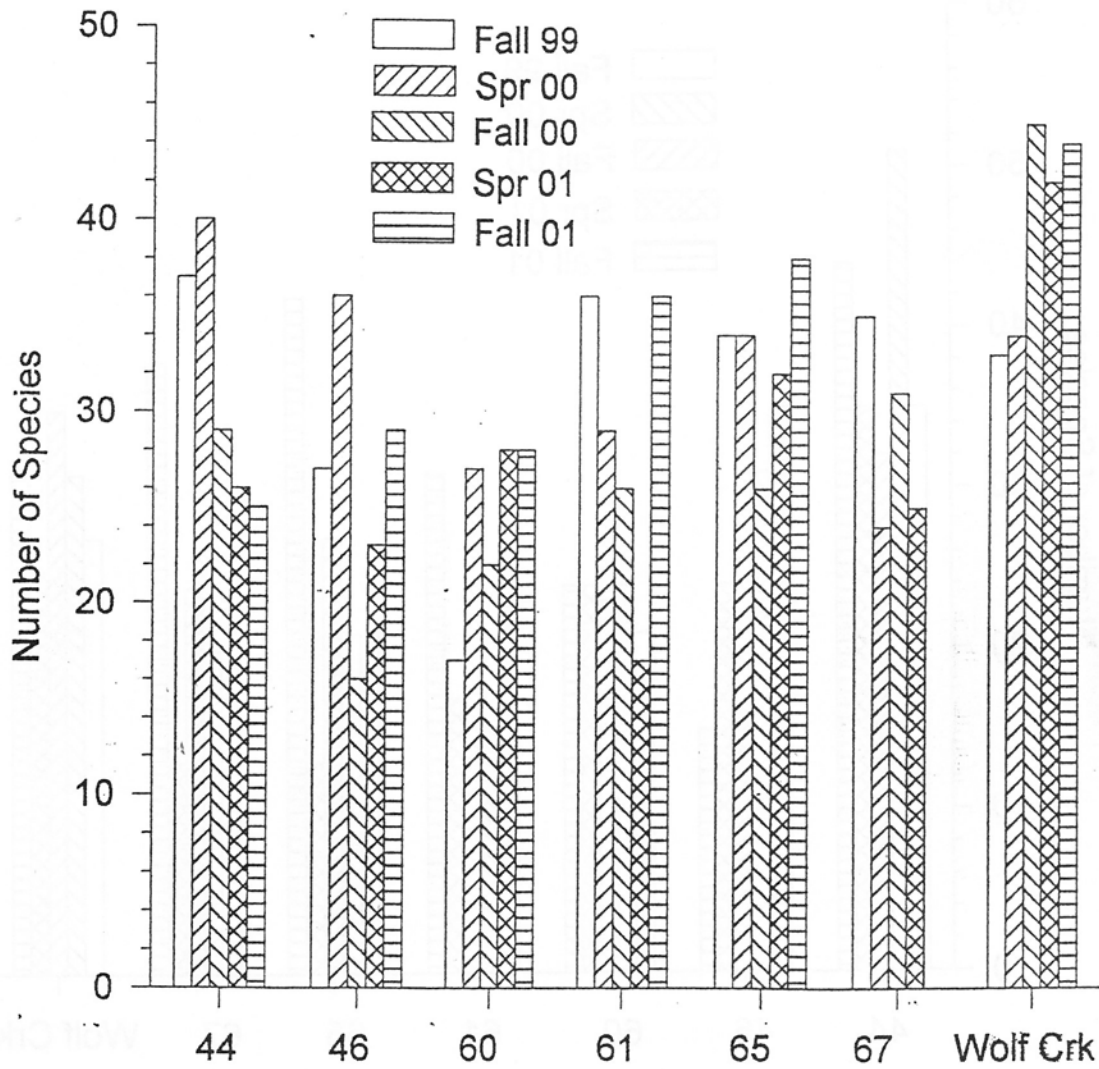


Figure 19

Macroinvertebrate Density in Riffles

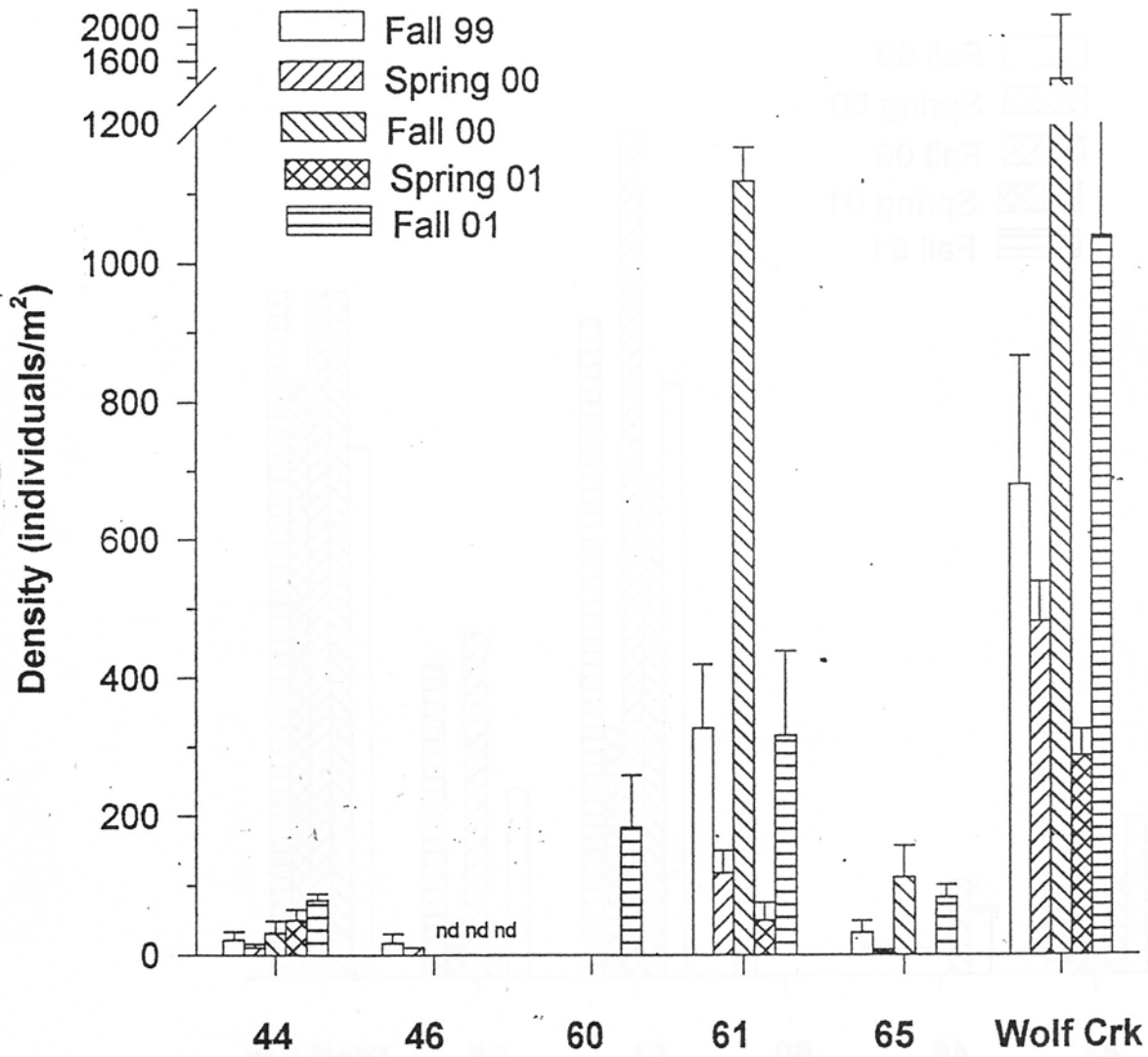


Figure 20

Macroinvertebrate Richness in Riffles

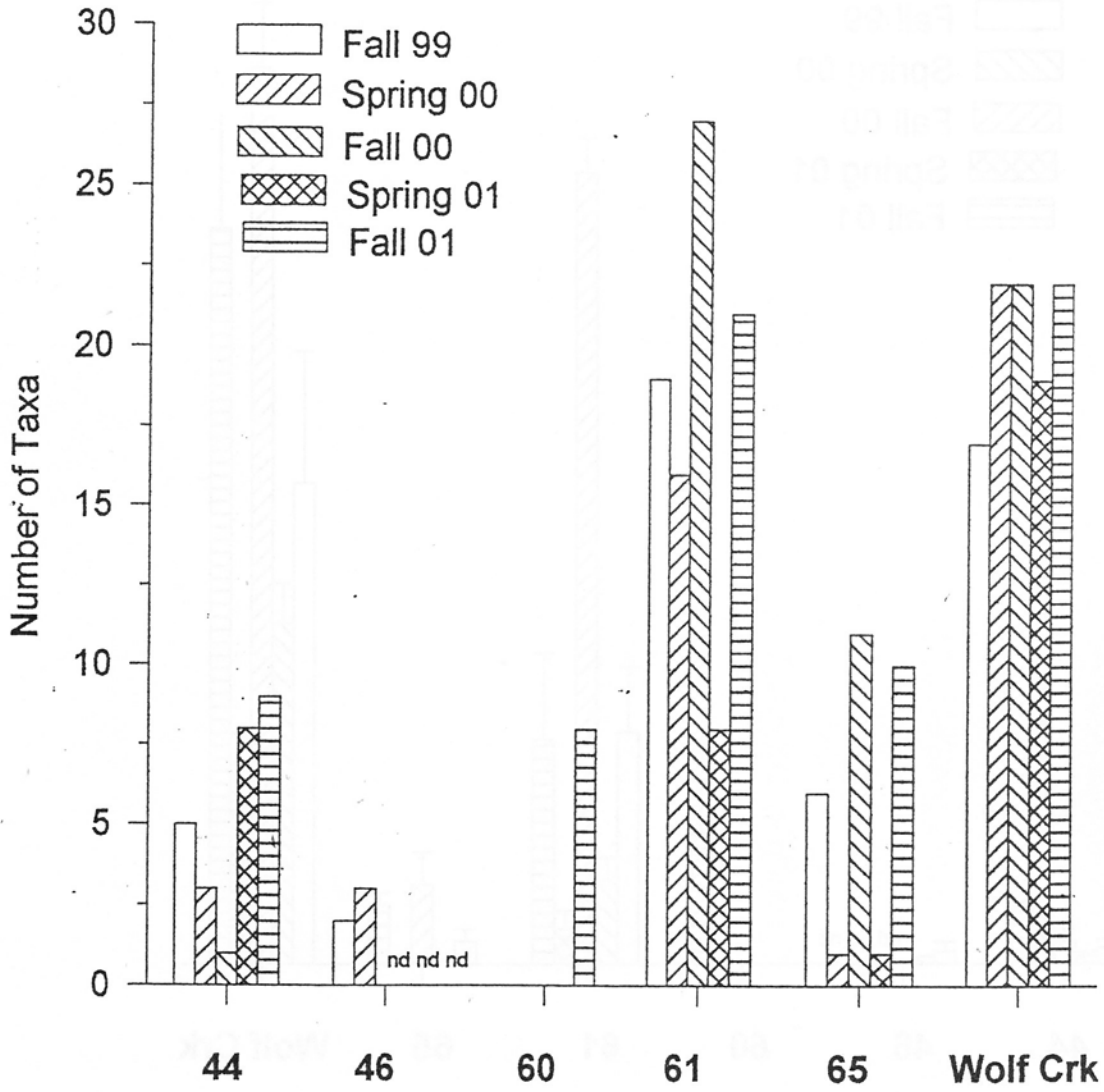


Figure 21

Appendix I

A. Taxa names and codes for algae

B. Relative abundance of epilithic algal taxa at each site on each date.

C. Relative abundance of epipellic algal taxa at each site on each date.

100	Chlorella
101	Chlorella
102	Chlorella
103	Chlorella
104	Chlorella
105	Chlorella
106	Chlorella
107	Chlorella
108	Chlorella
109	Chlorella
110	Chlorella
111	Chlorella
112	Chlorella
113	Chlorella
114	Chlorella
115	Chlorella
116	Chlorella
117	Chlorella
118	Chlorella
119	Chlorella
120	Chlorella
121	Chlorella
122	Chlorella
123	Chlorella
