

APPENDICES – FOR RESULTS

Appendix 1

Appendix 1.1

A. Measurements of variables and age (years) in all seedlings at site 2 (N= 8) during 14 months.

Ind	Site	plot	lls	age	llf	dlf	tlf	lde	nslf/ year	nslf	x value	y value
NF026	2	1	2.5	2.9	3.00	1.00	8.00	4.4	4.7	4.00	1.85	3.35
NF027	2	1	0.3	0.7	1.00	1.00	2.00	4.4	3.1	0.00	2.7	3.40
NF030	2	1	3.3	3.3	3.00	0.00	9.00	4.4	4.0	6.00	3.35	6.30
NF044	2	3	2.2	1.0	2.00	1.00	4.00	3.0	3.0	1.00	9.7	5.20
NF045	2	3	2.2	0.7	2.00	0.00	3.00	3.0	2.0	1.00	9.3	4.45
NF048	2	3	0.5	0.7	1.00	1.00	3.00	3.0	2.0	1.00	8.5	6.10
NF059	2	3	0.5	0.7	1.00	1.00	3.00	3.0	2.0	1.00	6.8	9.70
NF061	2	3	0.5	0.7	2.00	1.00	3.00	3.0	3.0	0.00	6.75	7.80

B. The measurement of Plastochrone (months) in 5 seedlings at site 2.

Site	plot	lde	tlf
2	1	4.8	8.0
2	1	4.0	9.0
2	3	3.0	4.0
2	3	3.1	3.0
2	3	3.0	3.0

C. The measurement of variables and age (years) in all juveniles at site 1 during 16 months.

Ind	Site	plot	lls	age	llf	dlf	tlf	lde	nslf/year	nslf	x value	y value
NF011	1	1	4.1	6.6	4	3	8	10	0.7	1	0.25	13.2
NF019	1	1	2.5	5.8	3	4	7	10	0.0	0	8.15	0.55
NF025	1	1	3.3	5.8	3	3	7	10	0.7	1	10.35	0.56
NF031	1	1	5.0	8.3	3	4	10	10	2.3	3	13.3	3.43
NF008	1	2	3.3	5.8	4	3	7	10	0.0	0	3.4	4.31
NF026	1	2	5.0	8.3	4	4	10	10	1.5	2	9.4	0.87
NF038	1	2	5.0	7.5	4	3	9	10	1.5	2	14.2	11.63
NF039	1	2	5.8	5.8	5	3	10	10	1.5	2	14.65	11.07
NF042	1	2	6.6	5.8	5	2	10	10	2.2	3	15.36	11.72
NF046	1	2	4.1	6.6	4	3	8	10	0.4	1	19.3	15.02
NF048	1	2	4.1	7.5	3	4	9	10	1.5	2	12	18
NF050	1	2	4.1	7.5	3	4	9	10	1.5	2	11.3	14.32

Ind	Site	plot	lls	age	llf	dlf	tlf	lde	nslf/year	nslf	x value	y value
NF061	1	2	1.6	5.0	2	4	6	10	0.0	0	14.63	0.01
NF070	1	2	5.0	7.5	4	3	9	10	1.5	2	14.23	7.72
NF073	1	2	4.1	6.6	4	3	8	10	0.4	1	11.6	9.18
NF077	1	2	4.1	6.6	3	3	8	10	1.5	2	13.41	13.02
NF083	1	2	2.5	6.6	2	5	8	10	0.4	1	4.05	4.09
NF087	1	2	4.1	6.6	4	3	8	10	0.4	1	0.5	6.4
NF002	1	3	5.0	7.5	4	3	9	10	1.5	2	2	4.18
NF009	1	3	5.8	7.5	4	2	9	10	2.2	3	5.4	0.76
NF012	1	3	5.0	7.5	4	3	9	10	1.5	2	10.21	2.2
NF015	1	3	3.3	5.0	3	2	6	10	0.8	1	10.5	0.66
NF016	1	3	3.3	5.0	4	2	6	10	0.0	0	12.8	3.42
NF035	1	3	4.1	5.0	4	1	6	10	0.8	1	7.44	9.2
NF044	1	3	4.1	5.8	4	2	7	10	0.8	1	11.84	10.15
NF066	1	3	4.1	5.8	4	2	7	10	0.8	1	1.56	17.7
NF094	1	3	5.0	8.3	3	4	10	10	2.3	3	9.6	2.85

D. The measurement of Plastochrone (months) and total number of leaves in 14 juveniles at site 1.

Site	plot	tlf	lde
1	1	9.0	7
1	1	9.0	10
1	2	10.4	9
1	2	11.3	10
1	2	12.7	9
1	2	8.4	9
1	2	10.4	9
1	2	10.8	8
1	2	8.7	8
1	3	12.0	9
1	3	8.8	9
1	3	9.6	6
1	3	10.2	7
1	3	9.7	10

E. The measurement of variables and age (years) in all adults at site 1 during 16 months.

Ind	Site	plot	lls	age	llf	dlf	tlf	lde	nslf/year	nslf	x value	y value
NF001	1	1	5.1	11.1	5	7	13	10	0.7	1	1.9	3.55
NF002	1	1	6.0	11.1	4	6	13	10	1.2	3	2	3.35
NF003	1	1	6.8	12.8	5	7	15	10	2.2	3	1.15	4.5
NF004	1	1	4.2	7.7	4	4	9	10	0.7	1	1.65	4.35
NF005	1	1	4.2	11.1	4	8	13	10	0.7	1	2.9	4.25
NF006	1	1	5.1	11.1	5	7	13	10	0.7	1	3.85	4.35
NF007	1	1	4.2	9.4	4	6	11	10	0.7	1	0.65	11.15
NF008	1	1	3.4	9.4	2	7	11	10	1.5	2	0.2	11.6
NF009	1	1	4.2	12.0	5	9	14	10	0.0	0	1.65	11.6
NF012	1	1	4.2	7.7	5	4	9	10	0.0	0	0.1	13.8
NF018	1	1	5.1	12.8	4	9	15	10	1.5	2	5.3	4
NF020	1	1	2.5	7.7	3	6	9	10	0.0	0	8.5	0.6
NF021	1	1	4.2	9.4	4	6	11	10	0.7	1	8.5	2.45
NF022	1	1	4.2	10.3	4	7	12	10	0.7	1	9.25	1.52
NF024	1	1	4.2	8.5	3	5	10	10	1.5	2	9.85	3.7
NF026	1	1	6.0	14.5	4	10	17	10	2.2	3	11.25	0.85

Ind	Site	plot	lls	age	llf	dlf	tlf	lde	nslf/year	nslf	x value	y value
NF029	1	1	4.2	12.0	5	9	14	10	0.0	0	14.35	2.25
NF030	1	1	3.4	8.5	3	6	10	10	0.7	1	13.45	3.25
NF032	1	1	3.4	9.4	4	7	11	10	0.0	0	12.8	3.6
NF034	1	1	2.5	7.7	3	6	9	10	0.0	0	19.01	8.05
NF035	1	1	3.4	10.3	3	8	12	10	0.7	1	19.65	10.85
NF038	1	1	6.8	14.5	6	9	17	10	1.5	2	19.25	13.85
NF039	1	1	3.4	10.3	4	8	12	10	0.0	0	20	15.25
NF040	1	1	5.1	12.0	5	8	14	10	0.7	1	20	16.9
NF041	1	1	4.2	9.4	4	6	11	10	0.7	1	18.78	17.1
NF042	1	1	6.0	12.8	5	8	15	10	1.5	2	19.68	17.2
NF043	1	1	6.8	13.7	6	8	16	10	1.5	2	18.2	19.2
NF001	1	2	3.4	12.0	4	10	14	10	0.0	0	1	18.17
NF002	1	2	5.1	9.4	4	5	11	10	1.5	2	3	15.55
NF004	1	2	6.0	12.0	6	7	14	10	0.7	1	1	13.35
NF005	1	2	6.0	10.3	5	5	12	10	1.5	2	0.33	12.1
NF006	1	2	4.2	8.5	3	5	10	10	1.5	2	1	6.3
NF007	1	2	4.2	8.5	5	5	10	10	0.0	0	1.47	4.4
NF009	1	2	3.4	6.8	4	4	8	10	0.0	0	4.4	7.25
NF010	1	2	4.2	7.7	4	4	9	10	0.7	1	3.8	2.9
NF012	1	2	4.2	10.3	4	7	12	10	0.7	1	5	0.65
NF013	1	2	6.0	11.1	4	6	13	10	2.2	3	4.35	1
NF014	1	2	4.2	8.5	5	5	10	10	0.0	0	4.85	0.01
NF015	1	2	3.4	6.8	4	4	8	10	0.0	0	2	0.05
NF016	1	2	4.2	8.5	3	5	10	10	1.5	2	0.4	2.1
NF017	1	2	4.2	10.3	4	7	12	10	0.7	1	2.7	1.9
NF018	1	2	4.2	8.5	4	5	10	10	0.7	1	2	2.35
NF019	1	2	4.2	12.0	5	9	14	10	0.0	0	5.2	2.91
NF020	1	2	3.4	9.4	4	7	11	10	0.0	0	6.5	4.63
NF021	1	2	6.0	9.4	5	4	11	10	1.5	2	6.3	6.67
NF022	1	2	4.2	12.0	4	9	14	10	0.7	1	4.96	8.77
NF023	1	2	4.2	9.4	4	6	11	10	0.7	1	6.95	6.67
NF024	1	2	3.4	12.0	4	10	14	10	0.0	0	7.3	5.59
NF027	1	2	5.1	12.0	5	8	14	10	0.7	1	8.7	2.24
NF028	1	2	4.2	12.0	5	9	14	10	0.0	0	8.6	0.7
NF030	1	2	3.4	12.0	4	10	14	10	0.0	0	9.27	5.61
NF031	1	2	6.0	12.8	5	8	15	10	1.5	2	19.03	2.75
NF032	1	2	4.2	8.5	5	5	10	10	0.0	0	15.43	3.67
NF033	1	2	3.4	8.5	3	6	10	10	0.7	1	19.8	1.72
NF035	1	2	5.1	12.8	4	9	15	10	1.5	2	16.68	6.17
NF036	1	2	5.1	10.3	5	6	12	10	0.7	1	16.33	7.94
NF037	1	2	6.0	11.1	4	6	13	10	2.2	3	15.07	8.52
NF040	1	2	5.1	9.4	4	5	11	10	1.5	2	14.71	11.25
NF041	1	2	6.8	10.3	6	4	12	10	1.5	2	15.3	12.75
NF043	1	2	6.8	13.7	5	8	16	10	2.2	3	15.6	13.42
NF044	1	2	5.1	10.3	5	6	12	10	0.7	1	12.45	18.1
NF045	1	2	5.1	9.4	4	5	11	10	1.5	2	14.6	3.01
NF047	1	2	5.1	7.7	5	3	9	10	0.7	1	20	15.57
NF051	1	2	4.2	8.5	4	5	10	10	0.7	1	11.2	13.82
NF052	1	2	6.0	12.8	6	8	15	10	0.7	1	11.15	12
NF053	1	2	4.2	9.4	5	6	11	10	0.0	0	12.25	11.26
NF054	1	2	6.0	8.5	5	3	10	10	1.5	2	9.4	17.65
NF055	1	2	6.0	11.1	5	6	13	10	1.5	2	9.25	18.07
NF056	1	2	6.0	9.4	6	4	11	10	0.7	1	7.85	19.74
NF057	1	2	5.1	9.4	5	5	11	10	0.7	1	9.7	15.2
NF058	1	2	4.2	8.5	5	5	10	10	0.0	0	8.9	14.38
NF059	1	2	6.0	13.7	5	9	16	10	1.5	2	8.8	13.43
NF060	1	2	6.0	9.4	6	4	11	10	0.7	1	8.85	14.09

Ind	Site	plot	lls	age	llf	dlf	tlf	lde	nslf/year	nslf	x value	y value
NF063	1	2	3.4	11.1	3	9	13	10	0.7	1	14.73	1.25
NF064	1	2	6.0	12.8	6	8	15	10	0.7	1	13.53	3.96
NF065	1	2	5.1	9.4	4	5	11	10	1.5	2	13.57	4.5
NF066	1	2	5.1	10.3	5	6	12	10	0.7	1	15.57	4.27
NF067	1	2	7.7	12.0	6	5	14	10	2.2	3	15.17	4.98
NF068	1	2	6.8	10.3	6	4	12	10	1.5	2	14.17	6.53
NF069	1	2	6.0	10.3	6	5	12	10	0.7	1	14.27	6.88
NF071	1	2	6.0	10.3	5	5	12	10	1.5	2	13.57	7.13
NF072	1	2	5.1	9.4	4	4	11	10	1.5	2	12.1	8.97
NF074	1	2	5.1	8.5	5	4	10	10	0.7	1	12.25	10.61
NF075	1	2	4.2	10.3	4	7	12	10	0.7	1	9.5	9.73
NF076	1	2	7.7	1.2	5	6	15	10	3.0	4	14.41	11.22
NF081	1	2	5.1	12.8	4	6	12	10	1.5	2	9.8	0.73
NF082	1	2	4.2	8.5	3	5	10	10	1.5	2	6.9	4.78
NF084	1	2	3.4	6.8	4	4	8	10	0.0	0	4.3	7.63
NF086	1	2	4.2	8.5	4	5	10	10	0.7	1	1.1	2.2
NF088	1	2	5.1	10.3	4	6	12	10	1.5	2	3.6	14.35
NF089	1	2	7.7	11.1	9	4	13	10	0.0	0	5.7	16.45
NF090	1	2	6.8	9.4	6	2	11	10	2.2	3	1.1	17.2
NF091	1	2	5.1	9.4	5	5	11	10	0.7	1	11.1	19.9
NF092	1	2	5.1	8.5	5	4	10	10	0.7	1	11.9	19.6
NF003	1	3	6.0	11.1	4	6	13	10	2.3	3	1.75	3.75
NF004	1	3	6.0	8.5	6	3	10	10	0.7	1	3.4	2.97
NF006	1	3	6.8	8.5	7	2	10	10	0.7	1	5.88	2.48
NF010	1	3	6.0	13.7	5	9	16	10	1.5	2	5.87	2.1
NF011	1	3	3.4	7.7	4	5	9	10	0.0	0	6.5	0.27
NF013	1	3	5.1	9.4	5	5	11	10	0.7	1	9.9	2.38
NF014	1	3	4.2	9.4	4	6	11	10	0.7	1	10.08	2.2
NF019	1	3	6.0	11.1	5	6	13	10	1.5	2	10.6	6.6
NF023	1	3	6.0	13.7	5	9	16	10	1.5	2	2.25	6.5
NF024	1	3	4.2	12.0	5	9	14	10	0.0	0	2.3	7.3
NF025	1	3	3.4	11.1	4	9	13	10	0.0	0	1.83	7.5
NF026	1	3	3.4	111.0	3	9	13	10	0.7	1	0.35	7.9
NF027	1	3	4.2	8.5	4	5	10	10	0.7	1	0.68	8.8
NF028	1	3	5.1	10.3	6	6	12	10	0.0	0	0.73	9.1
NF029	1	3	3.4	12.0	4	10	14	10	0.0	0	-	-
NF031	1	3	6.8	13.7	5	8	16	10	2.3	3	4.82	9.9
NF032	1	3	5.1	8.5	5	4	10	10	0.7	1	5.81	10
NF033	1	3	5.1	9.4	4	5	11	10	1.5	2	6.44	9.7
NF036	1	3	3.4	8.5	4	6	10	10	0.0	0	7.39	8.6
NF037	1	3	5.1	11.1	6	7	13	10	0.0	0	8.22	8.1
NF041	1	3	4.2	11.1	4	8	13	10	0.7	1	9.94	9.25
NF042	1	3	8.5	10.3	9	3	12	10	0.7	1	12.03	10.85
NF043	1	3	8.5	11.1	10	3	13	10	0.0	0	11.64	10.35
NF047	1	3	4.2	12.0	5	9	14	10	0.0	0	17.25	20.1
NF049	1	3	4.2	9.4	5	6	11	10	0.0	0	17.5	11.65
NF052	1	3	4.2	10.2	5	7	12	10	0.0	0	17.4	14.3
NF053	1	3	4.2	10.3	5	7	12	10	0.0	0	18.35	17.6
NF054	1	3	5.1	10.3	5	6	12	10	0.7	1	17.55	14.05
NF055	1	3	4.2	12.0	5	9	14	10	0.0	0	16.65	15.2
NF056	1	3	4.2	10.3	5	7	12	10	0.0	0	17.15	17.7
NF057	1	3	6.0	10.3	4	5	12	10	2.3	3	11.3	12.4
NF058	1	3	3.4	7.7	3	5	9	10	0.7	1	10.5	12.35
NF059	1	3	2.5	9.4	3	8	11	10	0.0	0	8.53	12.25
NF060	1	3	5.1	8.5	5	4	10	10	0.7	1	10.4	12.51
NF061	1	3	5.1	12.0	4	8	14	10	1.5	2	17.85	11.25
NF062	1	3	4.2	8.5	3	5	10	10	1.5	2	4.81	10.6
NF063	1	3	6.0	9.4	5	4	11	10	1.5	2	5.9	12.85

