Data Report

Seagrass Health Monitoring in the Jurien Bay Marine Park

Year Two –Baseline Sampling February 2004

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Prepared for
Department of Environment
And
Strategic Research Fund for the Marine Environment

Introduction

This report summarises the methods and data collected for monitoring of seagrass within the Jurien Bay Marine Park (JBMP).

These data provide a baseline upon which any possible changes to the seagrass parameters measured can be referenced against in the future. The data were collected as part of a SFRME Collaborative project designed to address strategic research needs for the central west coast. The data collected will assist the Department of Environment (DoE) in its development of environmental quality criteria for the State's marine waters, and particularly in the central west coast region. This project will also contribute to the management of the "seagrass marine ecological value" of the JBMP as per the JBMP Management Plan.

The methods are based on those used to monitor seagrasses in both Cockburn and Warnbro Sounds in 2003 (Lavery & Westera, 2003), allowing the data to be compared.

The Monitoring was funded by the Strategic Research Fund for the Marine Environment.

Sampling & Personnel

Seagrass sampling and site selection was performed on 27th and 28th of February 2004 by:
T. Daly (DoE, vessel skipper);
P. Lavery (ECU)
J. How (ECU)
M. Westera (ECU)
M. Vanderklift (ECU)
T. Wernberg (ECU)

Site Description

The JBMP was declared open on 31 August 2003. The township of Jurien is located centrally along the length of the Park and is approximately 200 km north of Perth, Western Australia.

Sampling locations were established at three depths at each of two sites, Boullanger Island and Fisherman's Island. The Boullanger Island site is located close to the Jurien Bay township in a Special Purpose (Puerulus) Zone, while the Fisherman Islands site is approximately 17 km north of the township and is within the Fisherman Islands Sanctuary Zone. One site that was established in 2003, the 2.5 m deep site at Fisherman Islands, fell just outside the sanctuary zone. As a result a new site was established and sampled at the 2.5m depth that was within the sanctuary zone of Fisherman Islands. (see Table 1). The 2002 site was not re-sampled in 2004.

Table 1 Site details for sites established in March – April 2001 and new site established in February 2004 as part of the Seagrass Health monitoring Programme.

Location	Waypoint No.	Depth	UTM Coordinates		Comment
			East	North	
Fisherman Is.	45	2.0 m	307408	6664795	2003 site – not sampled 2004
	70	2.5m	307146	6664594	New site for 2004
	58	3.5 m	306940	6665428	
	47	5.5 m	306417	6664328	
Boullanger Is.	52	2.5 m	307929	6644723	
	56	3.5 m	307955	6644916	
	54	5.5 m	307971	6645019	

Methods

Site Establishment

Sites were established on large *Posidonia sinuosa* dominated seagrass meadows, which incorporated the range of depths required for monitoring.

At each site, a central star picket was driven into the sediment to locate the site (see GPS coordinates in Table 1). Four transects were randomly located at each site by assigning bearings from the central star picket to the start point of each transect. Each transect then continued along a new random bearing for a length of 10 meters. (Appendix 2) A subsequent depth measurement was made at the end of each transect to ensure it was within the allowable depth limits for that site. If the depth at the end of the transect was outside the allowable depth limits the end of the transect was rotated until it satisfied the criterion (being within ±0.2m of the assigned depth for that site).

Along the transect, six randomly assigned permanent quadrats were sampled for shoot density, percentage cover, maximum and average shoot height. For those quadrats where the randomly assigned position was either on bare sand (i.e. no shoots) or contained other seagrass species other than *P. sinuosa*, the quadrat was moved until it contained shoots of only *P. sinuosa*. Data were collected as follows.

Shoot Density

The number of shoots within the 20 x 20 cm quadrat was recorded by a diver on SCUBA. This was then expressed as a density of shoots per $1m^2$.

