Data Report

Seagrass Health Monitoring in the Jurien Bay Marine Park

Year One – Initial Baseline Sampling March 2003

Prepared by
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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 collected will assist the Department of Environment (DoE) in its development of environmental quality criteria for the State's marine waters, 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.

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Sampling & Personnel

Site selection and sampling was conducted between the 31 March 2003 and 3 April 2003. Site selection was undertaken on 31 March 2003 by:

C. Sim (DoE);
T. Daly (DoE, vessel skipper);
P. Lavery (ECU);
M. Westera (ECU); and
T. Grubba (Department of Conservation and Land Management - DCLM)

Seagrass sampling was performed on 1-3 April 2003 by:
C. Sim (DoE);
T. Daly (DoE, vessel skipper);
N. Wood (ECU);
C. Collier (ECU);
J. Eyres (ECU); and
K. Crawley (ECU).

R. Lawrie (DCLM) assisted with the provision of benthic habitat and marine reserve boundary data. The assistance of Mr K. Hockey, Manager, DCLM Moora District is also acknowledged.

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 (Map 1). 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.

Table 1 Site details for all sites established in March – April 2001 as part of the Seagrass Health monitoring Programme. Only 2.5, 3.5 and 5.5 m sites were sampled.

Location	Waypoint No.	Depth	UTM Coordinates		Comment
			East	North	
Fisherman Is.	44	2.7 m	307139	6664796	2:18 31/3/03
	45	2.0 m	307408	6664795	2:56 31/3/03
	58	3.5 m	306940	6665428	6:23 3/4/03
	47	5.5 m	306417	6664328	3:32 31/3/03
	55	2.7 m	307141	6664814	5:02 2/4/03 Not Used
	46	3.5 m	307082	6664820	3:13 31/3/03 Not used
	57	3.5 m	307090	6664842	Not used
Boullanger Is.	52	2.5 m	307929	6644723	7:41 31/3/03
	56	3.5 m	307955	6644916	2:52 3/4/03
	54	5.5 m	307971	6645019	8:23 31/3/03

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 the same bearing for a length of 10 meters. 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 a 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 each 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 (ie. 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 $1m^2$.

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 maximum 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.

At the time this report was prepared the PAR loggers had not be downloaded.
Accordingly, PAR data have not been provided here.

Results

The following figures summarise seagrass health monitoring data collected in the JBMP during 2003. Raw data is provided in Appendix 1.

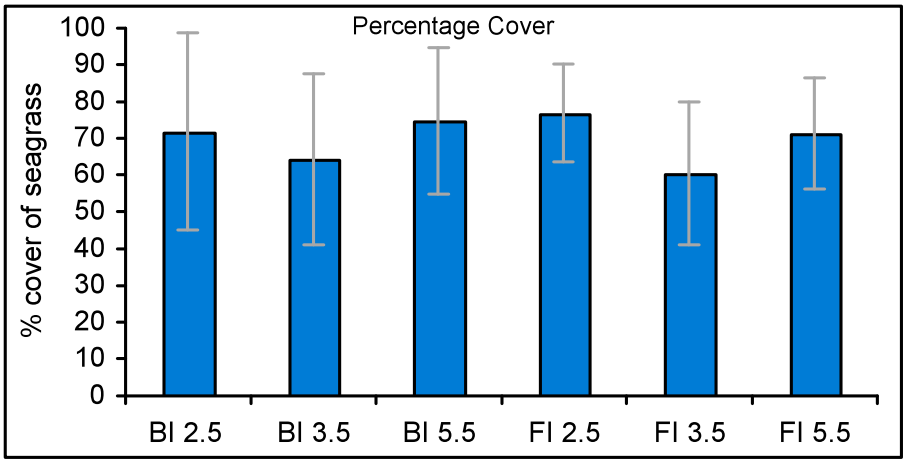

Figure 1 – Mean percent cover (± std dev) of seagrass at each site monitored in Jurien Bay Marine Park, April 2003. BI = Boullanger Island sites, FI = Fisherman Islands sites.

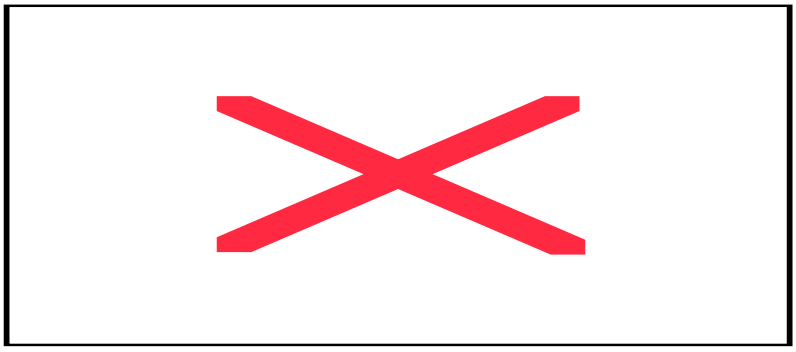

Figure 2 – Mean shoot density (± std dev) of seagrass at each site monitored in Jurien Bay Marine Park, April 2003. BI = Boullanger Island sites, FI = Fisherman Islands sites.