NF064	1	3	4.2	12.0	5	9	14	10	0.0	0	0.15	16.2
NF065	1	3	6.0	9.4	5	4	11	10	1.5	2	1.05	16.3
NF067	1	3	4.2	9.4	5	6	11	10	0.0	0	2.17	17.4
NF068	1	3	4.2	12.0	4	9	14	10	0.7	1	2.44	17.1
NF069	1	3	5.1	9.4	5	5	11	10	0.7	1	3	17.3
NF070	1	3	5.1	12.0	5	8	14	10	0.7	1	3.3	17.9
NF071	1	3	5.1	8.5	6	4	10	10	0.0	0	4.08	16.45
NF072	1	3	6.0	12.0	5	7	14	10	1.5	2	5.1	19
NF073	1	3	4.2	7.7	5	4	9	10	0.0	0	5.95	16.2
NF074	1	3	6.0	12.0	4	7	14	10	2.3	3	7.2	15.65
NF075	1	3	7.7	12.8	6	6	15	10	2.3	3	7.25	16
NF076	1	3	6.0	11.1	4	6	13	10	2.3	3	9.4	13.65
NF077	1	3	4.2	12.0	5	9	14	10	0.0	0	8.55	17.9
NF078	1	3	4.2	10.3	3	7	12	10	1.5	2	10.45	16
NF080	1	3	5.1	10.3	5	6	12	10	0.7	1	11.25	17.79
NF081	1	3	5.1	10.3	5	4	10	10	0.7	1	8.17	19.4
NF082	1	3	7.7	12.8	7	6	15	10	1.5	2	9.9	20
NF083	1	3	5.1	11.1	5	7	13	10	0.7	1	11.03	19.25
NF084	1	3	3.4	8.5	4	6	10	10	0.0	0	11.75	17.8
NF085	1	3	3.4	9.4	4	7	11	10	0.0	0	12.75	18.7
NF086	1	3	4.2	7.7	5	4	9	10	0.0	0	13.45	18.85
NF087	1	3	4.2	7.7	4	4	9	10	0.7	1	15.22	17.15
NF088	1	3	5.1	9.4	4	5	11	10	1.5	2	16.55	17.1
NF089	1	3	3.4	8.5	4	6	10	10	0.0	0	17.85	17.7
NF091	1	3	4.2	12.8	4	10	15	10	0.7	1	13.85	18.35
NF092	1	3	2.5	7.7	3	6	9	10	0.0	0	15.45	18.35
NF093	1	3	4.2	11.1	5	8	13	10	0.0	0	18.8	18.6

F. The measurement of Plastochrone (months) and total number of leaves in 40 adults at site 1.

Site	plot	tlf	lde
1	1	13.0	10.8
1	1	15.0	10.8
1	1	13.0	10.3
1	1	15.0	12.0
1	1	11.0	11.6
1	1	10.0	11.0
1	1	14.0	10.0
1	1	10.0	10.2
1	1	11.0	10.1
1	1	15.0	9.8
1	2	14.0	9.8
1	2	12.0	9.8
1	2	10.0	12.4
1	2	9.0	11.2
1	2	13.0	11.2
1	2	10.0	11.9
1	2	10.0	11.2
1	2	11.0	9.3
1	2	14.0	9.2
1	2	12.0	9.8
1	2	11.0	11.2
1	2	12.0	9.8

Site	plot	tlf	lde
1	2	11.0	11.3
1	2	10.0	10.8
1	2	16.0	10.3
1	2	15.0	9.0
1	2	12.0	11.2
1	2	12.0	9.7
1	2	11.0	9.2
1	3	13.0	10.8
1	3	16.0	9.0
1	3	12.0	9.0
1	3	9.0	10.9
1	3	11.0	9.0
1	3	11.0	10.3
1	3	14.0	9.7
1	3	13.0	10.7
1	3	12.0	9.7
1	3	10.0	9.3
1	3	11.0	12.0
1	3	15.0	11.0

G. The measurement of variables and age (years) in all mature trees at site 1 during 16 months.

Lnd	Site	plot	lls	age	llf	dlf	tlf	lde	nslf/year	nslf	x value	y value
NF010	1	1	5.2	13.0	6	9	15	10	0.0	0	3.15	12.8
NF013	1	1	7.8	16.4	6	10	19	10	2.2	3	8	8
NF014	1	1	6.0	17.3	6	13	20	10	0.7	1	9.43	11.75
NF015	1	1	5.2	16.4	5	13	19	10	0.7	1	7.7	4
NF016	1	1	4.3	13.0	5	10	15	10	0.0	0	6	2.7
NF017	1	1	6.9	13.8	4	11	16	10	0.7	1	5.4	3.15
NF023	1	1	6.9	14.7	5	12	17	10	2.2	3	8.55	1.95
NF027	1	1	6.0	14.7	5	12	17	10	1.5	2	12.7	1.45
NF028	1	1	5.2	15.6	6	12	18	10	0.0	0	13.35	1.3
NF033	1	1	6.0	13.8	5	11	16	10	1.5	2	16.61	9.15
NF036	1	1	6.9	14.7	5	12	17	10	2.2	3	16.01	11.15
NF003	1	2	8.6	18.2	8	11	21	10	1.5	2	1.24	16.47
NF025	1	2	4.3	13.8	4	11	16	10	0.7	1	8.3	4.9
NF029	1	2	5.2	15.6	6	12	18	10	0.0	0	9	6.41
NF034	1	2	6.0	13.8	6	9	16	10	0.7	1	16.95	5.17
NF078	1	2	4.3	16.4	4	14	19	10	0.7	1	11.73	4.16
NF079	1	2	4.3	13.8	5	11	16	10	0.0	0	10.8	3.51
NF080	1	2	6.0	16.4	4	12	19	10	2.2	3	9.53	5.21
NF085	1	2	3.4	14.6	4	14	19	10	0.0	0	3.9	2.85
NF001	1	3	4.3	13.8	5	11	16	10	0.0	0	0.35	3.93
NF005	1	3	5.2	16.4	4	13	19	10	1.5	2	3.8	3.58
NF007	1	3	4.3	13.8	5	11	16	10	0.0	0	5.32	2.2
NF008	1	3	5.2	13.8	6	10	16	10	0.0	0	4.95	0.58
NF017	1	3	9.5	18.2	11	10	21	10	0.0	0	14.05	0.47
NF018	1	3	3.4	14.7	4	13	17	10	0.0	0	10.55	6.25
NF020	1	3	4.3	18.7	16	4	21	10	0.7	1	7.51	4.17
NF021	1	3	4.3	14.7	5	12	17	10	0.0	0	6.49	6.46
NF022	1	3	7.8	19.9	5	14	23	10	3.0	4	6.44	7.35
NF030	1	3	5.2	13.0	6	9	15	10	0.0	0	4.27	8.9
NF034	1	3	10.4	18.7	8	9	21	10	3.0	4	6.79	9.65
NF038	1	3	5.2	18.7	5	15	21	10	0.7	1	8.05	6.4

NF039	1	3	4.3	13.8	5	11	16	10	0.0	0	9.24	8.15
NF040	1	3	8.6	15.6	8	8	18	10	1.5	2	10.09	8.35
NF045	1	3	7.8	17.3	5	11	20	10	3.0	4	14.45	12.45
NF046	1	3	4.3	13.8	5	11	16	10	0.0	0	14.55	13.41
NF048	1	3	6.0	14.7	5	10	17	10	1.5	2	16.95	13.15
NF050	1	3	10.4	19.9	8	11	23	10	3.0	4	18.6	11.05
NF051	1	3	9.5	13.0	11	4	15	10	0.0	0	19.8	12.2
NF079	1	3	5.2	14.7	5	11	17	10	0.7	1	11.75	16.6

H. The measurement of Plastochrone (months) and total number of leaves in 11 mature trees at site 1.

Site	plot	tlf	lde
1	1	19.0	9.6
1	1	17.0	11.0
1	1	17.0	11.0
1	1	16.0	11.2
1	2	16.0	11.0
1	2	19.0	11.4
1	3	19.0	11.7
1	3	23.0	8.0
1	3	21.0	10.7
1	3	20.0	8.7
1	3	17.0	11.0
1	3	23.0	10.5

Appendix 1.2

A. The measurement of variables and age (years) in all juveniles at site 2 during 14 months.

Ind	Site	plot	lls	age	llf	dlf	tlf	lde	nslf/year	nslf	x value	y value
NF009	2	1	3.6	5.4	4	3	9	7.2	1.7	2	4.79	2.98
NF011	2	1	4.8	6.0	5	2	10	7.2	2.5	3	7.05	6.3
NF019	2	1	3.0	5.4	3	4	9	7.2	1.7	2	5.65	5.2
NF028	2	1	3.6	4.2	4	1	7	7.2	1.7	2	2.81	3.7
NF006	2	2	1.0	4.2	1	6	8	6.4	0.8	1	8.1	6.67
NF028	2	2	3.2	4.2	4	2	8	6.4	1.7	2	2.37	5.35
NF041	2	2	2.8	2.6	3	1	5	6.4	0.8	1	0.95	1.55
NF006	2	3	3.5	7.1	2	5	10	8.6	2.5	3	2.45	8.3
NF010	2	3	2.8	2.8	4	0	4	8.6	0.0	0	2.8	5.2
NF011	2	3	3.5	6.4	4	4	9	8.6	0.8	1	3	4.75
NF013	2	3	2.8	5.0	4	3	7	8.6	0.0	0	3.1	4.85
NF015	2	3	2.8	5.0	4	3	7	8.6	0.0	0	2.9	4.2
NF017	2	3	2.1	5.7	2	5	8	8.6	0.8	1	2.74	1.8
NF021	2	3	2.8	5.7	3	4	8	8.6	0.8	1	4.3	1.45
NF022	2	3	2.8	5.7	2	4	8	8.6	1.7	2	4.8	2.75
NF023	2	3	2.8	5.0	3	3	7	8.6	0.8	1	5.4	0.92
NF035	2	3	1.4	3.5	2	3	5	8.6	0.0	0	9.5	3.8
NF037	2	3	2.1	4.3	3	3	6	8.6	0.0	0	9.7	4.9
NF038	2	3	2.1	4.3	2	3	6	8.6	0.8	1	9.5	4.2
NF042	2	3	2.8	4.3	2	2	6	8.6	1.7	2	9.9	5.4
NF054	2	3	2.8	3.5	3	1	5	8.6	0.8	1	7.25	9.65
NF055	2	3	2.8	4.3	2	2	6	8.6	1.7	2	7.45	9.35
NF058	2	3	2.1	3.5	3	2	5	8.6	0.0	0	6.7	9.6

B. The measurement of Plastochrone (months) and total number of leaves in 13 juveniles at site 2.

Site	plot	lde	tlf
2	1	7.8	9.0
2	1	7.2	10.0
2	1	6.2	9.0
2	1	7.6	7.0
2	2	6.2	8.0
2	2	7.2	8.0
2	2	6.0	5.0
2	3	8.3	10.0
2	3	8.3	8.0
2	3	10.3	8.0
2	3	8.2	7.0
2	3	7.6	5.0
2	3	9.1	6.0

C. The measurement of variables and age (years) in all adults at site 2 (lfl= dlf + llf + new leaves) during 14 months.

Ind	Site	plot	lls	age	llf	dlf	tlf	lde	nslf/ year	nslf	x value	y value
NF001	2	1	4.9	11.5	3	8	14	9.9	2.5	3	9.05	9.85
NF004	2	1	6.6	9.9	8	3	12	9.9	0.0	1	8.35	4.20
NF005	2	1	8.2	11.5	8	4	14	9.9	1.7	2	7.85	3.62
NF006	2	1	7.4	13.2	7	7	16	9.9	1.7	2	9.25	2.95
NF010	2	1	6.6	8.2	6	2	10	9.9	1.7	2	6.70	5.70
NF012	2	1	4.9	13.2	4	10	16	9.9	1.7	2	7.00	6.60
NF013	2	1	4.1	12.3	4	8	15	9.9	0.8	1	6.65	7.80
NF015	2	1	4.1	12.3	4	10	15	9.9	0.8	1	7.05	9.50
NF016	2	1	4.1	9.9	4	7	12	9.9	0.8	1	5.35	9.55
NF017	2	1	4.1	10.7	4	8	13	9.9	0.8	1	4.58	9.80
NF020	2	1	5.7	12.3	5	8	15	9.9	1.7	2	5.85	-
NF021	2	1	5.7	10.7	4	6	13	9.9	2.5	3	3.79	3.15
NF022	2	1	5.7	13.2	5	9	16	9.9	1.7	2	3.44	2.45
NF023	2	1	6.6	13.2	6	8	16	9.9	1.7	2	2.24	1.55
NF024	2	1	4.9	9.9	5	6	12	9.9	0.8	1	1.74	0.10
NF025	2	1	4.9	9.9	6	6	12	9.9	0.0	0	0.35	0.05
NF029	2	1	4.9	12.3	5	9	15	9.9	0.8	1	2.48	4.95
NF032	2	1	4.9	9.9	5	6	12	9.9	0.8	1	1.80	6.85
NF034	2	1	5.7	13.2	5	9	16	9.9	1.7	2	0.95	7.75
NF035	2	1	3.3	6.6	4	4	8	9.9	0.0	0	0.15	8.40
NF001	2	2	5.0	10.9	4	7	13	10.1	1.7	2	9.65	9.25
NF002	2	2	5.8	10.9	4	6	13	10.1	2.5	3	8.20	7.55
NF003	2	2	6.7	12.6	5	7	15	10.1	2.5	3	7.15	7.75
NF004	2	2	5.8	11.7	5	7	14	10.1	1.7	2	5.82	6.35
NF005	2	2	5.8	9.2	5	4	11	10.1	1.7	2	9.00	5.35
NF007	2	2	3.4	6.7	4	4	8	10.1	0.0	0	7.40	5.90
NF010	2	2	6.7	12.6	6	7	15	10.1	1.7	2	8.25	2.75
NF011	2	2	5.0	10.1	5	6	12	10.1	0.8	1	8.10	2.05
NF012	2	2	6.7	13.4	6	8	16	10.1	1.7	2	9.25	1.05
NF013	2	2	7.5	12.6	7	6	15	10.1	1.7	2	7.85	1.28
NF014	2	2	5.8	11.7	6	7	14	10.1	0.8	1	1.90	1.60
NF015	2	2	5.8	12.6	5	8	15	10.1	1.7	2	7.65	0.30
NF016	2	2	5.0	10.9	4	7	13	10.1	1.7	2	5.58	2.20
NF017	2	2	10.1	12.6	10	3	15	10.1	1.7	2	4.88	3.65