$0.04\ m^2 \times 25 = 1\ m^2$

Maximum Shoot Height

The maximum shoot height was recorded by placing a one metre rule on the seabed and measuring the tallest leaf inside the 20 x 20 cm quadrat.

Average Shoot Height

The average shoot height was recorded by placing a one metre rule on the seabed and measuring the height above the sea floor of 80% of the seagrass leaves inside the 20 x 20 cm quadrat (i.e. the tallest 20% of leaves are ignored; as per Duarte & Kirkman, 2001). The 80^{th} percentile was estimated visually.

Percentage Cover

Within the 20 x 20 cm quadrat all leaves were stood upright and an estimate of the percentage of the quadrat that contained seagrass was made.

Light measurement

Odyssey data loggers with 2π light sensors were deployed to measure photosynthetically active radiation (PAR). Two PAR loggers, each with automatic wiper units to minimise sensor fouling, were deployed in an arrangement to enable continuous assessment light attenuation at 5.5 m at the Fisherman Islands site. Another logger was deployed at a shore station at the DCLM District office in Jurien to measure ambient surface PAR.

Maintenance of these loggers is undertaken by the DoE and PAR data have not been provided here.

Results

The following figures summarise seagrass health monitoring data collected in the JBMP during 2004. Raw data is provided in Appendix 1.

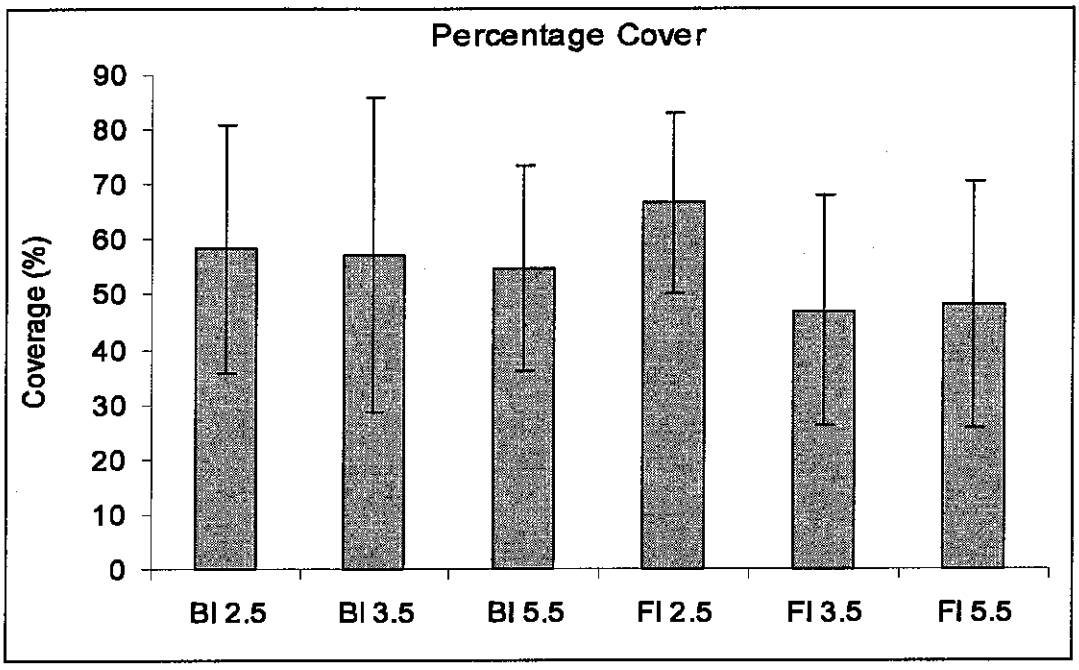


Figure 1 – Mean percent cover (± std dev) of seagrass at each site monitored in Jurien Bay Marine Park, February 2004. BI = Boullanger Island sites, FI = Fisherman Islands sites.