124	Chlorella
125	Chlorella
126	Chlorella
127	Chlorella
128	Chlorella
129	Chlorella
130	Chlorella
131	Chlorella
132	Chlorella
133	Chlorella
134	Chlorella
135	Chlorella
136	Chlorella
137	Chlorella
138	Chlorella
139	Chlorella
140	Chlorella
141	Chlorella
142	Chlorella
143	Chlorella
144	Chlorella
145	Chlorella
146	Chlorella
147	Chlorella
148	Chlorella
149	Chlorella
150	Chlorella
151	Chlorella
152	Chlorella
153	Chlorella
154	Chlorella
155	Chlorella
156	Chlorella
157	Chlorella
158	Chlorella
159	Chlorella
160	Chlorella
161	Chlorella
162	Chlorella
163	Chlorella
164	Chlorella
165	Chlorella
166	Chlorella
167	Chlorella
168	Chlorella
169	Chlorella
170	Chlorella
171	Chlorella
172	Chlorella
173	Chlorella
174	Chlorella
175	Chlorella
176	Chlorella
177	Chlorella
178	Chlorella
179	Chlorella
180	Chlorella
181	Chlorella
182	Chlorella
183	Chlorella
184	Chlorella
185	Chlorella
186	Chlorella
187	Chlorella
188	Chlorella
189	Chlorella
190	Chlorella
191	Chlorella
192	Chlorella
193	Chlorella
194	Chlorella
195	Chlorella
196	Chlorella
197	Chlorella
198	Chlorella
199	Chlorella
200	Chlorella

Appendix IA- Numeric codes for algal species names.

Ach childanos	235
Ach cleavii	160
Ach deflexa	161
Ach exigua v. constricta	214
Ach exigua	104
Ach hauckinana rost	261
Ach hustedii	218
Ach lanceolata v. dubia	105
Ach lanceolata	100
Ach lapponica v ninkei	213
Ach linearis	162
Ach marginulata	317
Ach minutissima macro	250
Ach minutissima	102
Ach peragalli	287
Ach saccula	281
Ach. caspierra	338
Ach. helvetica	355
Ach. laveis	354
Ach. minutis. gracillima	306
Ach. pseudoblitera	343
Ach. sp	328
Ach. stewartii	307
Amphora ovalis	107
Amphora sp	332
Amphora sp.	370
Amphora venter	108
Amphoroa perpusilla	109
Anabaena	163
Ankistridesmus	110
Anom serians brach	237
Anom vitrea	236
Asteroecystis	337
Audouinella	314
Bacillaria paradoxa	303
Caloneis bacillium	260
Calonies hylina	163
Cladophora	311
Closterium	222
Clostridium	164
Coc. plac. v. euglypta	111
Cosmarium	165
Croococcus	112
Crucigina	166
Cyclotella	167
Cymatopluera solera	168
Cymb amphicephala	224
Cymb angusta	251
Cymb cessatii	280
Cymb cistula	169
Cymb cuspidata	319
Cymb hebrede	252
Cymb laveis	284
Cymb lunata	292
Cymb mexicana	170
Cymb microcephala	285
Cymb minuta	171
Cymb naviculaformis	215
Cymb prostrata	172
Cymb sinuata	113
Cymb tumida	173
Cymb. turgidula	375
Denticula elegans	114