Ind	Site	plot	lls	age	llf	dlf	tlf	lde	nslf/ year	nslf	x value	y value
NF018	2	2	5.8	10.9	4	6	13	10.1	2.5	3	5.00	4.20
NF019	2	2	4.2	10.9	4	8	13	10.1	0.8	1	5.20	4.48
NF020	2	2	6.7	10.1	6	4	12	10.1	1.7	2	5.39	5.30
NF021	2	2	4.2	7.5	4	4	9	10.1	0.8	1	5.79	5.20
NF022	2	2	7.5	12.6	6	6	15	10.1	2.5	3	3.39	7.60
NF023	2	2	5.8	10.9	5	6	13	10.1	1.7	2	2.96	7.70
NF025	2	2	6.7	14.3	7	9	17	10.1	0.8	1	1.60	8.40
NF026	2	2	4.2	7.5	4	4	9	10.1	0.8	1	2.19	5.95
NF027	2	2	5.0	9.2	5	5	11	10.1	0.8	1	1.55	6.10
NF029	2	2	5.0	10.9	4	7	13	10.1	1.7	2	2.70	5.15
NF032	2	2	5.8	11.7	5	7	14	10.1	1.7	2	0.15	5.05
NF033	2	2	5.0	9.2	5	5	11	10.1	0.8	1	2.80	1.95
NF034	2	2	5.0	10.9	4	7	13	10.1	1.7	2	3.33	1.48
NF035	2	2	5.0	10.1	4	6	12	10.1	1.7	2	2.55	0.80
NF036	2	2	5.8	11.7	5	7	14	10.1	1.7	2	3.35	0.45
NF037	2	2	5.0	10.1	4	6	12	10.1	1.7	2	1.18	1.93
NF038	2	2	4.2	9.2	4	6	11	10.1	0.8	1	1.50	1.87
NF040	2	2	5.0	10.9	5	7	13	10.1	0.8	1	1.75	0.20
NF042	2	2	5.8	11.7	5	7	14	10.1	1.7	2	0.14	1.08
NF043	2	2	6.7	11.7	5	6	14	10.1	2.5	3	0.08	0.93
NF001	2	3	3.7	9.4	3	6	10	11.3	0.8	1	0.01	9.40
NF003	2	3	4.7	11.3	3	7	12	11.3	1.7	2	2.50	7.10
NF004	2	3	3.7	10.3	3	7	11	11.3	0.8	1	1.70	0.50
NF005	2	3	3.7	9.4	4	6	10	11.3	0.0	0	1.95	7.25
NF007	2	3	3.7	10.3	4	7	11	11.3	0.0	0	2.70	8.20
NF008	2	3	3.7	11.3	4	8	12	11.3	0.0	0	1.22	5.40
NF009	2	3	6.5	16.9	5	11	18	11.3	1.7	2	2.40	6.40
NF012	2	3	4.7	13.1	4	9	14	11.3	0.8	1	1.90	4.80
NF016	2	3	4.7	9.4	4	5	10	11.3	0.8	1	3.75	4.70
NF018	2	3	4.7	9.4	3	5	10	11.3	1.7	2	2.85	3.80
NF019	2	3	2.8	8.4	3	6	9	11.3	0.0	0	4.00	4.55
NF024	2	3	3.7	14.1	3	11	15	11.3	0.8	1	6.40	0.72
NF027	2	3	3.7	9.4	3	6	10	11.3	0.8	1	6.83	0.30
NF028	2	3	4.7	13.1	3	9	14	11.3	1.7	2	8.17	1.50
NF029	2	3	4.7	12.2	4	8	13	11.3	0.8	1	8.42	2.10
NF030	2	3	5.6	11.3	3	6	12	11.3	2.5	3	7.58	0.90
NF031	2	3	4.7	12.2	3	8	13	11.3	1.7	2	9.33	2.35
NF032	2	3	5.6	16.0	3	11	17	11.3	2.5	3	8.50	0.50
NF033	2	3	3.7	9.4	3	6	10	11.3	0.8	1	8.84	1.30
NF034	2	3	4.7	12.2	3	8	13	11.3	1.7	2	9.55	2.40
NF039	2	3	2.8	12.2	3	10	13	11.3	0.0	0	7.25	4.40
NF040	2	3	4.7	12.2	4	8	13	11.3	0.8	1	8.30	5.10
NF041	2	3	4.7	10.3	4	6	11	11.3	0.8	1	8.30	6.10
NF043	2	3	2.8	8.4	3	6	9	11.3	0.0	0	9.80	6.20
NF046	2	3	4.7	8.4	4	4	9	11.3	0.8	1	9.00	6.80
NF047	2	3	4.7	13.1	3	9	14	11.3	1.7	2	9.80	8.50
NF049	2	3	4.7	10.3	5	6	11	11.3	0.0	0	7.80	7.80
NF050	2	3	4.7	10.3	4	7	11	11.3	0.8	1	8.90	9.40
NF051	2	3	3.7	12.2	3	10	13	11.3	0.8	1	8.20	8.85
NF053	2	3	4.7	7.5	3	5	8	11.3	1.7	2	7.40	9.50
NF056	2	3	3.7	7.5	3	5	8	11.3	0.8	1	7.75	8.95
NF060	2	3	3.7	13.1	4	10	14	11.3	0.0	0	5.40	9.80
NF062	2	3	2.8	8.4	3	6	9	11.3	0.0	0	7.30	7.00
NF063	2	3	4.7	14.1	4	9	15	11.3	0.8	1	4.70	7.55
NF064	2	3	5.6	14.1	5	9	15	11.3	0.8	1	5.35	8.85
NF065	2	3	4.7	10.3	4	6	11	11.3	0.8	1	3.85	8.60

D. The measurement of Plastochrone (months) and total number of leaves in 34 adults at site 2.

<u>Site</u>	<u>plot</u>	<u>tlf</u>	<u>dlf</u>
2	1	14.0	10.1
2	1	16.0	10.6
2	1	10.0	8.0
2	1	10.0	8.0
2	1	15.0	10.5
2	1	12.0	10.7
2	1	15.0	11.2
2	1	16.0	11.0
2	1	12.0	9.0
2	2	13.0	9.2
2	2	13.0	10.3
2	2	15.0	9.2
2	2	14.0	11.0
2	2	11.0	10.2
2	2	15.0	11.0
2	2	12.0	11.0
2	2	15.0	8.2
2	2	15.0	9.1
2	2	13.0	11.0
2	2	13.0	11.0
2	2	14.0	10.1
2	2	11.0	10.1
2	2	12.0	9.2
2	2	12.0	11.0
2	2	14.0	10.0
2	3	12.0	10.7
2	3	10.0	12.0
2	3	12.0	11.0
2	3	13.0	12.0
2	3	17.0	11.0
2	3	13.0	11.0
2	3	8.0	11.0
2	3	15.0	11.0
2	3	11.0	12.0

E. The measurement of variables and age (years) in all matures at site 2 during 14 months.

Ind	Site	plot	lls	age	llf	dlf	tlf	lde	nsf	nsf/ year	x value	y value
NF002	2	1	4.8	13.6	4	11	17	9.6	2	1.7	9	9.30
NF003	2	1	4.8	14.4	4	12	18	9.6	2	1.7	9.8	9.30
NF008	2	1	4.8	12.8	5	10	16	9.6	1	0.8	9.22	0.80
NF014	2	1	4.0	16.8	4	16	21	9.6	1	0.8	5.85	8.20
NF018	2	1	3.2	16.8	3	17	21	9.6	1	0.8	5.82	6.70
NF031	2	1	4.0	12.8	4	11	16	9.6	1	0.8	2.73	6.80
NF033	2	1	4.0	12.8	4	11	16	9.6	1	0.8	0.28	6.85
NF036	2	1	7.2	17.6	6	13	22	9.6	3	2.5	1.15	9.70
NF037	2	1	5.6	12.0	5	10	15	9.6	2	1.7	3.03	9.50
NF008	2	2	5.5	14.8	5	10	16	11.1	1	0.8	9.95	4.15
NF009	2	2	5.5	14.8	5	10	16	11.1	1	0.8	9.6	3.05
NF031	2	2	9.2	16.6	8	8	18	11.1	2	1.7	0.75	6.25
NF039	2	2	6.4	15.7	6	10	17	11.1	1	0.8	1.4	1.41
NF014	2	3	4.5	13.7	5	10	15	11.1	0	0.0	1.65	2.50
NF020	2	3	5.5	15.5	5	11	17	11.0	1	0.8	3.32	1.55
NF025	2	3	4.5	15.5	4	12	17	11.0	1	0.8	4.66	3.45
NF026	2	3	5.5	17.4	4	13	19	11.0	2	1.7	5.18	3.35
NF036	2	3	4.5	15.5	4	12	17	11.0	1	0.8	5.76	3.90
NF057	2	3	4.5	15.5	4	12	17	11.0	1	0.8	7.1	8.85

F. The measurement of Plastochrone (months) and total number of leaves in 12 matures at site 2.

Site	plot	tlf	lde
2	1	17.0	9.0
2	1	18.0	9.0
2	1	16.0	9.6
2	1	16.0	9.7
2	1	16.0	9.7
2	1	22.0	9.7
2	1	15.0	11.0
2	2	18.0	11.0
2	2	17.0	11.3
2	3	17.0	11.1
2	3	17.0	12.0
2	3	17.0	10.0

Appendix 2

A. The mean spear elongation (cm) per month in 4 Juveniles, 5 matures, and 30 Adults
At site 1.

<u>Juveniles</u>		
<u>Site</u>	<u>plot</u>	<u>Length</u>
1	2	42.0
1	2	72.1
1	3	49.5
1	3	97.8

<u>matures</u>		
<u>Site</u>	<u>plot</u>	<u>Length</u>
1	1	82.50
1	1	92.90
1	3	98.30
1	3	92.50
1	3	106.85

<u>Adults</u>		
<u>Site</u>	<u>plot</u>	<u>length</u>
1	1	69.3
1	1	49.7
1	1	83.0
1	1	98.3
1	1	64.9
1	1	85.0
1	1	99.7
1	1	92.9
1	1	98.9
1	1	69.7
1	2	80.1
1	2	63.4
1	2	73.3
1	2	89.8
1	2	75.1
1	2	77.6
1	2	61.3
1	2	77.8
1	2	83.3
1	2	82.4
1	2	96.1
1	3	71.8
1	3	79.3
1	3	73.8
1	3	90.5
1	3	77.8
1	3	74.6
1	3	90.2
1	3	70.4
1	3	103

B. The mean spear elongation (cm) per month in 4 Juveniles, 31 Adults, and 11 Matures. at site 2.

Juvenile

<u>Site</u>	<u>plot</u>	<u>length</u>
2	1	74.5
2	1	37.9
2	3	36.7
<u>2</u>	<u>3</u>	<u>33.7</u>

Adults

<u>Site</u>	<u>plot</u>	<u>length</u>
2	1	104.8
2	1	99.6
2	1	92.4
2	1	72.2
2	1	71.1
2	1	80.3
2	1	95.1
2	2	76.1
2	2	82.5
2	2	82.8
2	2	74.4
2	2	83.8
2	2	79.8
2	2	91.3
2	2	89.6
2	2	117.7
2	2	81.5
2	2	85.3
2	2	80.7
2	2	92.4
2	2	82.8
2	2	56.8
2	3	64.6
2	3	67.3
2	3	53.9
2	3	83.4
2	3	73.7
2	3	87.1
2	3	55.7
2	3	97.7
<u>2</u>	<u>3</u>	<u>8</u>

Matures

<u>site</u>	<u>plot</u>	<u>length</u>
2	1	84.4
2	1	93.3
2	1	107.7
2	1	110.2
2	1	95.2
2	1	96.5
2	2	80.7
2	2	77.5
2	3	75.1
2	3	59.3
<u>2</u>	<u>3</u>	<u>102.8</u>

Appendix 3

Appendix 3.1

The measurement of moisture content (mc) for soil samples of site 1(8 months, each month with 3 samples for each plot and soil samples of site 2 (7 months, each month with 3 samples for each plot).

<u>site</u>	<u>plot</u>	<u>mc</u>	<u>site</u>	<u>plot</u>	<u>mc</u>
1	1	40.69	2	1	29.57
1	1	44.90	2	1	32.06
1	1	38.79	2	1	29.14
1	1	46.81	2	1	30.98
1	1	29.18	2	1	30.18
1	1	42.72	2	1	32.99
1	1	38.91	2	1	30.73
1	1	34.93	2	1	28.25
1	1	43.88	2	1	29.02
1	1	37.37	2	1	26.02
1	1	40.47	2	1	26.57
1	1	39.16	2	1	23.01
1	1	31.41	2	1	26.95
1	1	40.34	2	1	28.84
1	1	43.48	2	1	27.71
1	1	41.02	2	1	34.48
1	1	41.15	2	1	29.44
1	1	44.06	2	1	28.75
1	1	42.95	2	1	25.12
1	1	32.37	2	1	30.25
1	1	38.73	2	1	27.78
1	1	42.77	2	2	29.66
1	1	42.37	2	2	32.52
1	1	39.08	2	2	33.96
1	2	34.13	2	2	29.77
1	2	45.83	2	2	26.73
1	2	42.32	2	2	35.10
1	2	37.68	2	2	25.95
1	2	31.68	2	2	31.15
1	2	31.15	2	2	30.61
1	2	37.49	2	2	26.01
1	2	32.90	2	2	24.70
1	2	38.66	2	2	29.95
1	2	36.40	2	2	28.75
1	2	31.36	2	2	30.91
1	2	32.90	2	2	31.41
1	2	34.92	2	2	25.76
1	2	38.22	2	2	31.18
1	2	33.50	2	2	32.79
1	2	37.60	2	2	28.33
1	2	37.19	2	2	31.09
1	2	38.48	2	2	30.03
1	2	43.37	2	3	32.08
1	2	38.68	2	3	28.18
1	2	36.29	2	3	33.34
1	2	35.19	2	3	29.13
1	2	38.87	2	3	30.33
1	2	34.58	2	3	28.11
1	3	43.23	2	3	31.51

site	plot	mc	site	plot	mc
1	3	40.12	2	3	26.82
1	3	40.89	2	3	32.35
1	3	43.44	2	3	29.95
1	3	43.72	2	3	25.12
1	3	37.52	2	3	25.97
1	3	38.66	2	3	29.27
1	3	39.66	2	3	26.87
1	3	38.48	2	3	26.42
1	3	36.44	2	3	25.89
1	3	45.79	2	3	25.35
1	3	43.80	2	3	27.11
1	3	38.92	2	3	33.82
1	3	46.19	2	3	26.96
1	3	45.31	2	3	28.15
1	3	35.60			
1	3	22.90			
1	3	37.50			
1	3	40.62			
1	3	37.45			
1	3	42.20			
1	3	38.01			
1	3	38.67			
1	3	37.42			

Appendix 3.2

The measurements of pH, temperature (c°) soil samples at both sites for 9 months.

Site	plot	pH	temperature
1	1	6.26	29.00
1	1	6.46	29.10
1	1	6.29	29.50
1	1	6.07	29.20
1	1	6.06	29.50
1	1	6.11	29.30
1	1	5.66	30.70
1	1	6.51	30.60
1	1	6.34	30.20
1	2	6.80	28.80
1	2	6.67	29.00
1	2	6.67	29.90
1	2	6.30	29.30
1	2	6.34	29.30
1	2	6.59	29.00
1	2	6.83	29.60
1	2	5.99	29.90
1	2	5.86	29.90
1	3	6.59	28.90
1	3	6.80	29.50
1	3	6.97	29.60
1	3	6.63	28.70
1	3	6.68	29.50
1	3	6.47	29.00
1	3	6.11	29.90
1	3	6.63	30.00
1	3	6.34	29.90

<u>Site</u>	<u>plot</u>	<u>pH</u>	<u>temperature</u>
2	1	6.21	31.50
2	1	6.59	31.50
2	1	6.38	31.50
2	1	6.84	28.70
2	1	7.30	28.00
2	1	7.05	28.90
2	1	6.84	29.70
2	1	7.30	29.70
2	1	7.05	29.40
2	2	6.01	31.50
2	2	6.05	31.00
2	2	6.87	31.30
2	2	7.09	28.70
2	2	6.80	28.30
2	2	7.17	27.70
2	2	5.62	29.60
2	2	6.45	29.60
2	2	5.98	29.70
2	3	6.67	31.70
2	3	6.80	31.90
2	3	5.54	31.60
2	3	6.80	28.50
2	3	7.13	28.90
2	3	6.17	28.70
2	3	5.56	29.30
2	3	5.65	29.00
2	3	5.30	29.00

Appendix 4

Appendix 4.1

A. The measurement of salinity (ppt), pH, temperature(c°), DO (mg/L), EC (ms/cm); TDS (ppt) of water samples at site 1 during 7 months (each months with 3 samples for each plot).