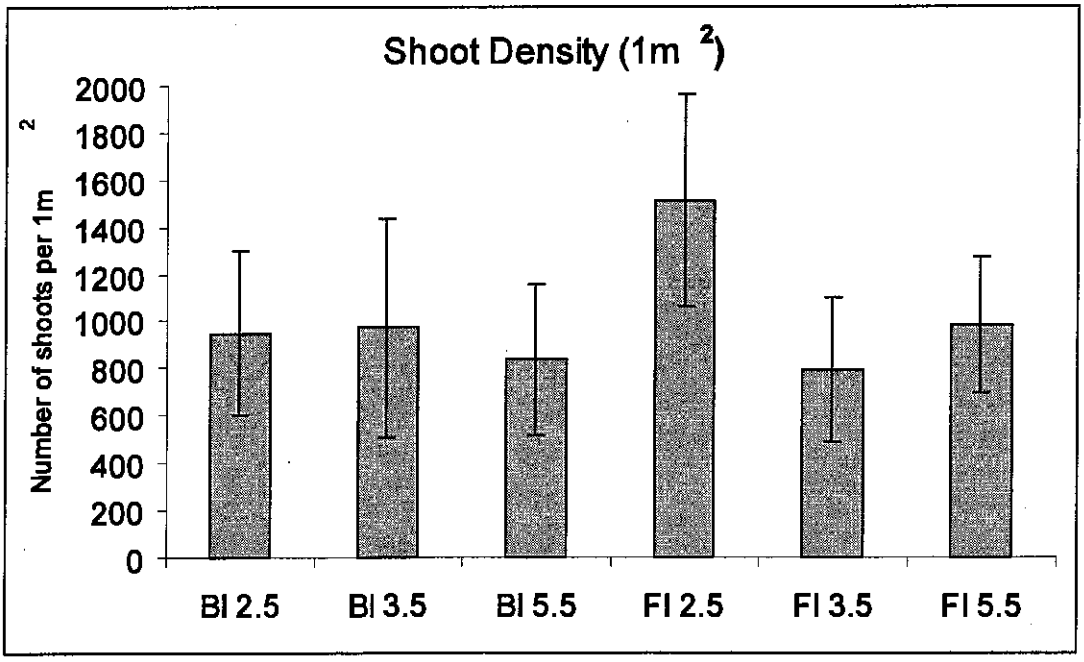


Figure 2 – Mean shoot density (± std dev) of seagrass at each site monitored in Jurien Bay Marine Park, February 2004. BI = Boullanger Island sites, FI = Fisherman Islands sites.