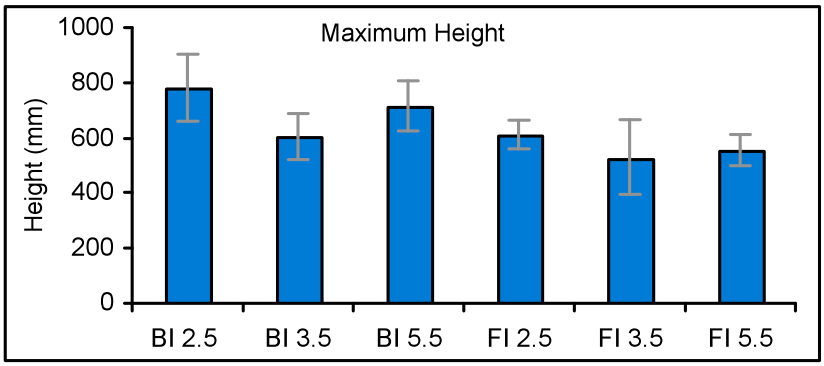

Figure 3 – Mean of maximum shoot height (± std dev) of seagrass at each site monitored in Jurien Bay Marine Park, April 2003. BI = Boullanger Island sites, FI = Fisherman Islands sites.

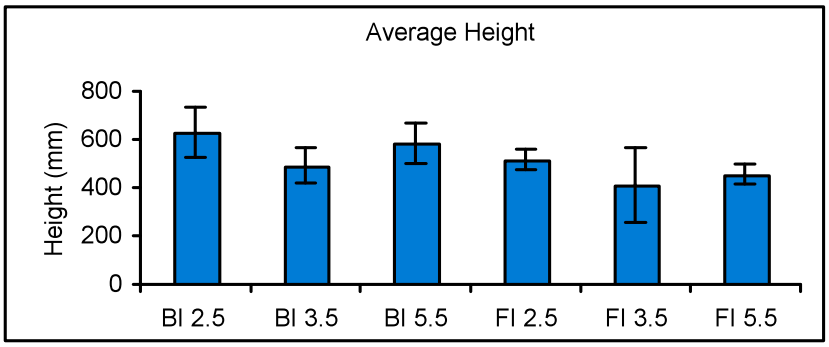

Figure 4 – Mean of average shoot height (± std dev) of seagrass at each site monitored in the Jurien Bay Marine Park, April 2003. BI = Boullanger Island sites, FI = Fisherman Islands sites. Averge shoot height is the mean height of the seagrass after ignoring the tallest 20% of leaves.

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

Site	Depth	Transect	Bearing to Start	Distance to Start	Bearing to End	Distance to End	Bearing of Transect	Quadrat distance	Max Height	Avg Height	Percentage Cover	Shoot Density
Boullanger Is	2.5	1	0	7.1	340	16.7	330	1	705	480	90	35
Boullanger Is	2.5	1	0	7.1	340	16.7	330	2.5	880	690	95	46
Boullanger Is	2.5	1	0	7.1	340	16.7	330	3	790	680	90	44
Boullanger Is	2.5	1	0	7.1	340	16.7	330	6	810	660	95	31
Boullanger Is	2.5	1	0	7.1	340	16.7	330	7.2	710	595	95	42
Boullanger Is	2.5	1	0	7.1	340	16.7	330	9.5	765	640	50	32
Boullanger Is	2.5	2	85	5.8	50	14.5	35	0.0E+01	760	600	75	32
Boullanger Is	2.5	2	85	5.8	50	14.5	35	0.5	890	660	70	27
Boullanger Is	2.5	2	85	5.8	50	14.5	35	3	1115	640	90	40
Boullanger Is	2.5	2	85	5.8	50	14.5	35	3.5	560	440	90	34
Boullanger Is	2.5	2	85	5.8	50	14.5	35	7	950	690	60	21
Boullanger Is	2.5	2	85	5.8	50	14.5	35	8.9	580	470	40	26
Boullanger Is	2.5	3	160	4.95	180	14.5	185	2.5	990	710	95	53
Boullanger Is	2.5	3	160	4.95	180	14.5	185	3.5	720	630	65	42
Boullanger Is	2.5	3	160	4.95	180	14.5	185	4	700	610	100	55
Boullanger Is	2.5	3	160	4.95	180	14.5	185	4.5	730	720	10	7
Boullanger Is	2.5	3	160	4.95	180	14.5	185	5	750	700	85	29
Boullanger Is	2.5	3	160	4.95	180	14.5	185	9.5	790	690	75	34
Boullanger Is	2.5	4	210	5.1	285	8.9	320	3	835	630	70	42
Boullanger Is	2.5	4	210	5.1	285	8.9	320	5	805	650	90	52
Boullanger Is	2.5	4	210	5.1	285	8.9	320	8	750	830	85	28
Boullanger Is	2.5	4	210	5.1	285	8.9	320	8.5	643	340	5	8
Boullanger Is	2.5	4	210	5.1	285	8.9	320	9	788	650	30	25
Boullanger Is	2.5	4	210	5.1	285	8.9	320	9.5	770	700	75	46
Boullanger Is	3.5	1	28.6	9			46	1.5	610	510	95	48
Boullanger Is	3.5	1	28.6	9			46	2.5	520	380	50	15
Boullanger Is	3.5	1	28.6	9			46	3	640	470	70	35
Boullanger Is	3.5	1	28.6	9			46	4.5	570	480	90	20