Site	plot	salinity	pH	temp.	DO	EC	TDS
1	1	26.7	6.5	27.1	9.6	41.6	25.6
1	1	25.7	6.7	26.6	9.3	40.2	24.7
1	1	26.8	6.6	26.5	9.3	41.7	25.7
1	1	26.0	6.4	27.1	9.4	40.6	25.0
1	1	26.1	6.7	27.4	9.2	40.8	25.1
1	1	25.8	6.8	27.3	9.4	40.9	24.8
1	1	21.5	6.7	27.9	6.5	30.0	21.5
1	1	21.3	6.5	27.8	6.9	32.8	21.4
1	1	21.1	6.3	29.1	7.7	33.2	21.6
1	1	22.0	6.7	26.8	8.6	39.0	24.5
1	1	22.5	6.5	26.6	8.4	40.7	24.9
1	1	23.5	6.4	26.7	8.1	41.1	25.6
1	1	21.0	6.3	27.8	5.3	31.3	19.0
1	1	21.4	6.5	27.9	5.5	33.7	20.7
1	1	21.3	6.4	27.7	5.4	33.8	20.6
1	1	21.8	6.0	26.6	10.3	34.7	21.0
1	1	22.4	6.2	26.9	9.5	35.5	21.5
1	1	22.8	6.5	26.7	10.2	35.0	21.2
1	1	22.4	6.3	27.5	9.3	35.6	21.6
1	1	23.1	6.1	27.8	8.9	36.5	22.2
1	1	23.5	6.4	27.1	9.1	37.2	22.6
1	2	27.3	6.8	26.7	9.4	42.4	26.2
1	2	27.4	6.8	26.1	9.3	42.6	26.4
1	2	26.7	6.8	26.1	9.2	41.5	25.6
1	2	25.6	6.7	27.1	9.5	40.1	24.6
1	2	25.8	6.7	27.2	9.6	40.8	25.2
1	2	26.3	6.7	26.9	10	41.6	25.7
1	2	20.3	6.6	6.6	7.4	32.5	20.7
1	2	20.3	6.1	6.1	7.6	30.3	24.6
1	2	20.1	6.5	6.5	6.9	31.4	19.7
1	2	23.9	6.5	6.5	8.4	41.3	25.8
1	2	26.1	6.1	6.1	8.6	40.8	26.4
1	2	24.3	6.3	6.3	8.1	40.0	26.1
1	2	22.0	6.5	6.5	5.5	32.8	20.1
1	2	20.0	6.1	6.1	6.3	30.0	19.5
1	2	21.7	6.3	6.3	8.5	33.5	21.0
1	2	23.2	5.2	5.2	9.1	36.1	21.9
1	2	22.5	6.5	6.5	9.1	35.7	21.6
1	2	22.2	6.5	6.5	9.5	35.3	21.4
1	2	23.7	6.2	6.2	9.0	37.5	22.8
1	2	23.0	6.4	6.4	9.5	37.8	23.0
1	2	22.8	6.4	6.4	9.2	36.2	22.0

Site	plot	salinity	pH	temp.	DO	EC	TDS
1	3	28.1	6.9	27.2	9.4	43.4	27.0
1	3	27.7	7.0	27.3	9.4	43.0	26.7
1	3	27.8	6.9	27.1	9.2	43.1	26.8
1	3	26.5	6.1	27.3	9.3	41.9	25.7
1	3	25.9	6.6	27.6	9.6	40.4	24.8
1	3	26.0	6.6	27.5	9.6	40.8	25.1
1	3	20.5	5.9	27.5	7.2	25.8	20.4
1	3	20.3	6.3	27.7	6.9	30.0	20.3
1	3	20.2	6.3	27.7	7.0	29.7	20.9
1	3	23.5	6.4	25.8	7.3	33.4	27.3
1	3	25.1	6.4	26.4	7.0	39.4	24.7
1	3	26.0	6.6	26.1	8.8	37.1	28.5
1	3	21.0	6.2	27.9	6.2	31.6	19.2
1	3	21.3	6.1	27.5	6.2	32.0	19.5
1	3	21.3	6.1	27.8	7.1	34.2	20.5
1	3	22.3	6.6	26.9	8.9	35.3	21.6
1	3	21.8	6.5	26.8	9.3	34.7	21.0
1	3	23.5	6.6	26.8	9.0	36.7	22.3
1	3	24.2	6.5	26.9	9.0	38.1	23.2
1	3	24.8	6.4	26.8	9.2	37.9	23.1
1	3	24.2	6.5	26.8	9.1	38.1	23.2

B. The measurement of salinity (ppt), pH, temperature (c°), DO (mg/L), EC (ms/cm), TDS (ppt) of water samples at site 2 during 6 months (3 samples for each plot for each plot).

Site	plot	salinity	pH	temp.	DO	EC	TDS
2	1	25.7	5.8	25.8	8.9	33.3	37.0
2	1	24.4	6.3	25.5	7.9	30.7	38.2
2	1	25.0	6.8	25.5	8.8	37.0	37.2
2	1	29.0	6.6	28.1	4.7	44.7	27.8
2	1	25.4	6.6	27.5	4.5	40.2	24.6
2	1	25.8	6.6	27.5	5.8	40.8	25.1
2	1	27.9	6.7	29.8	7.3	43.7	29.2
2	1	28.4	6.5	27.7	6.3	41.2	27.8
2	1	27.8	6.2	28.1	6.2	42.8	23.4
2	1	23.0	7.0	27.8	7.4	40.0	22.0
2	1	23.5	7.1	27.4	6.7	41.7	22.1
2	1	24.5	7.4	27.3	7.0	42.1	23.0
2	1	28.6	6.2	27.0	4.7	43.7	25.0
2	1	24.4	6.5	27.1	5.4	40.0	23.9
2	1	25.0	6.5	27.3	5.0	40.0	25.0
2	1	23.7	6.7	28.7	8.8	37.0	23.0
2	1	24.0	6.2	28.9	8.0	38.2	23.0
2	1	23.9	6.2	29.1	8.8	37.2	23.0
2	2	24.4	6.3	26.9	9.9	37.6	22.9
2	2	24.8	6.5	26.3	9.6	38.8	23.8
2	2	23.6	6.3	26.1	8.7	37.2	22.7
2	2	26.1	6.3	27.5	3.5	41.0	25.2
2	2	27.7	6.3	27.8	4.3	42.8	26.4
2	2	27.3	6.3	27.6	4.7	42.3	26.3
2	2	27.8	6.4	28.1	7.6	41.0	26.7
2	2	28.1	6.0	28.1	7.7	42.8	26.0
2	2	30.0	6.1	27.5	6.1	42.8	29.0
2	2	24.5	6.6	28.9	8.6	41.2	23.4
2	2	24.9	7.0	26.9	7.8	41.8	25.0
2	2	26.3	7.0	27.1	8.0	41.0	24.0

Site	plot	salinity	pH	temp.	DO	EC	TDS
2	2	25.0	6.0	26.7	5.7	42.8	26.2
2	2	27.2	6.7	26.8	6.1	41.0	21.2
2	2	21.8	6.0	27.4	6.0	43.8	28.6
2	2	24.0	6.6	28.6	9.0	37.4	23.0
2	2	24.0	6.5	28.9	9.0	37.3	23.0
2	2	24.5	6.6	28.9	8.7	37.2	23.6
2	3	24.9	6.5	26.5	9.8	39.1	24.0
2	3	24.5	6.1	26.4	8.7	38.5	38.5
2	3	25.2	6.4	26.6	7.3	39.5	39.5
2	3	27.1	6.5	27.9	5.0	42.4	26.2
2	3	29.3	5.9	27.6	4.7	40.5	28.3
2	3	26.8	6.2	27.8	5.3	41.3	26.9
2	3	29.0	5.9	28.0	6.6	42.4	29.4
2	3	28.0	5.4	27.2	8.8	42.5	28.1
2	3	27.8	6.0	27.2	6.9	41.2	26.6
2	3	24.5	6.0	27.5	6.0	39.4	23.5
2	3	26.1	7.0	27.3	7.7	40.4	25.3
2	3	27.2	6.0	27.3	7.3	40.0	26.0
2	3	24.7	6.6	27.0	4.7	40.1	23.1
2	3	24.6	6.9	28.0	4.8	40.2	24.9
2	3	21.3	6.9	27.8	5.7	41.0	22.9
2	3	24.6	6.5	29.0	9.1	38.5	23.8
2	3	24.6	6.6	28.1	8.7	38.2	23.7
2	3	24.6	6.4	29.1	8.3	38.3	23.7

Appendix 4.2

A. the concentration of heavy metal, trace metal, major metal (mg/L), and chloride, sulphate, phosphate (ppm) at site 1.

Site	plot	Ca	site	plot	Mg	site	plot	Pb
1	1	179.4	1	1	291.0	1	1	0.03
1	1	200.3	1	1	299.8	1	1	0.01
1	1	190.5	1	1	296.4	1	1	0.01
1	1	248.9	1	1	298.9	1	1	0.07
1	1	291.7	1	1	291.7	1	2	0.00
1	1	305.6	1	1	305.6	1	2	0.00
1	1	299.8	1	1	258.9	1	2	0.01
1	1	286.9	1	1	254.1	1	3	0.00
1	1	305.9	1	1	260.9	1	3	0.01
1	1	213.4	1	1	248.3	1	3	0.03
1	1	204.6	1	1	245.7			
1	1	204.0	1	1	247.4			
1	1	151.8	1	1	229.7			
1	1	153.5	1	1	231.2			
1	1	155.2	1	1	229.7			
1	1	268.8	1	1	688.6			
1	1	244.5	1	1	633.3			
1	1	284.8	1	1	732.3			
1	1	256.3	1	1	665.5			
1	1	242.3	1	1	684.3			
1	1	240.8	1	1	646.5			
1	2	189.2	1	2	295.6			

Site	plot	Ca	site	plot	Mg
1	2	191.1	1	2	296.1
1	2	190.5	1	2	296.4
1	2	311.7	1	2	311.7
1	2	297.0	1	2	297.0
1	2	295.8	1	2	295.8
1	2	286.3	1	2	256.9
1	2	304.8	1	2	260.4
1	2	289.7	1	2	252.6
1	2	201.2	1	2	245.9
1	2	53.2	1	2	128.9
1	2	191.3	1	2	241.6
1	2	158.4	1	2	231.2
1	2	116.9	1	2	210.9
1	2	165.6	1	2	236.8
1	2	158.4	1	2	619.1
1	2	116.9	1	2	568.6
1	2	165.6	1	2	570.2
1	2	221.7	1	2	616.8
1	2	234.9	1	2	628.8
1	2	239.1	1	2	644.1
1	3	170.0	1	3	297.0
1	3	207.8	1	3	304.2
1	3	190.0	1	3	296.0
1	3	304.3	1	3	304.3
1	3	308.8	1	3	308.8
1	3	312.5	1	3	312.5
1	3	307.0	1	3	260.4
1	3	294.3	1	3	255.1
1	3	312.2	1	3	265.0
1	3	147.6	1	3	225.8
1	3	182.2	1	3	237.7
1	3	255.8	1	3	258.9
1	3	206.5	1	3	152.9
1	3	271.3	1	3	212.3
1	3	244.2	1	3	235.5
1	3	214.5	1	3	573.7
1	3	209.0	1	3	710.9
1	3	227.9	1	3	640.3
			1	3	603.0
			1	3	584.2
			1	3	617.0

<u>site</u>	<u>plot</u>	<u>Cu</u>	<u>site</u>	<u>plot</u>	<u>Zn</u>	<u>site</u>	<u>plot</u>	<u>As</u>
1	1	0.003	1	1	0.01	1.00	1.00	0.05
1	1	0.002	1	1	0.02	1.00	1.00	0.04
1	1	0.003	1	1	0.01	1.00	1.00	0.05
1	1	0.008	1	1	0.01	1.00	1.00	0.01
1	1	0.008	1	1	0.04	1.00	1.00	0.01
1	1	0.007	1	1	0.01	1.00	1.00	0.00
1	1	0.088	1	1	0.06	1.00	1.00	0.02
1	1	0.068	1	1	0.02	1.00	1.00	0.02
1	1	0.058	1	1	0.03	1.00	1.00	0.02
1	1	0.112	1	2	0.00	1.00	1.00	0.03
1	1	0.086	1	2	0.03	1.00	1.00	0.03
1	1	0.121	1	2	0.05	1.00	1.00	0.04
1	1	0.148	1	2	0.01	1.00	1.00	0.04
1	1	0.134	1	2	0.03	1.00	1.00	0.45
1	1	0.064	1	2	0.04	1.00	1.00	0.02
1	2	0.003	1	2	0.02	1.00	2.00	0.06
1	2	0.003	1	2	0.02	1.00	2.00	0.05
1	2	0.003	1	2	0.00	1.00	2.00	0.05
1	2	0.009	1	2	0.01	1.00	2.00	0.02
1	2	0.007	1	2	0.03	1.00	2.00	0.02
1	2	0.009	1	3	0.03	1.00	2.00	0.03
1	2	0.057	1	3	0.01	1.00	2.00	0.01
1	2	0.058	1	3	0.01	1.00	2.00	0.01
1	2	0.040	1	3	0.02	1.00	2.00	0.01
1	2	0.140	1	3	0.04	1.00	2.00	0.00
1	2	0.098	1	3	0.01	1.00	2.00	0.03
1	2	0.112	1	3	0.02	1.00	2.00	0.06
1	2	0.039	1	3	0.02	1.00	2.00	0.09
1	2	0.164	1	3	0.01	1.00	2.00	0.02
1	2	0.158	1	3	0.00	1.00	2.00	0.02
1	3	0.003	<u>1</u>	<u>3</u>	<u>0.02</u>	1.00	2.00	0.02
1	3	0.002				1.00	2.00	0.82
1	3	0.003				1.00	3.00	0.05
1	3	0.014				1.00	3.00	0.05
1	3	0.008				1.00	3.00	0.06
1	3	0.012				1.00	3.00	0.02
1	3	0.081				1.00	3.00	0.02
1	3	0.074				1.00	3.00	0.03
1	3	0.037				1.00	3.00	0.01
1	3	0.110				1.00	3.00	0.01
1	3	0.134				1.00	3.00	0.01
1	3	0.105				1.00	3.00	0.01
1	3	0.117				1.00	3.00	0.02
1	3	0.081				1.00	3.00	0.07
<u>1</u>	<u>3</u>	<u>0.190</u>				1.00	3.00	0.08
						1.00	3.00	0.07
						1.00	3.00	0.66
						1.00	3.00	0.02
						<u>1.00</u>	<u>3.00</u>	<u>0.03</u>