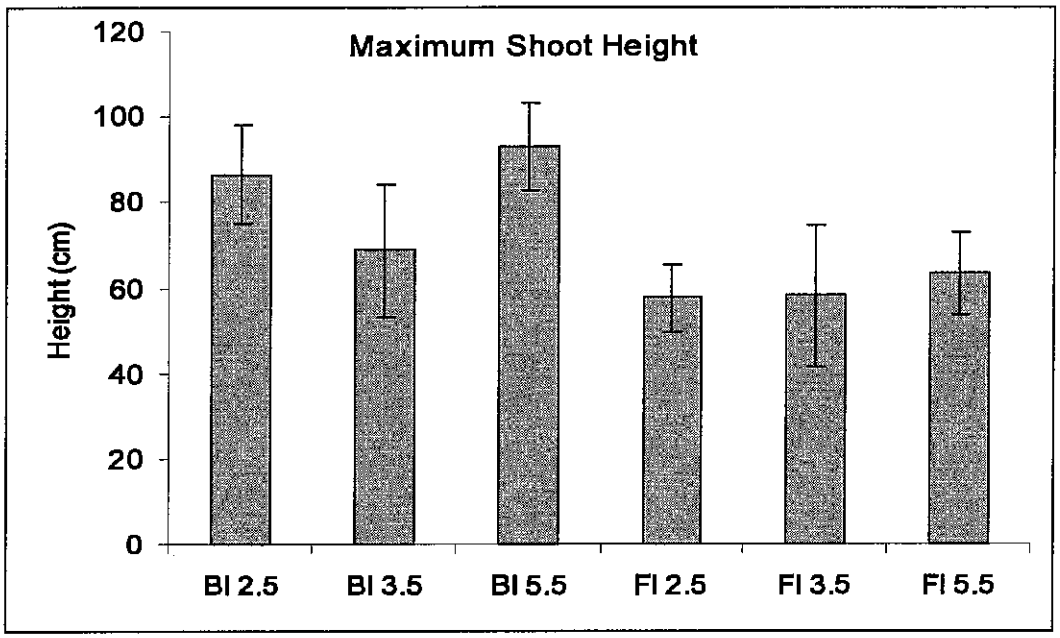


Figure 3 – Mean of maximum shoot height (± std dev) of seagrass at each site monitored in Jurien Bay Marine Park, February 2004. BI = Boullanger Island sites, FI = Fisherman Islands sites.

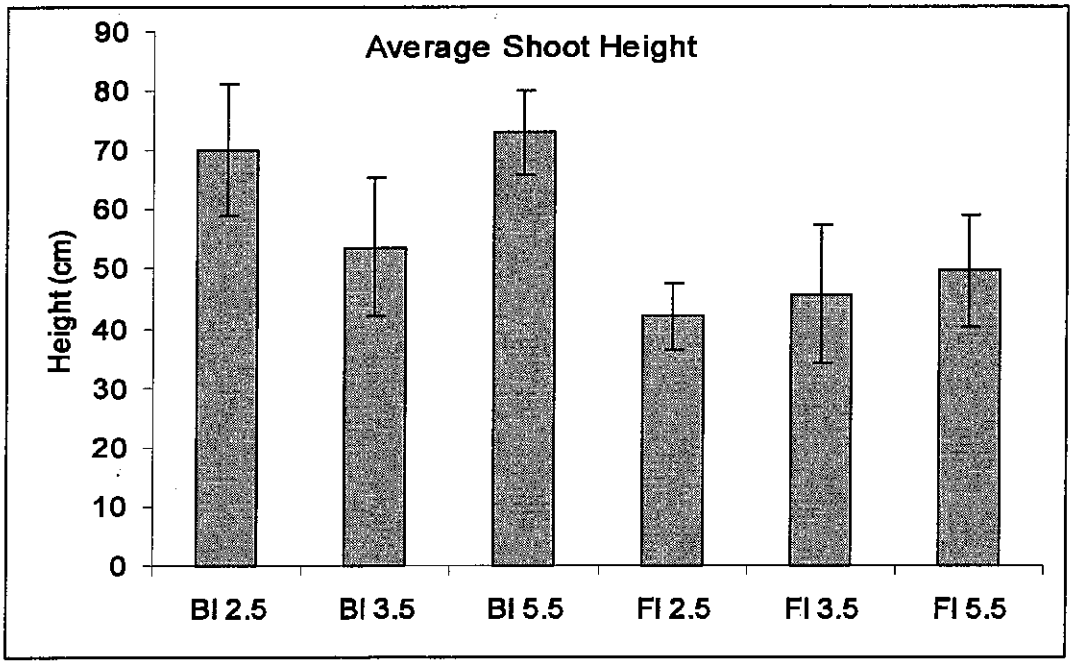


Figure 4 – Mean of average shoot height (± std dev) of seagrass at each site monitored in the Jurien Bay Marine Park, February 2004. BI = Boullanger Island sites, FI = Fisherman Islands sites.

References

Duarte CM and Kirkman H. 2001 Methods for measurement of seagrass abundance and depth distribution. In: Short FT, Coles RG and Short CA (Eds) Global Seagrass Research Methods. Elsevier Publ. Amsterdam

Lavery P and Westera M. 2003 A survey of Selected Seagrass Meadows in the Fremantle to Warnbro Sound Region, 2003. Centre for Ecosystem Management Report 2003-08.