Denticula sp.	365
Diatoma vulg hiemalie	174
Diploneis sp	216
Euglena	349
Eun bilunaris	269
Eun curvata	240
Eun curvata v. capitata	319
Eun elegans	241
Eun exigua	238
Eun implicata	268
Eun intermedia	267
Eun musicola triden	270
Eun negelii	239
Eun sp.	318
Eun tenella	243
Eun vanherk	242
Eun. bilunaris v. microceph	348
Eun. GV	361
Eun. musicola	374
Eun. pectinalis NV	346
Eunotia minor	115
Frag brevisstrata v. inflata	118
Frag capucina	217
Frag constr v venter	119
Frag lepto	117
Frag pinata NV	229
Frag pinnata v. lancetula	175
Frag sp	116
Frag vaucheriae	176
Frag virescens	262
Frust rhomb viridula	274
Frust rhomb. v. amphi	316
Frust rhomboides	177
Frust vulg crass	263
Frust weinholdii	302
Gomp acuminatum	120
Gomp affine	227
Gomp angustatum	122
Gomp constructum v capitata 123	
Gomp gracile	228
Gomp olivacium	230
Gomp parvulum	121
Gomp sp.	178
Gomp subclavicum	179
Gomp. GV	352
Gongostonium	350
Gryosigma spencerii	180
Gyro modiferum	282
Hantz. amphioxys	359
Kirchneriella?	124
Klebsormidium	312
Melosira distans	258
Melosira islandica	220
Melosira varians	125
Meridon circulare	259
Merismopedia	335
Microspora	327
Mougeotia	339
Nav ?schoreder	323
Nav accommoda	211
Nav agphuphala??	317
Nav arvensis	133
Nav capitata	181
Nav celmintis	131
Nav cryptocephala NV	135
Nav cryptocephala venter	134
Nav crytotenella	265

Nav exigua capitata	295
Nav gottlandica	297
Nav gregarica/ secura	182
Nav gynginsingensis	219
Nav indent	183
Nav lanceolata	184
Nav menisculus v. upsalensis or Nav menisculus	186
Nav minima	137
Nav miniscula	185
Nav minnewaukonesis	272
Nav muralis	136
Nav mutica	289
Nav notha	275
Nav odiosa	264
Nav pelliculosa	187
Nav placentula	126
Nav pupula v. minuta	231
Nav pupula	132
Nav pupula v. ellipica	188
Nav radiosa v tenella	130
Nav radiosa NV	127
Nav rhyncephala	189
Nav seminulum	255
Nav simula	273
Nav sp	128
Nav subtilissima	129
Nav symetrica	296
Nav symetrica	190
Nav tripunctata NV	192
Nav viridula v. rostellata	210
Nav. bicephala	308
Nav. cuspidata	336
Nav. secura	368
Nav. viridula	369
Ned. affine v. humurus	334
Nedium affine	286
Nedium bisculatum	256
Nedium iridis	362
Nedium productum	271
Nedium sp	257
Nitz communis/Kutz	193
Nitz acicularis	194
Nitz amphibia	195
Nitz apiculata	196
Nitz communis	212
Nitz commutata	276
Nitz dissipata	142
Nitz filiformis	279
Nitz flexoides	320
Nitz fonticula	199
Nitz frust v. perp	200
Nitz frust NV	139
Nitz ganderschmidtensis	197
Nitz gracilis	138
Nitz holstatica	144
Nitz hungarica	209
Nitz linearis	293
Nitz littoralis	198
Nitz nana	245
Nitz palea	140
Nitz paleacea	141
Nitz pellucida	294
Nitz perminuta	315
Nitz recta	208
Nitz romana	143
Nitz sigma	266
Nitz sociabilis	322