Site	plot	K	site	plot	Mn	site	plot	Fe
1	1	260.40	1	1	0.04	1	1	0.02
1	1	251.30	1	1	0.38	1	1	0.47
1	1	244.80	1	1	0.20	1	1	0.33
1	1	271.90	1	1	0.01	1	1	0.37
1	1	243.20	1	1	0.01	1	1	0.82
1	1	289.70	1	1	0.01	1	1	0.38
1	2	229.40	1	1	0.23	1	1	0.49
1	2	241.90	1	1	0.23	1	1	0.10
1	2	241.50	1	1	0.20	1	1	0.11
1	2	235.30	1	1	0.13	1	1	0.04
1	2	213.40	1	1	0.12	1	1	0.94
1	2	214.70	1	1	0.11	1	1	0.45
1	3	214.50	1	1	0.13	1	1	0.03
1	3	209.00	1	1	0.12	1	2	0.32
1	3	227.90	1	1	0.11	1	2	0.58
1	3	217.30	1	1	0.60	1	2	0.24
1	3	275.40	1	1	0.17	1	2	0.19
1	3	249.00	1	1	0.31	1	2	0.36
			1	2	0.05	1	2	0.50
			1	2	0.05	1	2	0.06
			1	2	0.58	1	2	0.09
			1	2	0.37	1	2	0.04
			1	2	0.01	1	2	0.89
			1	2	0.01	1	2	1.08
			1	2	0.01	1	2	0.82
			1	2	0.19	1	3	0.00
			1	2	0.07	1	3	0.23
			1	2	0.20	1	3	0.98
			1	2	0.12	1	3	0.05
			1	2	0.10	1	3	0.09
			1	2	0.13	1	3	0.13
			1	2	0.11	1	3	0.08
			1	2	0.25	1	3	0.09
			1	2	0.11	1	3	0.23
			1	2	0.29	1	3	0.40
			1	2	0.30	1	3	0.02
			1	2	0.49	1	3	0.45
			1	3	0.75			
			1	3	0.70			
			1	3	0.00			
			1	3	0.01			
			1	3	0.01			
			1	3	0.20			
			1	3	0.24			
			1	3	0.05			
			1	3	0.09			
			1	3	0.13			
			1	3	0.08			
			1	3	0.09			
			1	3	0.23			
			1	3	0.40			
			1	3	0.02			
			1	3	0.45			

Site	plot	AL
1	1	0.01
1	1	0.57
1	1	0.19
1	1	0.73
1	1	0.72
1	1	0.46
1	1	0.42
1	1	0.51
1	1	0.20
1	2	0.19
1	2	0.00
1	2	0.02
1	2	0.34
1	2	0.62
1	2	0.29
1	2	0.36
1	2	0.66
1	2	0.16
1	2	0.03
1	2	0.06

Site	plot	Al
1	2	0.14
1	2	0.39
1	2	1.02
1	3	0.00
1	3	0.00
1	3	0.02
1	3	0.00
1	3	0.05
1	3	0.38
1	3	1.13
1	3	0.24
1	3	0.20
1	3	0.09
1	3	0.06
1	3	0.06
1	3	0.14
1	3	0.92
1	3	0.18
1	3	0.37

Site	plot	Chloride
1	1	13.57
1	1	27.70
1	1	13.10
1	1	35.02
1	1	34.28
1	1	35.40
1	1	33.08
1	1	33.87
1	1	33.82
1	1	26.71
1	1	26.40
1	1	25.92
1	1	22.09
1	1	22.15
1	1	23.29
1	1	2.17
1	1	1.99
1	1	19.26
1	1	16.37
1	1	17.49
1	2	14.00
1	2	15.80
1	2	13.10
1	2	36.17
1	2	36.11
1	2	36.11
1	2	32.60
1	2	33.70
1	2	34.50
1	2	25.03
1	2	5.23
1	2	24.39

site	plot	Sulphate	Nitrate
1	1	1.73	35.57
1	1	3.19	42.40
1	1	1.69	41.50
1	1	3.94	49.86
1	1	3.82	52.39
1	1	3.66	40.39
1	1	3.78	40.93
1	1	3.79	40.02
1	1	3.00	38.50
1	1	2.95	35.85
1	1	3.04	25.90
1	1	2.64	33.07
1	1	2.64	34.10
1	1	2.79	35.49
1	1	0.31	23.20
1	1	0.23	26.01
1	1	2.52	21.62
1	1	2.78	22.39
1	1	2.39	21.31
1	2	18.03	41.90
1	2	17.46	41.90
1	2	0.00	42.80
1	2	2.82	39.88
1	2	2.08	42.23
1	2	2.86	49.86
1	2	2.76	36.23
1	2	0.72	1.04
1	2	2.67	34.80
1	2	3.61	35.65
1	2	3.61	26.32
1	2	3.86	36.17
1	2	4.08	26.1

Site	plot	Chloride	site	plot	Sulphate	site	plot	Nitrate
1	2	23.36	1	2	40.63	1	2	22.00
1	2	17.41	1	2	1.80	1	2	23.10
1	2	23.52	1	2	1.96	1	3	5.03
1	2	3.24	1	2	1.69	1	3	8.44
1	2	2.96	1	3	1.26	1	3	12.36
1	2	7.02	1	3	1.89	1	3	26.00
1	2	18.03	1	3	4.44	1	3	22.00
1	2	17.46	1	3	4.21	1	3	23.64
1	2	0.00	1	3	50.83	1	3	18.75
1	3	9.62	1	3	4.18	1	3	14.76
1	3	14.70	1	3	3.94	1	3	19.79
1	3	38.70	1	3	3.58	1	3	16.57
1	3	35.02	1	3	3.75	1	3	41.56
1	3	42.08	1	3	2.18	1	3	44.69
1	3	36.87	1	3	2.82	1	3	39.09
1	3	35.39	1	3	2.57	1	3	41.71
1	3	33.33	1	3	1.02	1	3	26.02
1	3	33.99	1	3	1.98	1	3	35.80
1	3	18.24	1	3	3.12	1	3	34.64
1	3	23.46	1	3	49.14	1	3	55.44
1	3	23.53	1	3	1.87	1	3	48.12
1	3	8.23	1	3	22.31	1	3	41.10
1	3	16.16	1	3	2.65	1	3	43.60
1	3	26.79	1	3	2.63	1	3	38.80
1	3	9.86	1	3	2.60			
1	3	11.08						
1	3	10.20						
1	3	19.68						
1	3	20.08						
1	3	19.92						

B. The concentration of heavy metal, trace metal, major metal (mg/l), and chloride, sulphate, phosphate (ppm) in site 2.

Site	plot	Mn	site	plot	Pb	site	plot	Nitrate
2	1	0.00	2	1	0.00	2	1	0.00
2	1	0.02	2	1	0.02	2	1	0.00
2	1	0.01	2	1	0.04	2	1	0.00
2	1	0.01	2	1	0.01	2	1	0.02
2	1	0.08	2	2	0.00	2	1	0.01
2	1	0.11				2	1	0.01
2	1	0.14				2	1	0.01
2	1	0.05				2	1	0.01
2	1	0.04				2	1	0.01
2	1	0.06				2	1	0.09
2	1	0.05				2	1	0.10
2	1	0.02				2	1	0.07
2	1	0.06				2	1	0.07
2	1	0.00				2	1	0.06
2	1	0.02				2	1	0.08
2	2	0.01				2	2	0.00
2	2	0.01				2	2	0.00

Site	plot	Mn
2	2	0.01
2	2	0.12
2	2	0.12
2	2	0.13
2	2	0.13
2	2	0.09
2	2	0.08
2	2	0.06
2	2	0.09
2	2	0.06
2	2	0.02
2	2	0.02
2	2	0.02
2	3	0.00
2	3	0.01
2	3	0.01
2	3	0.01
2	3	0.10
2	3	0.11
2	3	0.12
2	3	0.12
2	3	0.11
2	3	0.13
2	3	0.10
2	3	0.07
2	3	0.08
2	3	0.06
2	3	0.04
2	3	0.01
2	3	0.10
2	3	0.07
2	3	0.08
2	3	0.06
2	3	0.04
2	3	0.01

site	plot	Nitrate
2	2	0.00
2	2	0.02
2	2	0.04
2	2	0.01
2	2	0.01
2	2	0.01
2	2	0.01
2	2	0.06
2	2	0.06
2	2	0.11
2	2	0.06
2	2	0.07
2	2	0.04
2	3	0.00
2	3	0.01
2	3	0.01
2	3	0.01
2	3	0.01
2	3	0.01
2	3	0.01
2	3	0.06
2	3	0.09
2	3	0.01

Site	plot	Zn
2	1	0.00
2	1	0.04
2	1	0.05
2	1	0.00
2	1	0.02
2	1	0.01
2	1	0.03
2	2	0.04
2	2	0.03
2	2	0.06
2	2	0.01
2	2	0.01
2	2	0.00
2	3	0.01
2	3	0.02
2	3	0.08
2	3	0.66

site	plot	As
2	1	0.00
2	1	0.01
2	1	0.02
2	1	0.02
2	1	0.02
2	1	0.00
2	1	0.71
2	1	0.00
2	2	0.02
2	2	0.01
2	2	0.02
2	2	0.02
2	2	0.02
2	2	0.02
2	2	0.01
2	2	0.00
2	2	0.26
2	2	0.82
2	3	0.04
2	3	0.02

site	plot	K
2	1	59.50
2	1	69.10
2	1	78.31
2	1	493.10
2	1	109.60
2	1	476.30
2	2	70.70
2	2	113.70
2	2	103.80
2	2	248.80
2	2	680.90
2	2	388.10
2	3	707.70
2	3	827.50
2	3	850.30
2	3	136.92
2	3	140.40
2	3	120.47

<u>site</u>	<u>plot</u>	<u>As</u>
2	3	0.02
2	3	0.02
2	3	0.01
2	3	0.02
2	3	0.02
2	3	0.01
2	3	0.02
2	3	0.01
2	3	0.03
2	3	0.00
2	3	0.01

<u>Site</u>	<u>plot</u>	<u>Ca</u>
2	1	35.03
2	1	40.28
2	1	48.00
2	1	114.00
2	1	17.33
2	1	116.20
2	1	172.70
2	1	179.00
2	1	175.20
2	1	85.46
2	1	128.30
2	1	120.60
2	1	85.46
2	1	128.30
2	1	120.60
2	2	62.64
2	2	51.42
2	2	77.61
2	2	35.03
2	2	40.28
2	2	48.00
2	2	173.30
2	2	171.20
2	2	181.60
2	2	279.60
2	2	272.50
2	2	289.10
2	2	292.60
2	2	285.30
2	2	304.10
2	2	42.69
2	2	84.41
2	2	73.43
2	3	142.90
2	3	109.40
2	3	58.22
2	3	42.69
2	3	84.41
2	3	73.43
2	3	194.50
2	3	191.80

<u>site</u>	<u>plot</u>	<u>Mg</u>
2	1	342.70
2	1	151.55
2	1	356.80
2	1	287.60
2	1	290.50
2	1	289.00
2	1	177.40
2	1	210.30
2	1	205.40
2	1	263.20
2	1	258.20
2	1	259.90
2	1	152.10
2	1	134.30
2	1	174.70
2	2	100.80
2	2	121.00
2	2	141.30
2	2	287.40
2	2	286.40
2	2	292.10
2	2	257.60
2	2	256.40
2	2	257.30
2	2	258.50
2	2	258.80
2	2	260.20
2	2	228.40
2	2	206.90
2	2	143.80
2	3	125.90
2	3	257.30
2	3	230.80
2	3	297.00
2	3	280.40
2	3	290.50
2	3	256.80
2	3	254.60
2	3	255.90
2	3	265.10
2	3	263.60

<u>site</u>	<u>plot</u>	<u>Fe</u>
2	1	1.29
2	1	0.52
2	1	0.87
2	1	1.29
2	1	0.52
2	1	0.87
2	1	0.04
2	1	0.00
2	1	0.01
2	1	0.01
2	1	0.01
2	1	0.93
2	1	0.68
2	1	0.36
2	1	1.00
2	2	0.75
2	2	0.43
2	2	0.04
2	2	0.02
2	2	0.03
2	2	1.84
2	2	5.61
2	2	0.91
2	2	0.26
2	2	0.82
2	2	0.38
2	2	0.01
2	2	0.01
2	2	1.24
2	2	8.52
2	3	0.66
2	3	0.27
2	3	0.22
2	3	0.81

<u>site</u>	<u>plot</u>	<u>Ca</u>
2	3	178.80
2	3	290.80
2	3	276.40
2	3	252.50
2	3	308.60
2	3	292.60
2	3	298.30
2	3	158.30
2	3	155.90
2	3	143.30
2	3	10.39
2	3	135.90
2	3	31.69

<u>site</u>	<u>plot</u>	<u>Mg</u>
2	3	259.60
2	3	234.60
2	3	233.00
2	3	227.30

<u>Site</u>	<u>plot</u>	<u>Al</u>
2	1	0.08
2	1	0.30
2	1	0.13
2	1	0.01
2	1	0.03
2	1	0.14
2	1	0.04
2	1	0.03
2	1	0.37
2	1	0.51
2	1	0.10
2	1	0.32
2	1	0.39
2	1	0.56

<u>Site</u>	<u>plot</u>	<u>Al</u>
2	2	0.14
2	2	0.12
2	2	0.12
2	2	0.14
2	2	0.32
2	2	0.49
2	2	0.38
2	2	0.14
2	2	0.09
2	3	0.02
2	3	0.07
2	3	0.13
2	3	0.13
2	3	0.04
2	3	0.02

<u>Site</u>	<u>plot</u>	<u>chloride</u>
2	1	19.13
2	1	15.10
2	1	11.82
2	1	32.49
2	1	30.96
2	1	30.44
2	1	17.25
2	1	16.08
2	1	16.03
2	1	11.62
2	1	12.81
2	1	15.09
2	2	13.71
2	2	12.77
2	2	15.78
2	2	12.51
2	2	26.74
2	2	12.52
2	2	30.58
2	2	33.12

<u>site</u>	<u>plot</u>	<u>Sulphate</u>
2	1	1.07
2	1	1.52
2	1	1.12
2	1	3.73
2	1	3.48
2	1	3.44
2	1	0.86
2	1	0.70
2	1	1.84
2	1	1.20
2	1	1.55
2	1	1.20
2	1	1.55
2	2	0.42
2	2	1.46
2	2	2.27
2	2	1.61
2	2	3.16
2	2	1.62
2	2	3.45

<u>site</u>	<u>plot</u>	<u>Nitrate</u>
2	1	9.45
2	1	57.38
2	1	54.49
2	1	53.85
2	1	3.15
2	1	1.04
2	1	2.00
2	2	39.34
2	2	35.37
2	2	36.31
2	2	47.22
2	2	56.65
2	2	56.62
2	2	38.47
2	2	17.99
2	3	36.77
2	3	35.61
2	3	35.61
2	3	51.33
2	3	58.16

2	2	31.74	2	2	3.73	2	3	52.51
2	2	31.52	2	2	3.57	2	3	56.58
2	2	32.24	2	2	3.54	2	3	29.35
2	2	32.81	2	2	3.61	2	3	2.24
2	2	20.84	2	2	3.69	2	3	2.86
2	2	13.79	2	2	2.29	<u>2</u>	<u>3</u>	<u>2.70</u>
2	2	16.85	2	2	1.63			
2	2	13.71	2	2	0.81			
2	2	12.77	2	2	0.42			
2	2	15.78	2	2	1.46			
2	3	13.64	2	2	2.27			
2	3	13.15	2	3	1.78			
2	3	32.19	2	3	1.71			
2	3	31.26	2	3	3.70			
2	3	33.27	2	3	3.60			
2	3	32.46	2	3	3.80			
2	3	39.22	2	3	3.71			
2	3	16.13	2	3	4.27			
2	3	22.13	2	3	2.74			
2	3	19.04	2	3	2.76			
2	3	14.02	2	3	2.50			
2	3	21.65	2	3	2.24			
<u>2</u>	<u>3</u>	<u>17.93</u>	2	3	2.86			
			<u>2</u>	<u>3</u>	<u>2.70</u>			