Appendix 1 – Raw Data

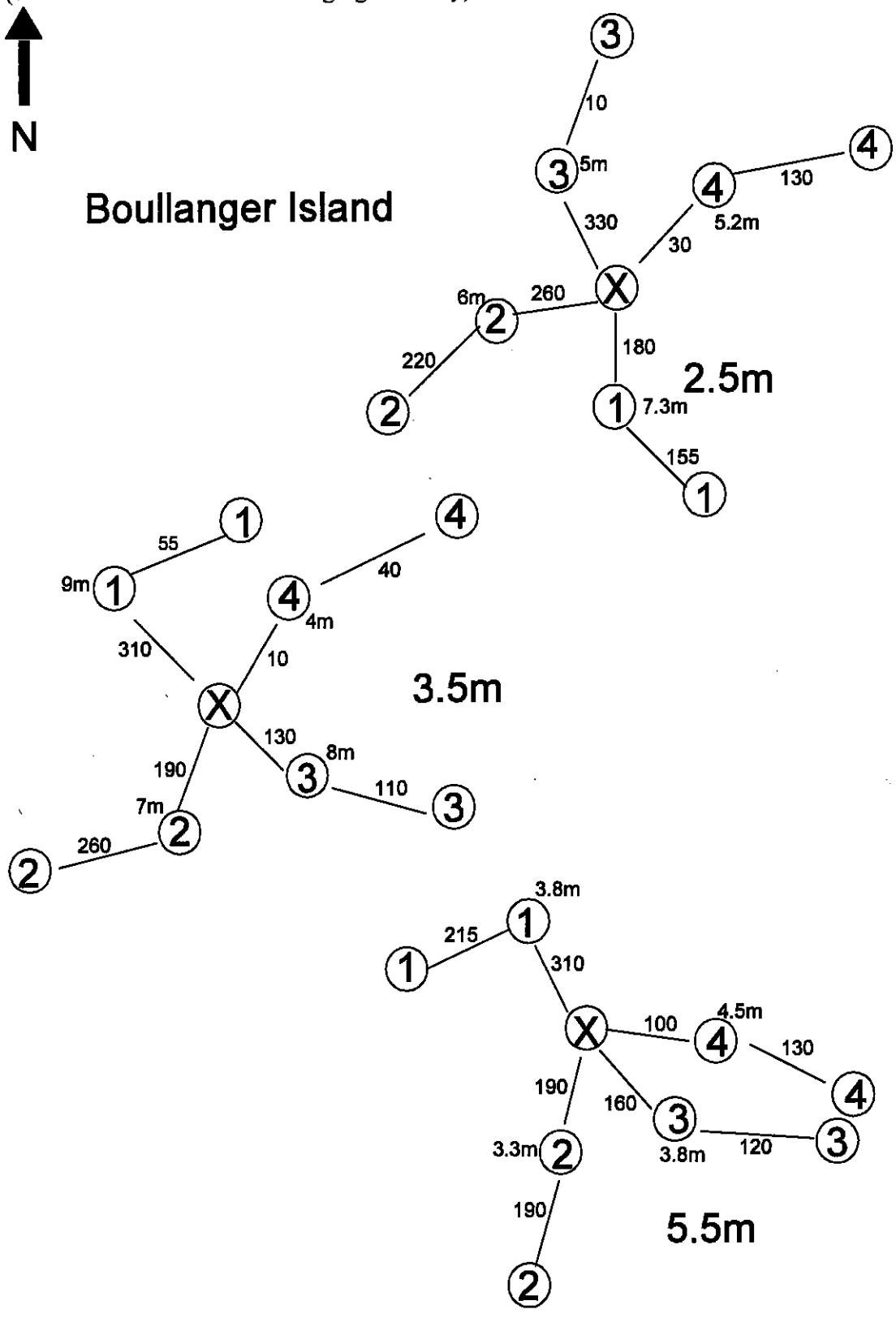
Island	depth	transect	distance	Shoot density	max height	avg height	% cover
Boullanger Island	2.5	1	1	37	64	55	60
Boullanger Island	2.5	1	2	54	78	60	75
Boullanger Island	2.5	1	3	50	85	65	85
Boullanger Island	2.5	1	6	48	97	81	75
Boullanger Island	2.5	1	7.2	43	87	60	60
Boullanger Island	2.5	1	9.5	35	87	68	60
Boullanger Island	2.5	2	0	29	95	85	60
Boullanger Island	2.5	2	0.5	33	76	64	50
Boullanger Island	2.5	2	3	63	92	70	100
Boullanger Island	2.5	2	3.5	29	74	56	50
Boullanger Island	2.5	2	7	17	93	79	25
Boullanger Island	2.5	2	8.9	34	70	58	30
Boullanger Island	2.5	3	2.5	49	103	94	80
Boullanger Island	2.5	3	3.5	38	97	74	40
Boullanger Island	2.5	3	4	56	78	65	75
Boullanger Island	2.5	3	4.5	56	91	75	75
Boullanger Island	2.5	3	5	28	82	75	40
Boullanger Island	2.5	3	9.5	29	90	56	40
Boullanger Island	2.5	4	3	38	88	76	70
Boullanger Island	2.5	4	5	48	105	92	100
Boullanger Island	2.5	4	8	23	95	72	40
Boullanger Island	2.5	4	8.5	4	65	60	10
Boullanger Island	2.5	4	9	25	100	78	50
Boullanger Island	2.5	4	9.5	46	85	62	50
Boullanger Island	3.5	1	1.5	70	84	62	75
Boullanger Island	3.5	1	2.5	9	32	28	10
Boullanger Island	3.5	1	3	37	70	56	30
Boullanger Island	3.5	1	4.5	25	61	45	25
Boullanger Island	3.5	1	7	54	61	50	75
Boullanger Island	3.5	1	8	64	62	45	75
Boullanger Island	3.5	2	1	45	66	47	100
Boullanger Island	3.5	2	1.5	55	71	52	95
Boullanger Island	3.5	2	4	32	83	74	50
Boullanger Island	3.5	2	4.5	59	66	52	70
Boullanger Island	3.5	2	6	47	49	45	60
Boullanger Island	3.5	2	8.5	20	61	45	90
Boullanger Island	3.5	3	3.5	3	42	38	5
Boullanger Island	3.5	3	5.5	25	64	50	50
Boullanger Island	3.5	3	6	42	61	50	75
Boullanger Island	3.5	3	7.5	38	83	55	40
Boullanger Island	3.5	3	8	49	69	57	55
Boullanger Island	3.5	3	9	66	62	51	75
Boullanger Island	3.5	4	1.5	11	75	53	20
Boullanger Island	3.5	4	2	51	94	72	100
Boullanger Island	3.5	4	2.5	34	98	82	80
Boullanger Island	3.5	4	7	44	69	54	50
Boullanger Island	3.5	4	8	15	89	68	15
Boullanger Island	3.5	4	9.5	40	80	57	50
Boullanger Island	5.5	1	1.5	17	96	72	40
Boullanger Island	5.5	1	2.5	51	91	74	70