Nitz sp.	201
Nitz sublinearis	298
Nitz. acuminate	347
Nitz. clausii	373
Nitz. dubia	301
Nitz. intermedia	360
Nitz. lencensis?	367
Nitz. obtusa	371
Nitz. perminuta	353
Nodularia	357
Odeogonium	316
Oocystis	333
Opephora martyi	146
Orthoseria roeseana	288
Oscillatoria	147
Pediastrum	201
PGV	305
Phormidium	148
Pinn abaujensis	318
Pinn braunii	321
Pinn caudata	225
Pinn dactylus	246
Pinn divergentissima	291
Pinn mesopleta	254
Pinn microstauron	248
Pinn obscura	249
Pinn sp	253
Pinn subcapitata	247
Pinn. divergens	309
Pinn. GV	358
Pinn. pseudomicrostauron	325
Pinn. subcapitata v. subog	344
Plectorina??	372
Rhoc cruvata	149
Scen bijuga	202
Scen incrasulatus	203
Scen obliquis	150
Scen quadicaudata	204
Scendesmus sp.	378
Sprulina	340
Staur phonecentron	282
Staur smithii	283
Stauroneis anceps	290
Stauroneis kregerii	281
Stig basal cells	152
Stig filament	153
Sur. patella	330
Suri angust	278
Suri linearis	223
Suri minuta	277
Suri ovallis	299
Suri ovata	205
Suriella amphioxys	304
Suriella brebisooni v. kut	342
Suriella sp	329
Symploca	363
Syn radians	351
Syn. puchella lanceolata	310
Synd acus	226
Synd rumpens or rumpens v. familiaris	206
Synd tenera	221
Synd ulna	207
Tab flocculosa	244
Tribonema	341
Unknown green	154
Wollea	313

Run: Relative abundance of epilithic algae for each sample
 Date: SLIPPERY ROCK CREEK EPILITHIC DATA 1999-2001

Table I. Data and Summary Statistics

Original Sample Units

Label	99FL44	99FL46	99FL60	99FL61	99FL65	99FL67	99FLMC	00SP44	00SP46	00FL60
Totals	99.99	100.06	99.98	100.07	100.28	99.98	100.31	100.01	99.99	99.55
Species ID										
100	0.0011	0.0000	0.0000	0.0000	0.0112	0.0000	0.0066	0.0017	0.0000	0.0214
102	0.0276	0.0788	0.1494	0.1189	0.6122	0.5688	0.0729	0.0107	0.0658	0.2837
107	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
109	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0563	0.0006	0.0000	0.0000
110	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0043
111	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
112	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0006	0.0000	0.0000
113	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0053
115	0.0028	0.0284	0.1665	0.0067	0.0445	0.0000	0.0000	0.0023	0.0252	0.0508
119	0.0000	0.0000	0.0000	0.0021	0.0000	0.0420	0.0000	0.0009	0.0000	0.0000
120	0.0000	0.0000	0.0000	0.0010	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
121	0.0152	0.0047	0.0049	0.0031	0.0473	0.0056	0.0066	0.0055	0.0054	0.0187
125	0.0000	0.0016	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
127	0.0000	0.0000	0.0000	0.0000	0.0028	0.0000	0.0033	0.0000	0.0000	0.0000
128	0.0000	0.0032	0.0000	0.0000	0.0056	0.0056	0.0265	0.0017	0.0000	0.0000
133	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0018	0.0000
135	0.0000	0.0000	0.0049	0.0000	0.0167	0.0056	0.1027	0.0000	0.0054	0.0000
136	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
137	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0100	0.0000	0.0000	0.0107
139	0.0034	0.0032	0.0000	0.0000	0.0000	0.0000	0.0000	0.0009	0.0000	0.0000
140	0.0124	0.0488	0.0147	0.0010	0.0028	0.0000	0.0232	0.0017	0.0063	0.0107
141	0.0023	0.0126	0.0049	0.0021	0.0112	0.0168	0.0000	0.0000	0.0018	0.0000
142	0.0011	0.0095	0.0000	0.0010	0.0000	0.0000	0.1225	0.0023	0.0018	0.0161
144	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0066	0.0000	0.0000	0.0000
147	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
148	0.8309	0.5271	0.2655	0.8442	0.1622	0.1315	0.0000	0.0000	0.0067	0.0000
149	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0066	0.9055	0.7231	0.1838
152	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
153	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
154	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
162	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
165	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
167	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0033	0.0000	0.0000	0.0000
169	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0033	0.0000	0.0000	0.0000