Appendix 5

A. Inflorescence stages of individuals at site 1 at initial census on August 2008.

Ind	Infl. stage	Ind	Infl.stage	Ind	Infl.stage
NF001	7	NF001	7	NF001	7,7
NF002	1	NF002	7,1	NF002	1
NF003	1	NF003	1	NF003	1
NF004	7,7	NF004	7,5,4	NF004	7
NF005	7,7	NF005	1	NF005	7
NF006	1	NF006	1	NF006	7
NF007	1	NF007	7	NF007	7
NF008	1	NF008	1	NF008	7
NF009	7,7,5	NF009	1	NF009	1
NF010	7,7	NF010	1	NF010	7
NF011	1	NF011	.	NF011	1
NF012	1	NF012	7	NF012	1
NF013	7,5,7	NF013	7	NF013	1
NF014	1	NF014	7,7,7	NF014	1
NF015	7	NF015	1	NF015	7
NF016	7,5,7	NF016	1	NF016	1
NF017	1	NF017	7	NF017	7
NF018	1	NF018	1	NF018	7
NF019	1	NF019	5,7	NF019	1
NF020	1	NF020	1	NF020	7
NF021	1	NF021	1	NF021	7
NF022	1	NF022	1	NF022	7
NF023	7,7	NF023	1	NF023	1
NF024	1	NF024	7	NF024	1
NF025	1	NF025	5,7	NF025	1
NF026	5	NF026	1	NF026	1
NF027	7,7	NF027	5	NF027	1
NF028	7,7	NF028	1	NF028	1
NF029	7	NF029	5,6,7	NF029	5
NF030	1	NF030	1	NF030	6
NF031	1	NF031	6	NF031	7
NF032	1	NF032	1	NF032	1
NF033	7	NF033	1	NF033	1
NF034	1	NF034	1	NF034	7,5,5
NF035	1	NF035	1	NF035	1
NF036	2	NF036	1	NF036	1

NF037	
NF038	7,7,7
NF039	1
NF040	7
NF041	1
NF042	1
NF043	7,7

NF037	1
NF038	1
NF039	1
NF040	1
NF041	1
NF042	1
NF043	1
NF044	1
NF045	1
NF046	1
NF047	1
NF048	1
NF049	1
NF050	1
NF051	1
NF052	7
NF053	1
NF054	1
NF055	1
NF056	1
NF057	1
NF058	1
NF059	1
NF060	1
NF061	1
NF062	1
NF063	7
NF064	7
NF065	7
NF066	1
NF067	1
NF068	1
NF069	1
NF070	1
NF071	1
NF072	1
NF073	1
NF074	1
NF075	1
NF076	1
NF077	1
NF079	7,7
NF080	7,7

NF037	7
NF038	7
NF039	1
NF040	1
NF041	6
NF042	7
NF043	7
NF044	7
NF045	5,7
NF046	5
NF047	6,7,7
NF048	7
NF049	7
NF050	1
NF051	7
NF052	7
NF053	7,6
NF054	6
NF055	1
NF056	6
NF057	7
NF058	1
NF059	1
NF060	1
NF061	7
NF062	1
NF063	1
NF064	7
NF065	1
NF066	1
NF067	7
NF068	1
NF069	1
NF070	7.7
NF071	1
NF072	7
NF073	1
NF074	1
NF075	6
NF076	1
NF077	5
NF079	7
NF080	5

NF081	1	NF081	1
NF082	1	NF082	1
NF083	1	NF083	7
NF084	1	NF084	1
NF085	7,7,7	NF085	1
NF086	7	NF086	1
NF087	1	NF087	1
NF088	1	NF088	1
NF089	1	NF089	1
NF090	1	NF090	-
NF091	1	NF091	7
NF092	1	NF092	1
NF093	-	NF093	6
		NF094	1

B. Inflorescence stages of individuals at site 2 at initial census on August 2008.

<u>Ind</u>	<u>Infl. stage</u>	<u>Ind</u>	<u>Infl. stage</u>	<u>Ind</u>	<u>Infl. stage</u>
NF001	1	NF001	6	NF001	1
NF002	7	NF002	1	NF002	1
NF003	7	NF003	7,7	NF003	1
NF004	7	NF004		NF004	1
NF005	6,7	NF005	1	NF005	1
NF006	1	NF006	1	NF006	1
NF007	.	NF007	1	NF007	1
NF008	7	NF008	7	NF008	7
NF009		NF009	1	NF009	6
NF010		NF010	1	NF010	0
NF011	1	NF011	1	NF011	1
NF012	7	NF012	7,7,7	NF012	1
NF013	1	NF013	1	NF013	1
NF014	7	NF014	1	NF014	1
NF015	7	NF015	1	NF015	1
NF016	1	NF016	1	NF016	1
NF017	1	NF017	1	NF017	1
NF018	7	NF018	1	NF018	1
NF019	1	NF019	1	NF019	1
NF020	1	NF020	1	NF020	
NF021	5	NF021	1	NF021	1
NF022	7,7	NF022	1	NF022	1
NF023	7	NF023	7	NF023	1
NF024	7	NF024	.	NF024	1
NF025	1	NF025	2	NF025	1
NF026	1	NF026	1	NF026	1
NF027	1	NF027	1	NF027	1
NF028	1	NF028	1	NF028	1

NF029	1
NF030	1
NF031	7
NF032	1
NF033	7
NF034	1
NF035	1
NF036	7
NF037	5

NF029	1
NF030	.
NF031	1
NF032	1
NF033	1
NF034	1
NF035	1
NF036	1
NF037	1
NF038	1
NF039	1
NF040	1
NF041	1
NF042	7
NF043	1

NF029	1
NF030	1
NF031	1
NF032	1
NF033	1
NF034	1
NF035	1
NF036	1
NF037	1
NF038	1
NF039	1
NF040	1
NF041	1
NF042	1
NF043	1
NF044	1
NF045	1
NF046	1
NF047	1
NF048	1
NF049	1
NF050	1
NF051	1
NF052	.
NF053	1
NF054	1
NF055	1
NF056	1
NF057	7
NF058	1
NF059	1
NF060	1
NF061	1
NF062	1
NF063	1
NF064	1
NF065	1

C. Number of rachillae and male flowers in 6 inflorescence.

n. inflorescence	Number of rachillae	Number of male flowers
1	12	80
2	15	89
3	18	97
4	15	89
5	21	98
6	15	90

D. Number of rachillae and female flowers in 6 inflorescence.

n. inflorescence	Number of rachillae	Number of male flowers
1	1	64
2	1	95
3	1	120
4	1	100
5	1	120
6	1	81

Appendix 6

Appendix 6.1

A. the measurement of the number of new spear leaves during 16 months in each plot at site 1.

Date	2008				2009											
plot	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
1	6	6	2	7	4	10	5	3	2	6	1	4	5	0	1	9
2	11	12	4	12	10	5	12	14	8	2	7	12	9	7	4	16
3	18	10	6	7	7	5	8	3	10	14	5	4	5	15	0	5

B. the measurement of the number of new recruits during 16 months (every two months observation) at site 1.

	2008			2009						
plot	Nov	Jan	Mar	May	July	Sep	Nov	Jan	total	
1	0	2	1	3	0	0	0	2	11	
2	3	2	2	3	0	4	0	16	28	
3	6	1	1	4	5	4	4	15	39	
mean	4.5	1.66	1.33	3.33	1.66	2.66	1.33	11	26	

Appendix 6.2

A. the measurement of the number of new spear leaves during 16 months in each plot at site 2.

Date	2008		2009												2010	
plot	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb
1	3	7	1	3	5	4	4	4	3	4	4	3	no	4	4	5
2	3	4	1	1	9	4	4	2	1	3	6	4	6	8	1	1
3	4	10	10	1	1	7	7	5	1	5	3	no	4	10	2	9

B. the measurement of the number of new recruits during 15 months in each plot at site 2.

Date	2008	2009						2010	
plot	Nov	Jan	Mar	May	July	Sep	Nov	Jan	total
1	0	0	0	3	0	0	0	26	29
2	0	0	0	0	0	0	0	16	16
3	0	0	0	13	1	0	0	0	14
mean	0	0	0	5.3	0.33	0	0	14	19.6

Appendix 7

Appendix 7.1

A. Correlation between water variables (physical parameters) and growth of seedlings.

		lls	llf	dlf	lde	tlf	nslf
PH	Pearson Correlation	-.453	-.645	-.168	-.064	-.446	-.620
	Sig. (2-tailed)	.260	.084	.691	.918	.268	.101
	N	8	8	8	5	8	8
temperature	Pearson Correlation	-.477	-.336	.322	-.030	-.471	-.552
	Sig. (2-tailed)	.232	.415	.436	.962	.238	.156
	N	8	8	8	5	8	8
salinity	Pearson Correlation	.647	.418	-.401	.136	.479	.407
	Sig. (2-tailed)	.083	.303	.324	.827	.229	.317
	N	8	8	8	5	8	8
Do	Pearson Correlation	.523	.318	-.272	.706	.343	.352
	Sig. (2-tailed)	.184	.443	.514	.182	.405	.393
	N	8	8	8	5	8	8
EC	Pearson Correlation	.584	.408	-.365	.143	.414	.397
	Sig. (2-tailed)	.128	.315	.373	.818	.307	.330
	N	8	8	8	5	8	8
TDS	Pearson Correlation	.666	.440	-.414	.105	.500	.420
	Sig. (2-tailed)	.071	.276	.308	.866	.208	.300
	N	8	8	8	5	8	8

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

B. Correlation between water variables (physical parameters) and growth of Juveniles.

		lls	llf	tlf	dlf	lde	nslf	elongation
PH	Pearson Correlation	-.009	.109	-.240	-.195	.407 [*]	-.278	-.218
	Sig. (2-tailed)	.950	.453	.093	.175	.035	.050	.605
	N	50	50	50	50	27	50	8
temperature	Pearson Correlation	.316 [*]	.238	.215	-.176	.024	.366 ^{**}	-.402
	Sig. (2-tailed)	.026	.095	.133	.221	.906	.009	.324
	N	50	50	50	50	27	50	8
salinity	Pearson Correlation	-.217	-.185	-.316 [*]	-.042	.124	-.292 [*]	.474
	Sig. (2-tailed)	.130	.197	.025	.771	.539	.039	.235
	N	50	50	50	50	27	50	8
Do	Pearson Correlation	-.053	-.050	-.092	.029	-.271	-.157	.518
	Sig. (2-tailed)	.715	.728	.526	.841	.172	.278	.188
	N	50	50	50	50	27	50	8
EC	Pearson Correlation	-.137	-.106	-.183	.022	.124	-.241	.465
	Sig. (2-tailed)	.342	.465	.203	.882	.537	.092	.246
	N	50	50	50	50	27	50	8
TDS	Pearson Correlation	-.110	-.061	-.150	-.064	.258	-.100	.467
	Sig. (2-tailed)	.448	.675	.298	.659	.194	.491	.244
	N	50	50	50	50	27	50	8

C. Correlation between water variables (physical parameters) and growth of adults.

		lls	llf	dlf	tlf3	lde3	nslf	elongation
PH	Pearson Correlation	.139	.203*	-.004	.096	.014	-.034	-.109
	Sig. (2-tailed)	.134	.028	.968	.306	.903	.714	.405
	N	117	117	117	117	75	117	61
temperature	Pearson Correlation	.090	.213*	-.033	.023	.108	-.121	.185
	Sig. (2-tailed)	.333	.021	.725	.809	.359	.193	.154
	N	117	117	117	117	75	117	61
salinity	Pearson Correlation	.093	.044	-.045	.022	.125	.087	.025
	Sig. (2-tailed)	.316	.637	.626	.812	.285	.352	.848
	N	117	117	117	117	75	117	61
Do	Pearson Correlation	-.046	.023	.024	-.004	-.185	-.113	.030
	Sig. (2-tailed)	.619	.802	.799	.965	.112	.224	.819
	N	117	117	117	117	75	117	61
EC	Pearson Correlation	.152	.122	-.118	-.003	.126	.084	.048
	Sig. (2-tailed)	.102	.189	.205	.973	.281	.369	.716
	N	117	117	117	117	75	117	61
TDS	Pearson Correlation	.028	.059	-.045	-.023	-.027	-.029	-.018
	Sig. (2-tailed)	.763	.528	.630	.807	.819	.754	.889
	N	117	117	117	117	75	117	61

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

D. Correlation between water variables (physical parameters) and growth of matures.

		lls	llf	dlf	lde	tlf	Nslf	elongation
PH	Pearson Correlation	-.120	.017	.102	-.192	.006	.191	-.016
	Sig. (2-tailed)	.368	.901	.446	.149	.962	.151	.952
	N	58	58	58	58	58	58	16
temperature	Pearson Correlation	-.051	-.111	.061	-.049	.000	.006	.021
	Sig. (2-tailed)	.702	.406	.647	.712	.998	.964	.937
	N	58	58	58	58	58	58	16
salinity	Pearson Correlation	-.228	.042	.117	.022	.052	.351**	.102
	Sig. (2-tailed)	.085	.753	.383	.872	.696	.007	.707
	N	58	58	58	58	58	58	16
Do	Pearson Correlation	-.175	.043	.092	-.009	.089	.279*	.509*
	Sig. (2-tailed)	.189	.749	.491	.945	.505	.034	.044
	N	58	58	58	58	58	58	16
EC	Pearson Correlation	-.172	.066	.145	-.017	.112	.325*	.083
	Sig. (2-tailed)	.196	.624	.277	.901	.403	.013	.760
	N	58	58	58	58	58	58	16
TDS	Pearson Correlation	-.125	.106	.048	-.087	.007	.244	.212
	Sig. (2-tailed)	.349	.430	.719	.518	.959	.065	.431
	N	58	58	58	58	58	58	16

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Appendix 7.2

A. correlation between heavy metals and growth of seedlings.

		lls	llf	dlf	tlf	lde	Nslf/ year	nslf
Pb	Pearson Correlation	.424	.328	.287	.267	.017	.379	.138
	Sig. (2-tailed)	.295	.427	.491	.522	.968	.354	.745
	N	8	8	8	8	8	8	8
Cu	Pearson Correlation	-.518	-.338	.322	-.348	-.501	-.379	-.367
	Sig. (2-tailed)	.188	.412	.436	.398	.206	.355	.372
	N	8	8	8	8	8	8	8
Zn	Pearson Correlation	-.245	-.374	-.082	-.348	-.372	-.529	-.264
	Sig. (2-tailed)	.559	.361	.847	.399	.364	.178	.528
	N	8	8	8	8	8	8	8
As	Pearson Correlation	.394	.578	-.139	.694	.932**	.858**	.658
	Sig. (2-tailed)	.334	.133	.743	.056	.001	.006	.076
	N	8	8	8	8	8	8	8

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

B. Correlation between heavy metals and growth of Juveniles.

		lls	llf	dlf	tlf	lde	Nslf/year	elongation
Pb	Pearson Correlation	.106	-.257	.296	.259	.084	.359	.586
	Sig. (2-tailed)	.730	.397	.326	.392	.786	.229	.127
	N	13	13	13	13	13	13	8
Cu	Pearson Correlation	-.005	.068	.172	.149	.276	-.014	-.503
	Sig. (2-tailed)	.971	.639	.232	.302	.164	.921	.204
	N	50	50	50	50	27	50	8
Zn	Pearson Correlation	-.082	-.047	-.288*	-.274	.089	-.033	-.103
	Sig. (2-tailed)	.579	.750	.047	.060	.660	.825	.808
	N	48	48	48	48	27	48	8
As	Pearson Correlation	-.241	-.390**	.226	-.024	.054	.077	-.213
	Sig. (2-tailed)	.092	.005	.114	.869	.788	.596	.612
	N	50	50	50	50	27	50	8

* . Correlation is significant at the 0.05 level (2-tailed).