Boullanger Island	5.5	1	3	27	85	70	50
Boullanger Island	5.5	1	6.5	34	82	61	35
Boullanger Island	5.5	1	7	28	82	60	50
Boullanger Island	5.5	1	7.5	45	91	69	40
Boullanger Island	5.5	2	1	44	101	82	70
Boullanger Island	5.5	2	4	10	92	75	15
Boullanger Island	5.5	2	4.5	33	115	79	40
Boullanger Island	5.5	2	6.5	23	77	74	50
Boullanger Island	5.5	2	8	51	91	68	75
Boullanger Island	5.5	2	8.5	48	86	70	60
Boullanger Island	5.5	3	1	49	98	80	45
Boullanger Island	5.5	3	3	38	94	80	50
Boullanger Island	5.5	3	5	38	87	75	75
Boullanger Island	5.5	3	5.5	31	82	70	75
Boullanger Island	5.5	3	8	50	98	70	60
Boullanger Island	5.5	3	9	17	81	57	15
Boullanger Island	5.5	4	2	38	95	70	75
Boullanger Island	5.5	4	2.5	41	89	74	80
Boullanger Island	5.5	4	5.5	37	110	80	50
Boullanger Island	5.5	4	8.5	18	117	75	75
Boullanger Island	5.5	4	9	13	100	85	70
Boullanger Island	5.5	4	9.5	23	92	82	50
Fisherman Islands	2.5	1	4	33	46	37	70
Fisherman Islands	2.5	1	5	45	58	40	50
Fisherman Islands	2.5	1	6	39	48	38	40
Fisherman Islands	2.5	1	7.5	40	49	36	40
Fisherman Islands	2.5	1	8	34	59	42	60
Fisherman Islands	2.5	1	8.5	80	57	42	75
Fisherman Islands	2.5	2	0.5	78	72	37	80
Fisherman Islands	2.5	2	1	79	58	35	75
Fisherman Islands	2.5	2	3	73	74	57	70
Fisherman Islands	2.5	2	4	83	52	38	80
Fisherman Islands	2.5	2	4.5	74	65	46	70
Fisherman Islands	2.5	2	5	74	72	51	70
Fisherman Islands	2.5	3	1	73	55	39	75
Fisherman Islands	2.5	3	4	60	64	50	70
Fisherman Islands	2.5	3	4.5	51	60	42	75
Fisherman Islands	2.5	3	6	76	47	40	75
Fisherman Islands	2.5	3	8.5	85	62	43	80
Fisherman Islands	2.5	3	9	73	61	50	90
Fisherman Islands	2.5	4	1	40	53	42	50
Fisherman Islands	2.5	4	1.5	47	51	38	40
Fisherman Islands	2.5	4	2	39	53	40	30
Fisherman Islands	2.5	4	3	73	59	45	75
Fisherman Islands	2.5	4	4.5	60	57	44	70
Fisherman Islands	2.5	4	6	42	47	36	90
Fisherman Islands	3.5	1	1.5	35	51	47	40
Fisherman Islands	3.5	1	2.5	36	53	50	50
Fisherman Islands	3.5	1	3	21	28	42	25
Fisherman Islands	3.5	1	4.5	36	42	32	65
Fisherman Islands	3.5	1	7	24	31	21	40
Fisherman Islands	3.5	1	8	8	32	30	5
Fisherman Islands	3.5	2	1	40	67	52	70
Fisherman Islands	3.5	2	1.5	15	34	28	20