461	0.0000	0.0000	0.0000	0.0002	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
463	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
475	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
480	0.0000	0.0000	0.0505	0.0064	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0463
481	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
492	0.0000	0.0000	0.0000	0.0064	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
497	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
498	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
503	0.0000	0.0000	0.0025	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
504	0.0000	0.0000	0.0051	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
533	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
545	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
552	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
618	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Diversity HE	1.1453	0.5367	1.6392	2.6837	0.4992	1.1762	1.8399	1.2600	2.6523	1.3906			
Diversity	16.0000	8.0000	20.0000	31.0000	32.0000	16.0000	23.0000	14.0000	27.0000	24.0000			

461	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
463	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
475	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
480	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0056	0.0000	0.0000	0.0000	0.0115
481	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0062	0.0000
492	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
497	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
498	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
503	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
504	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
533	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
545	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
552	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0041	0.0000
618	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Diversity HE	2.8474	3.1430	1.6054	1.7357	1.5817	1.8563	0.4510	2.5818	2.4679	0.9378		
Richness	35.0000	35.0000	24.0000	24.0000	17.0000	13.0000	13.0000	25.0000	44.0000	15.0000		



Table I. Data and Summary Statistics

Original Sample Units

Label	01FL60	01FL61	01FL65	01FL67	01FLWC
Totals	99.99	101.22	99.93	100.08	100.01
Species ID					
100	0.0000	0.0420	0.0059	0.0000	0.0296
102	0.2497	0.3081	0.1009	0.3468	0.0493
107	0.0000	0.0000	0.0119	0.0056	0.0131
109	0.0000	0.0000	0.0000	0.0000	0.0329
110	0.0000	0.0000	0.0000	0.0170	0.0000
111	0.0000	0.0000	0.0000	0.0000	0.0296
112	0.0000	0.0000	0.0000	0.0000	0.0000
113	0.0000	0.0000	0.0000	0.0000	0.0131
115	0.0416	0.0168	0.0415	0.0250	0.0000
119	0.0000	0.0000	0.0000	0.0971	0.0033
120	0.0000	0.0056	0.0000	0.0056	0.0000
121	0.0238	0.0841	0.1336	0.0305	0.0066
125	0.0000	0.0000	0.0059	0.0000	0.0000
127	0.0000	0.0000	0.0000	0.0000	0.0000
128	0.0000	0.0000	0.0000	0.0000	0.0000
133	0.0327	0.0000	0.0000	0.0056	0.0000
135	0.0030	0.0112	0.0534	0.0167	0.0197
136	0.0000	0.0000	0.0000	0.0028	0.0000
137	0.0000	0.0112	0.0000	0.0000	0.0000
139	0.0297	0.0224	0.0059	0.0056	0.2563
140	0.0178	0.0420	0.0831	0.0222	0.0230
141	0.0000	0.0000	0.0178	0.0000	0.0000
142	0.0000	0.0728	0.0000	0.0000	0.1347
144	0.0000	0.0000	0.0000	0.0000	0.0000
147	0.0000	0.0128	0.0030	0.0000	0.0070
148	0.0345	0.1413	0.0861	0.1499	0.0040
149	0.0000	0.0000	0.0000	0.0000	0.0394
152	0.0000	0.0000	0.0000	0.0000	0.0000
153	0.0080	0.0000	0.0000	0.0000	0.0000
154	0.0000	0.0000	0.0000	0.0000	0.0000
160	0.0000	0.0000	0.0000	0.0000	0.0033
162	0.0000	0.0000	0.0000	0.0056	0.0033
165	0.0000	0.0000	0.0000	0.0000	0.0000
167	0.0000	0.0000	0.0030	0.0028	0.0000
169	0.0000	0.0000	0.0000	0.0000	0.0000