** . Correlation is significant at the 0.01 level (2-tailed).

C. Correlation between heavy metals and growth of adults.

		lls	llf	dlf	tlf	lde	Nslf/year	elongation
Pb	Pearson Correlation	.080	.121	-.352	-.205	.181	.050	.203
	Sig. (2-tailed)	.795	.694	.239	.502	.555	.870	.505
	N	13	13	13	13	13	13	13
Cu	Pearson Correlation	.032	-.024	.055	.066	-.050	.092	.038
	Sig. (2-tailed)	.768	.827	.613	.549	.673	.397	.773
	N	86	86	86	86	75	86	61
Zn	Pearson Correlation	-.203	-.077	.267	.093	.158	-.205	.027
	Sig. (2-tailed)	.167	.602	.067	.527	.284	.163	.858
	N	48	48	48	48	48	48	48
As	Pearson Correlation	-.018	-.078	-.166	-.152	-.013	.060	.164
	Sig. (2-tailed)	.874	.492	.141	.179	.912	.594	.205
	N	80	80	80	80	75	80	61

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

D. Correlation between heavy metals and growth of matures.

		lls	llf	dlf	lde	tlf	nslf	elongation
Pb	Pearson Correlation	-.115	-.030	.236	.181	.085	-.006	-.161
	Sig. (2-tailed)	.709	.923	.439	.555	.781	.986	.600
	N	13	13	13	13	13	13	13
Cu	Pearson Correlation	-.044	.060	-.012	-.051	.027	.229	-.354
	Sig. (2-tailed)	.743	.657	.928	.705	.838	.083	.178
	N	58	58	58	58	58	58	16
Zn	Pearson Correlation	.026	-.038	-.073	.158	-.165	.284	-.087
	Sig. (2-tailed)	.862	.796	.622	.284	.261	.051	.748
	N	48	48	48	48	48	48	16
As	Pearson Correlation	-.040	-.059	.151	-.002	.137	.115	-.307
	Sig. (2-tailed)	.767	.661	.258	.986	.307	.389	.248
	N	58	58	58	58	58	58	16

Appendix 7.3

A. Correlation of major metals and trace metals with growth of seedlings.

		lls	llf	dlf	tlf	lde	nslf
Ca	Pearson Correlation	-.532	-.599	.108	-.686	-.942**	-.900**
	Sig. (2-tailed)	.175	.117	.799	.060	.000	.002
	N	8	8	8	8	8	8
Mg	Pearson Correlation	.372	.089	-.222	.210	.370	.165
	Sig. (2-tailed)	.364	.833	.597	.617	.368	.696
	N	8	8	8	8	8	8
Mn	Pearson Correlation	-.433	-.289	.133	-.186	.408	.088
	Sig. (2-tailed)	.283	.487	.753	.659	.315	.836
	N	8	8	8	8	8	8
Fe	Pearson Correlation	-.039	-.426	-.510	-.469	-.336	-.704
	Sig. (2-tailed)	.927	.293	.196	.242	.416	.051
	N	8	8	8	8	8	8
Al	Pearson Correlation	-.351	-.554	-.006	-.798*	-.652	-.725*
	Sig. (2-tailed)	.395	.154	.990	.018	.080	.042
	N	8	8	8	8	8	8

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

B. Correlation of major metals and trace metals with growth of Juveniles.

		lls	llf	dlf	tlf	lde	nslf	elongation
Ca	Pearson Correlation	.373**	.213	-.232	.151	-.099	.327*	-.173
	Sig. (2-tailed)	.008	.138	.105	.296	.622	.020	.683
	N	50	50	50	50	27	50	8
Mg	Pearson Correlation	.084	.030	.182	.150	-.684**	-.043	.509
	Sig. (2-tailed)	.561	.835	.207	.298	.000	.769	.197
	N	50	50	50	50	27	50	8
Mn	Pearson Correlation	-.053	.157	-.011	-.036	-.363	-.196	-.186
	Sig. (2-tailed)	.714	.276	.940	.807	.063	.174	.659
	N	50	50	50	50	27	50	8
Fe	Pearson Correlation	-.076	.039	.117	.002	.166	-.157	.468
	Sig. (2-tailed)	.598	.788	.419	.989	.409	.275	.243
	N	50	50	50	50	27	50	8
Al	Pearson Correlation	.026	.110	.170	.147	.248	-.068	.629
	Sig. (2-tailed)	.859	.445	.237	.308	.212	.639	.095
	N	50	50	50	50	27	50	8

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

C. Correlation of major metals and trace metals with growth of adults.

		lls	llf	dlf	tlf	lde	nslf	elongation
Ca	Pearson Correlation	-.314**	-.368**	.406**	.163	-.064	-.072	.206
	Sig. (2-tailed)	.001	.000	.000	.083	.586	.448	.112
	N	114	114	114	114	75	114	61
Mg	Pearson Correlation	-.158	-.209*	.041	-.068	-.067	-.008	.002
	Sig. (2-tailed)	.103	.030	.676	.487	.568	.933	.985
	N	108	108	108	108	75	108	61
Mn	Pearson Correlation	-.137	-.108	.133	.028	-.210	-.110	.035
	Sig. (2-tailed)	.162	.273	.177	.778	.070	.264	.791
	N	105	105	105	105	75	105	61
Fe	Pearson Correlation	.220	.182	-.263*	-.094	-.043	.143	-.271*
	Sig. (2-tailed)	.066	.129	.026	.434	.719	.233	.035
	N	71	71	71	71	71	71	61
Al	Pearson Correlation	.113	.057	.079	.129	.255*	.070	.014
	Sig. (2-tailed)	.357	.645	.520	.295	.036	.570	.912
	N	68	68	68	68	68	68	61

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

D. Correlation of major metals and trace metals with growth of matures.

		lls	llf	dlf	lde	tlf	nslf	elongation
Ca	Pearson Correlation	-.051	-.057	.076	.112	.059	.104	.706**
	Sig. (2-tailed)	.703	.669	.568	.401	.657	.438	.002
	N	58	58	58	58	58	58	16
Mg	Pearson Correlation	-.092	-.094	.067	.043	.052	.147	.319
	Sig. (2-tailed)	.492	.482	.618	.751	.696	.271	.229
	N	58	58	58	58	58	58	16
Mn	Pearson Correlation	.251	.191	-.150	-.172	.105	-.153	.327
	Sig. (2-tailed)	.057	.152	.262	.196	.434	.251	.217
	N	58	58	58	58	58	58	16
Fe	Pearson Correlation	.141	.050	-.057	-.022	-.023	-.014	-.018
	Sig. (2-tailed)	.289	.711	.671	.868	.863	.918	.948
	N	58	58	58	58	58	58	16
Al	Pearson Correlation	.239	.047	-.154	.318*	-.073	-.233	.134
	Sig. (2-tailed)	.071	.727	.248	.015	.586	.079	.621
	N	58	58	58	58	58	58	16

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Appendix 7.4

A. Correlation of anion with growth of seedlings.

		llf	dlf	tlf	lde	nslf
Chloride	Pearson Correlation	-.742*	.296	-.902**	-.882**	-.880**
	Sig. (2-tailed)	.035	.476	.002	.004	.004
	N	8	8	8	8	8
Sulphate	Pearson Correlation	-.726*	.291	-.904**	-.872**	-.862**
	Sig. (2-tailed)	.042	.484	.002	.005	.006
	N	8	8	8	8	8
Nitrate	Pearson Correlation	-.117	-.455	-.370	-.459	-.494
	Sig. (2-tailed)	.783	.258	.366	.252	.214
	N	8	8	8	8	8

*. Correlation is significant at the 0.05 level (2-tailed).

** . Correlation is significant at the 0.01 level (2-tailed).

B. Correlation of anion with growth of juveniles.

		lls	llf	dlf	tlf	lde	nslf	elongation
Chloride	Pearson Correlation	.118	.010	-.096	.021	.533**	.160	.221
	Sig. (2-tailed)	.414	.946	.508	.883	.004	.266	.599
	N	50	50	50	50	27	50	8
Sulphate	Pearson Correlation	.002	.072	.027	.119	-.275	.119	.259
	Sig. (2-tailed)	.989	.621	.852	.409	.165	.412	.535
	N	50	50	50	50	27	50	8
Nitrate	Pearson Correlation	.224	.267	-.262	-.073	.399*	-.065	.800*
	Sig. (2-tailed)	.117	.061	.066	.613	.039	.653	.017
	N	50	50	50	50	27	50	8

** . Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

C. Correlation of anion with growth of adults.

		lls	llf	dlf	tlf	lde	nslf	elongation
Chloride	Pearson Correlation	-.096	-.087	.071	.006	-.151	-.051	.245
	Sig. (2-tailed)	.329	.377	.475	.948	.195	.608	.057
	N	105	105	105	105	75	105	61
Sulphate	Pearson Correlation	-.123	-.086	.048	-.037	.073	-.084	-.104
	Sig. (2-tailed)	.222	.390	.635	.715	.535	.403	.425
	N	101	101	101	101	75	101	61
Nitrate	Pearson Correlation	.113	.080	.130	.170	.051	.071	-.015
	Sig. (2-tailed)	.313	.473	.245	.126	.666	.524	.908
	N	82	82	82	82	75	82	61

D. Correlation of anion with growth of matures.

		lls	llf	dlf	lde	tlf	nslf	elongation
Chloride	Pearson Correlation	-.017	.086	-.019	-.095	-.011	.118	.165
	Sig. (2-tailed)	.900	.522	.887	.477	.936	.378	.542
	N	58	58	58	58	58	58	16
Sulphate	Pearson Correlation	.056	-.006	-.068	.127	-.022	.114	.380
	Sig. (2-tailed)	.676	.964	.610	.343	.871	.395	.146
	N	58	58	58	58	58	58	16
Nitrate	Pearson Correlation	-.043	.025	-.043	-.028	-.129	-.160	.446
	Sig. (2-tailed)	.749	.853	.747	.837	.334	.230	.083
	N	58	58	58	58	58	58	16

Appendix 8

Appendix 8.1

Appendix 8.1.1

A. ANOVA test for growth variables of juveniles at site1.

Test of Homogeneity of Variances

	Levene Statistic	df1	df2	Sig.
lls	.186	2	24	.832
age	2.359	2	24	.116
llf	3.001	2	24	.069
dlf	.226	2	24	.799
tlf	1.627	2	24	.217
Nslf/year	.028	2	24	.973
lde	1.227	2	11	.330

Multiple Comparisons

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
lls	Between Groups	1.316	2	.658	.528	.596
	Within Groups	29.911	24	1.246		
	Total	31.227	26			
age	Between Groups	.554	2	.277	.233	.794
	Within Groups	28.492	24	1.187		
	Total	29.047	26			
llf	Between Groups	.776	2	.388	.689	.512
	Within Groups	13.520	24	.563		
	Total	14.296	26			
dlf	Between Groups	6.749	2	3.374	5.697	.009
	Within Groups	14.214	24	.592		
	Total	20.963	26			
tlf	Between Groups	3.907	2	1.954	1.078	.356
	Within Groups	43.500	24	1.813		
	Total	47.407	26			
Nslf/ year	Between Groups	.198	2	.099	.172	.843
	Within Groups	13.854	24	.577		
	Total	14.052	26			
Lde	Between Groups	2.841	2	1.421	.825	.464
	Within Groups	18.935	11	1.721		
	Total	21.776	13			

Tukey HSD

Dependent Variable	(I) plot	(J) plot	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
dlf	1	2	.143	.436	.943	-.95	1.23
		3	1.167*	.462	.047	.01	2.32
	2	1	-.143	.436	.943	-1.23	.95
		3	1.024*	.329	.013	.20	1.84
	3	1	-1.167*	.462	.047	-2.32	-.01
		2	-1.024*	.329	.013	-1.84	-.20

*. The mean difference is significant at the 0.05 level.

B. ANOVA test for age and growth variables of adults at site1.

Test of Homogeneity of Variances

	Levene Statistic	df1	df2	Sig.
llf	.118	2	155	.888
dlf	1.297	2	155	.276
tlf	1.529	2	155	.220
nslf	.226	2	155	.798
age	2.791	2	87	.067
Spear elongation	2.688	2	27	.086
lde	1.879	2	38	.167

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
llf	Between Groups	6.921	2	3.461	2.919	.057
	Within Groups	183.788	155	1.186		
	Total	190.709	157			
dlf	Between Groups	29.930	2	14.965	4.390	.014
	Within Groups	528.405	155	3.409		
	Total	558.335	157			
tlf	Between Groups	8.321	2	4.161	1.005	.368
	Within Groups	641.679	155	4.140		
	Total	650.000	157			
nslf	Between Groups	1.548	2	.774	1.507	.225
	Within Groups	79.615	155	.514		
	Total	81.163	157			
age	Between Groups	1.574	2	.787	.200	.819
	Within Groups	342.189	87	3.933		
	Total	343.763	89			
Spear elongation	Between Groups	1.620	2	.810	.918	.408
	Within Groups	33.538	38	.883		
	Total	35.158	40			
	Between Groups	62.776	2	31.388	.183	.834
	Within Groups	4636.484	27	171.722		
	Total	4699.260	29			

C. Test of Homogeneity of Variances and ANOVA test for growth variables of matures at site 1.

Test of Homogeneity of Variances

	Levene Statistic	df1	df2	Sig.
lifespan	6.637	2	36	.004
age	4.483	2	36	.018
llf	5.146	2	36	.011
dlf	1.338	2	36	.275
tlf	3.608	2	36	.037
Nslf/year	2.056	2	36	.143
lde	3.105	2	9	.094
Spear elongation	.002	1	3	.970

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
lls	Between Groups	5.715	2	2.858	.783	.465
	Within Groups	131.352	36	3.649		
	Total	137.068	38			
age	Between Groups	7.376	2	3.688	.907	.413
	Within Groups	146.350	36	4.065		
	Total	153.727	38			
llf	Between Groups	18.912	2	9.456	1.774	.184
	Within Groups	191.857	36	5.329		
	Total	210.769	38			
dlf	Between Groups	13.052	2	6.526	1.299	.285
	Within Groups	180.845	36	5.023		
	Total	193.897	38			
tlf	Between Groups	8.203	2	4.102	.805	.455
	Within Groups	183.386	36	5.094		
	Total	191.590	38			
Nslf/year	Between Groups	.532	2	.266	.243	.785
	Within Groups	39.322	36	1.092		
	Total	39.854	38			
Ide	Between Groups	2.140	2	1.070	.803	.478
	Within Groups	11.992	9	1.332		
	Total	14.132	11			
Spear elongation	Between Groups	159.160	1	159.160	3.016	.181
	Within Groups	158.302	3	52.767		
	Total	317.462	4			

Appendix 8.1.2

A. ANOVA test for growth variables of juveniles and Tukey test for Lde of juveniles at site 2.

Test of Homogeneity of Variances

	Levene Statistic	df1	df2	Sig.
lls	2.167	2	20	.141
age	.886	2	20	.428
llf	1.514	2	20	.244
dlf	1.833	2	20	.186
tlf	.452	2	20	.643
Nslf/year	.749	2	20	.486
Lde	.373	2	10	.698

Post Hoc Tests

Multiple Comparisons

Lde

Tukey HSD

(I) plot x x	(J) plot	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1	2	.7383	.6274	.492	-.982	2.458
	3	-1.4333	.5303	.053	-2.887	.020
2	1	-.7383	.6274	.492	-2.458	.982
	3	-2.1717*	.5809	.010	-3.764	-.579
3	1	1.4333	.5303	.053	-.020	2.887
	2	2.1717*	.5809	.010	.579	3.764

*. The mean difference is significant at the 0.05 level.

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
lifespan	Between Groups	4.746	2	2.373	5.353	.014
	Within Groups	8.867	20	.443		
	Total	13.613	22			
age	Between Groups	4.464	2	2.232	1.871	.180
	Within Groups	23.856	20	1.193		
	Total	28.320	22			
lfl	Between Groups	4.896	2	2.448	2.862	.081
	Within Groups	17.104	20	.855		
	Total	22.000	22			
dlf	Between Groups	.671	2	.336	.146	.865
	Within Groups	45.938	20	2.297		
	Total	46.609	22			
tlf	Between Groups	13.639	2	6.819	2.718	.090
	Within Groups	50.187	20	2.509		
	Total	63.826	22			
nslf1	Between Groups	4.076	2	2.038	4.008	.034
	Within Groups	10.170	20	.509		
	Total	14.246	22			
Lde	Between Groups	10.826	2	5.413	8.022	.008
	Within Groups	6.748	10	.675		
	Total	17.574	12			

B. ANOVA test and test of homogeneity of variances for growth variables, Games-Howell for dlf, Tukey t tests for nslf / year and Games-Howell for Lde in adults at site 2.