Fisherman Islands	3.5	2	4	35	74	59	80
Fisherman Islands	3.5	2	4.5	53	70	61	60
Fisherman Islands	3.5	2	6	38	63	52	50
Fisherman Islands	3.5	2	8.5	39	78	55	70
Fisherman Islands	3.5	3	3.5	23	54	35	40
Fisherman Islands	3.5	3	5.5	35	63	41	30
Fisherman Islands	3.5	3	6	31	53	37	60
Fisherman Islands	3.5	3	7	22	53	40	35
Fisherman Islands	3.5	3	8	46	75	55	50
Fisherman Islands	3.5	3	9	34	64	51	40
Fisherman Islands	3.5	4	1	32	65	50	90
Fisherman Islands	3.5	4	1.5	15	45	39	20
Fisherman Islands	3.5	4	2	31	59	45	50
Fisherman Islands	3.5	4	7	27	75	66	40
Fisherman Islands	3.5	4	8	63	86	64	70
Fisherman Islands	3.5	4	9.5	23	76	46	25
Fisherman Islands	5.5	1	0.5	33	62	50	40
Fisherman Islands	5.5	1	1.5	45	64	45	60
Fisherman Islands	5.5	1	2	34	68	55	40
Fisherman Islands	5.5	1	6.5	16	54	45	20
Fisherman Islands	5.5	1	7.5	38	73	54	45
Fisherman Islands	5.5	1	8	30	70	51	40
Fisherman Islands	5.5	2	2.5	27	74	62	50
Fisherman Islands	5.5	2	3.5	51	75	55	90
Fisherman Islands	5.5	2	4	53	73	65	90
Fisherman Islands	5.5	2	5.5	51	50	38	70
Fisherman Islands	5.5	2	6.5	34	60	50	30
Fisherman Islands	5.5	2	9	29	31	20	25
Fisherman Islands	5.5	3	3.5	53	64	58	60
Fisherman Islands	5.5	3	5	51	63	50	50
Fisherman Islands	5.5	3	5.5	36	62	50	40
Fisherman Islands	5.5	3	6	50	62	50	60
Fisherman Islands	5.5	3	6.5				
Fisherman Islands	5.5	3	9	65	55	41	70
Fisherman Islands	5.5	4	2	12	66	45	10
Fisherman Islands	5.5	4	2.5	33	70	56	80
Fisherman Islands	5.5	4	3	27	72	54	60
Fisherman Islands	5.5	4	7.5	36	65	52	25
Fisherman Islands	5.5	4	8	29	60	40	25
Fisherman Islands	5.5	4	8.5	26	64	55	25

Appendix 2 – Site Layout

(Not to scale. Intended as a rough guide only)



Appendix 3 – Raw Data Sheets

Seagrass shoot density JBMP
How Lavery

Mar-03						Feb-04					
Boullanger			Fishermans Is.			Boullanger			Fishermans Is.		
2.5m	3.5m	5.5m	2.5m	3.5m	5.5m	2.5m	3.5m	5.5m	2.5m	3.5m	5.5m
35	48	15	52	39	32	37	70	17	33	35	33
46	15	42	53	21	27	54	9	51	45	36	45
44	35	27	53	22	24	50	37	27	39	21	34
31	20	28	47	41	18	48	25	34	40	36	16
42	48	20	54	24	29	43	54	28	34	24	38
32	52	31	35	6	32	35	64	45	80	8	30
32	52	42	58	44	27	29	45	44	78	40	27
27	37	14	57	13	57	33	55	10	79	15	51
40	30	28	36	45	57	63	32	33	73	35	53
34	54	30	65	51	36	29	59	23	83	53	51
21	36	30	32	38	41	17	47	51	74	38	34
26	24	45	51	34	33	34	20	48	74	39	29
53	5	36	46	17	44	49	3	49	73	23	53
42	25	35	47	31	38	38	25	38	60	35	51
55	33	32	36	23	41	56	42	38	51	31	36
7	40	27	22	21	43	56	38	31	76	22	50
29	40	33	44	24	41	28	49	50	85	46	
34	52	14	37	27	42	29	66	17	73	34	65
42	11	33	38	37	38	38	11	38	40	32	12
52	56	41	46	17	40	48	51	41	47	15	33
28	39	41	38	33	26	23	34	37	39	31	27
8	28	21	44	45	58	4	44	18	73	27	36
25	18	16	40	36	32	25	15	13	60	63	29
46	29	17	40	17	25	46	40	23	42	23	26
34.63	34.46	29.08	44.63	29.42	36.71	38.00	38.96	33.50	60.46	31.75	37.35
865.625	861.4583	727.0833	1115.625	735.4167	917.7083	950	973.9583	837.5	1511.458	793.75	933.6957