Test of Homogeneity of Variances

	Levene Statistic	df1	df2	Sig.
lifespan	1.257	2	87	.290
llf	2.608	2	87	.079
dlf	4.533	2	87	.013
tlf	1.473	2	87	.235
lde	3.460	2	31	.044
nslf1	.885	2	87	.416
age	2.791	2	87	.067
Spear elongation	.958	2	28	.396

Post Hoc Tests

Multiple Comparisons

dlf

Games-Howell

(I) plot	(J) plot	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1	2	.724	.560	.411	-.66	2.11
	3	-.489	.601	.697	-1.96	.98
2	1	-.724	.560	.411	-2.11	.66
	3	-1.212*	.400	.010	-2.17	-.25
3	1	.489	.601	.697	-.98	1.96
	2	1.212*	.400	.010	.25	2.17

*. The mean difference is significant at the 0.05 level.

Multiple Comparisons

	(I) plot	(J) plot	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Tukey HSD Nslf / year	1	2	-.2929	.1944	.293	-.756	.171
		3	.3156	.1924	.234	-.143	.774
	2	1	.2929	.1944	.293	-.171	.756
		3	.6085*	.1649	.001	.215	1.002
	3	1	-.3156	.1924	.234	-.774	.143
		2	-.6085*	.1649	.001	-1.002	-.215

Lde

Games-Howell

(I) plot x x	(J) plot	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1.00	2.00	-.20000	.47211	.907	-1.4501	1.0501
	3.00	-1.40000*	.45246	.026	-2.6248	-.1752
2.00	1.00	.20000	.47211	.907	-1.0501	1.4501
	3.00	-1.20000*	.28548	.001	-1.9153	-.4847
3.00	1.00	1.40000*	.45246	.026	.1752	2.6248
	2.00	1.20000*	.28548	.001	.4847	1.9153

*. The mean difference is significant at the 0.05 level.

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
lls	Between Groups	35.743	2	17.871	14.685	.000
	Within Groups	105.880	87	1.217		
	Total	141.623	89			
llf	Between Groups	50.479	2	25.240	21.582	.000
	Within Groups	101.743	87	1.169		
	Total	152.222	89			
dlf	Between Groups	25.859	2	12.929	3.862	.025
	Within Groups	291.297	87	3.348		
	Total	317.156	89			
tlf	Between Groups	42.933	2	21.467	4.300	.017
	Within Groups	434.356	87	4.993		
	Total	477.289	89			
lde	Between Groups	10.938	2	5.469	6.350	.005
	Within Groups	26.700	31	.861		
	Total	37.638	33			
Nslf/year	Between Groups	6.481	2	3.240	6.812	.002
	Within Groups	41.387	87	.476		
	Total	47.867	89			
age	Between Groups	1.574	2	.787	.200	.819
	Within Groups	342.189	87	3.933		
	Total	343.763	89			
Spear elongation	Between Groups	896.049	2	448.025	2.483	.102
	Within Groups	5051.668	28	180.417		
	Total	5947.717	30			

C. ANOVA test and test of homogeneity of variances for growth variables of matures, Tukey test for llf of matures at site 2.

Test of Homogeneity of Variances

	Levene Statistic	df1	df2	Sig.
lls	1.712	2	16	.212
age	3.950	2	16	.040
llf	1.429	2	16	.269
dlf	3.124	2	16	.072
tlf	5.057	2	16	.020
lde	.771	2	9	.491
nslf/year	1.298	2	16	.300
Spear elongation	2.993	2	8	.107

Multiple Comparisons

llf

Tukey HSD

(I) plot	(J) plot	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1	2	-1.667*	.549	.020	-3.08	-.25
	3	.000	.481	1.000	-1.24	1.24
2	1	1.667*	.549	.020	.25	3.08
	3	1.667*	.589	.031	.15	3.19
3	1	.000	.481	1.000	-1.24	1.24
	2	-1.667*	.589	.031	-3.19	-.15

*. The mean difference is significant at the 0.05 level.

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Ilf	Between Groups	11.334	2	5.667	4.247	.033
	Within Groups	21.352	16	1.335		
	Total	32.686	18			
age	Between Groups	5.736	2	2.868	1.022	.382
	Within Groups	44.916	16	2.807		
	Total	50.652	18			
Ilf	Between Groups	8.772	2	4.386	5.263	.018
	Within Groups	13.333	16	.833		
	Total	22.105	18			
dlf	Between Groups	22.404	2	11.202	2.971	.080
	Within Groups	60.333	16	3.771		
	Total	82.737	18			
tlf	Between Groups	5.882	2	2.941	.705	.509
	Within Groups	66.750	16	4.172		
	Total	72.632	18			
Ide	Between Groups	5.803	2	2.902	5.526	.027
	Within Groups	4.726	9	.525		
	Total	10.529	11			
Nslf/year	Between Groups	.821	2	.410	1.256	.311
	Within Groups	5.225	16	.327		
	Total	6.045	18			
Spear elongation	Between Groups	964.270	2	482.135	2.688	.128
	Within Groups	1434.835	8	179.354		
	Total	2399.105	10			

Appendix 8.2

A. ANOVA test, test of homogeneity of variances and Tukey test for soil variables at site 1.

Test of Homogeneity of Variances

	Levene Statistic	df1	df2	Sig.
PH	1.250	2	24	.305
temperature	1.495	2	24	.244
mc	.090	2	69	.914

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
PH	Between Groups	.688	2	.344	4.100	.029
	Within Groups	2.015	24	.084		
	Total	2.703	26			
temperature	Between Groups	.380	2	.190	.682	.515
	Within Groups	6.687	24	.279		
	Total	7.067	26			
mc	Between Groups	152.812	2	76.406	4.184	.019
	Within Groups	1259.964	69	18.260		
	Total	1412.776	71			

Post Hoc Tests

Multiple Comparisons

Tukey HSD

Dependent Variable	(I) plot	(J) plot	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
PH	1.00	2.00	-.25444	.13659	.171	-.5955	.0867
		3.00	-.38444*	.13659	.025	-.7255	-.0433
	2.00	1.00	.25444	.13659	.171	-.0867	.5955
		3.00	-.13000	.13659	.614	-.4711	.2111
	3.00	1.00	.38444*	.13659	.025	.0433	.7255
		2.00	.13000	.13659	.614	-.2111	.4711
temperature	1.00	2.00	.26667	.24882	.540	-.3547	.8881
		3.00	.23333	.24882	.622	-.3881	.8547
	2.00	1.00	-.26667	.24882	.540	-.8881	.3547
		3.00	-.03333	.24882	.990	-.6547	.5881
	3.00	1.00	-.23333	.24882	.622	-.8547	.3881
		2.00	.03333	.24882	.990	-.5881	.6547

*. The mean difference is significant at the 0.05 level.

Multiple Comparisons

mc

Tukey HSD

(I) plot	(J) plot	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1.00	2.00	3.13125*	1.23357	.035	.1765	6.0860
	3.00	.08333	1.23357	.997	-2.8715	3.0381
2.00	1.00	-3.13125*	1.23357	.035	-6.0860	-.1765
	3.00	-3.04792*	1.23357	.042	-6.0027	-.0931
3.00	1.00	-.08333	1.23357	.997	-3.0381	2.8715
	2.00	3.04792*	1.23357	.042	.0931	6.0027

*. The mean difference is significant at the 0.05 level.

B. ANOVA test and test of homogeneity of variances for soil variables at site 2.

Test of Homogeneity of Variances

	Levene Statistic	df1	df2	Sig.
PH	3.420	2	24	.049
temperature	.284	2	24	.756
mc	.459	2	60	.634

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
PH	Between Groups	1.983	2	.991	3.201	.059
	Within Groups	7.433	24	.310		
	Total	9.416	26			
temperature	Between Groups	.140	2	.070	.037	.963
	Within Groups	45.007	24	1.875		
	Total	45.147	26			
mc	Between Groups	13.928	2	6.964	.967	.386
	Within Groups	432.092	60	7.202		
	Total	446.020	62			

mc

Tukey HSD

(I) plot	(J) plot	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1.00	2.00	-.74429	.82817	.643	-2.7345	1.2460
	3.00	.38905	.82817	.886	-1.6012	2.3793
2.00	1.00	.74429	.82817	.643	-1.2460	2.7345
	3.00	1.13333	.82817	.364	-.8569	3.1236
3.00	1.00	-.38905	.82817	.886	-2.3793	1.6012
	2.00	-1.13333	.82817	.364	-3.1236	.8569

Appendix 8.3

Appendix 8.3.1

A. ANOVA test and test of homogeneity of variances for physical parameters of water samples at site 1.

Test of Homogeneity of Variances

	Levene Statistic	df1	df2	Sig.
Salinity	1.009	2	60	.371
PH	1.241	2	60	.296
Temperature	1.505	2	60	.230
Do	1.169	2	60	.318
EC	.581	2	60	.563
TDS	1.484	2	60	.235

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
salinity	Between Groups	4.149	2	2.074	.368	.694
	Within Groups	338.123	60	5.635		
	Total	342.272	62			
PH	Between Groups	.028	2	.014	.163	.850
	Within Groups	5.160	60	.086		
	Total	5.188	62			
Temperature	Between Groups	.315	2	.157	.329	.721
	Within Groups	28.710	60	.478		
	Total	29.024	62			
Do	Between Groups	.681	2	.340	.190	.827
	Within Groups	107.226	60	1.787		
	Total	107.907	62			
EC	Between Groups	4.585	2	2.293	.124	.883
	Within Groups	1108.166	60	18.469		
	Total	1112.751	62			
TDS	Between Groups	3.461	2	1.730	.279	.757
	Within Groups	371.813	60	6.197		
	Total	375.273	62			

B. ANOVA test for heavy metals of water samples at site 1.

Test of Homogeneity of Variances

Levene Statistic	df1	df2	Sig.
Pb 3.398	2	7	.093
Cu .159	2	42	.854
Zn 1.590	2	28	.222
As .271	2	46	.764

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Pb					
Between Groups	.001	2	.001	1.445	.298
Within Groups	.003	7	.000		
Total	.004	9			
Cu					
Between Groups	.000	2	.000	.030	.970
Within Groups	.137	42	.003		
Total	.137	44			
Zn					
Between Groups	.000	2	.000	.464	.633
Within Groups	.006	28	.000		
Total	.006	30			
As					
Between Groups	.004	2	.002	.083	.920
Within Groups	1.147	46	.025		
Total	1.151	48			

B. ANOVA test and test of homogeneity of variances for majored metals and trace metals of water samples at site 1.

Test of Homogeneity of Variances

	Levene Statistic	df1	df2	Sig.
Ca	1.103	2	57	.339
Mg	2.196	2	57	.121
Mn	2.153	2	50	.127
Fe	.827	2	34	.446
Al	.080	2	36	.923

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Ca					
Between Groups	12710.492	2	6355.246	1.767	.180
Within Groups	204999.894	57	3596.489		
Total	217710.385	59			
Mg					
Between Groups	32373.137	2	16186.569	544	.583
Within Groups	1695446.468	57	29744.675		
Total	1727819.606	59			
Mn					
Between Groups	.017	2	.009	.250	.780
Within Groups	1.707	50	.034		
Total	1.724	52			
Fe					
Between Groups	.250	2	.125	1.323	.280
Within Groups	3.218	34	.095		
Total	3.469	36			
Al					
Between Groups	.194	2	.097	1.080	.350
Within Groups	3.242	36	.090		
Total	3.437	38			

D. ANOVA test and test of homogeneity of variances for anions of water samples at site 1.

Test of Homogeneity of Variances

Levene Statistic	df1	df2	Sig.
Chloride .614	2	59	.545
Sulphate 6.057	2	54	.004
Nitrate 3.187	2	53	.049

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Chloride					
Between Groups	141.958	2	70.979	.579	.564
Within Groups	7237.191	59	122.664		
Total	7379.149	61			
Sulphate					
Between Groups	318.144	2	159.072	1.452	.243
Within Groups	5916.862	54	109.572		
Total	6235.007	56			
Nitrate					
Between Groups	255.947	2	127.974	.875	.423
Within Groups	7751.836	53	146.261		
Total	8007.783	55			

Appendix 8.3.2

A. ANOVA test and test of homogeneity of variances for physical parameters of water samples at site 2.

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
PH	Between Groups	.489	2	.244	1.815	.173
	Within Groups	6.865	51	.135		
	Total	7.354	53			
salinity	Between Groups	.662	2	.331	.084	.919
	Within Groups	200.708	51	3.935		
	Total	201.370	53			
temperature	Between Groups	.001	2	.001	.001	.999
	Within Groups	46.142	51	.905		
	Total	46.143	53			
Do	Between Groups	2.080	2	1.040	.352	.705
	Within Groups	150.487	51	2.951		
	Total	152.567	53			
TDS	Between Groups	46.577	2	23.288	1.244	.297
	Within Groups	955.068	51	18.727		
	Total	1001.645	53			
EC	Between Groups	6.770	2	3.385	.493	.614
	Within Groups	350.513	51	6.873		
	Total	357.283	53			

Test of Homogeneity of Variances

	Levene Statistic	df1	df2	Sig.
PH	1.205	2	51	.308
salinity	.035	2	51	.965
temperature	1.038	2	51	.361
Do	.584	2	51	.561
TDS	3.246	2	51	.047
EC	4.939	2	51	.011

B. ANOVA test and test of homogeneity of variances for heavy metals of water samples at site 2.

Test of Homogeneity of Variances

	Levene Statistic	df1	df2	Sig.
Pb	.061	2	8	.941
Cu	2.204	2	38	.124
Zn	13.163	2	14	.001
As	4.478	2	28	.021

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Pb					
Between Groups	.000	2	.000	.584	.580
Within Groups	.002	8	.000		
Total	.002	10			
Cu					
Between Groups	.002	2	.001	.829	.444
Within Groups	.041	38	.001		
Total	.043	40			
Zn					
Between Groups	.088	2	.044	2.060	.164
Within Groups	.299	14	.021		
Total	.387	16			
As					
Between Groups	.065	2	.033	.887	.423
Within Groups	1.030	28	.037		
Total	1.096	30			

C. ANOVA test and test of homogeneity of variances or majore metals and trace metals of water samples at site 2.

Test of Homogeneity of Variances

	Levene Statistic	df1	df2	Sig.
Ca	6.716	2	51	.003
Mg	5.072	2	42	.011
Mn	1.244	2	43	.298
Fe	4.126	2	31	.026
Al	7.393	2	26	.003

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Ca					
Between Groups	33022.936	2	16511.468	2.039	.141
Within Groups	413001.370	51	8098.066		
Total	446024.306	53			
Mg					
Between Groups	4703.608	2	2351.804	.656	.524
Within Groups	150657.470	42	3587.083		
Total	155361.078	44			
Mn					
Between Groups	.005	2	.002	1.143	.328
Within Groups	.086	43	.002		
Total	.090	45			
Fe					
Between Groups	5.997	2	2.999	1.084	.351
Within Groups	85.775	31	2.767		
Total	91.772	33			
Al					
Between Groups	.103	2	.052	2.108	.142
Within Groups	.636	26	.024		
Total	.739	28			

C. ANOVA test and test of homogeneity of variances for anions of water samples at site 2.

Test of Homogeneity of Variances

Levene Statistic	df1	df2	Sig.
Chloride .989	2	40	.381
Sulphate 1.249	2	41	.297
Nitrate 5.379	2	23	.012

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Chloride					
Between Groups	125.986	2	62.993	.873	.426
Within Groups	2887.427	40	72.186		
Total	3013.413	42			
Sulphate					
Between Groups	8.878	2	4.439	4.134	.023
Within Groups	44.019	41	1.074		
Total	52.897	43			
Nitrate					
Between Groups	854.678	2	427.339	.944	.403
Within Groups	10406.705	23	452.465		
Total	11261.383	25			

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