Boullanger Is	3.5	1	28.6	9			46	7	610	430	70	48
Boullanger Is	3.5	1	28.6	9			46	8	430	380	95	52
Boullanger Is	3.5	2	187	7			255	1	560	480	95	52
Boullanger Is	3.5	2	187	7			255	1.5	580	470	80	37
Boullanger Is	3.5	2	187	7			255	4	690	620	50	30
Boullanger Is	3.5	2	187	7			255	4.5	550	550	60	54
Boullanger Is	3.5	2	187	7			255	6	530	470	70	36
Boullanger Is	3.5	2	187	7			255	8.5	490	430	45	24
Boullanger Is	3.5	3	121	8			116	3.5	490	350	5	5
Boullanger Is	3.5	3	121	8			116	5.5	580	460	40	25
Boullanger Is	3.5	3	121	8			116	6	690	510	60	33
Boullanger Is	3.5	3	121	8			116	7.5	655	500	60	40
Boullanger Is	3.5	3	121	8			116	8	550	420	90	40
Boullanger Is	3.5	3	121	8			116	9	680	480	85	52
Boullanger Is	3.5	4	11	4			35	1.5	640	560	35	11
Boullanger Is	3.5	4	11	4			35	2	670	610	70	56
Boullanger Is	3.5	4	11	4			35	2.5	750	600	75	39
Boullanger Is	3.5	4	11	4			35	7	620	480	60	28
Boullanger Is	3.5	4	11	4			35	8	690	580	25	18
Boullanger Is	3.5	4	11	4			35	9.5	750	590	70	29
Boullanger Is	5.5	1	120	3.8	30	9.3	15	1.5	710	550	80	15
Boullanger Is	5.5	1	120	3.8	30	9.3	15	2.5	745	610	85	42
Boullanger Is	5.5	1	120	3.8	30	9.3	15	3	780	640	75	27
Boullanger Is	5.5	1	120	3.8	30	9.3	15	6.5	610	510	50	28
Boullanger Is	5.5	1	120	3.8	30	9.3	15	7	605	520	75	20
Boullanger Is	5.5	1	120	3.8	30	9.3	15	7.5	710	530	100	31
Boullanger Is	5.5	2	15	3.3	15	13.3	10	1	810	640	90	42
Boullanger Is	5.5	2	15	3.3	15	13.3	10	4	520	420	40	14
Boullanger Is	5.5	2	15	3.3	15	13.3	10	4.5	740	640	90	28
Boullanger Is	5.5	2	15	3.3	15	13.3	10	6.5	660	560	50	30
Boullanger Is	5.5	2	15	3.3	15	13.3	10	8	640	560	85	30
Boullanger Is	5.5	2	15	3.3	15	13.3	10	8.5	720	590	90	45
Boullanger Is	5.5	3	330	3.8	300	14.5	0.0E+01	1	770	690	50	36
Boullanger Is	5.5	3	330	3.8	300	14.5	0.0E+01	3	740	640	70	35

Boullanger Is	5.5	3	330	3.8	300	14.5	0.0E+01	5	850	760	80	32
Boullanger Is	5.5	3	330	3.8	300	14.5	0.0E+01	5.5	830	730	75	27
Boullanger Is	5.5	3	330	3.8	300	14.5	0.0E+01	8	750	560	90	33
Boullanger Is	5.5	3	330	3.8	300	14.5	0.0E+01	9	560	470	25	14
Boullanger Is	5.5	4	270	4.5	290	13.5	20	2	765	550	70	33
Boullanger Is	5.5	4	270	4.5	290	13.5	20	2.5	570	505	100	41
Boullanger Is	5.5	4	270	4.5	290	13.5	20	5.5	780	655	90	41
Boullanger Is	5.5	4	270	4.5	290	13.5	20	8.5	710	490	55	21
Boullanger Is	5.5	4	270	4.5	290	13.5	20	9	820	680	85	16
Boullanger Is	5.5	4	270	4.5	290	13.5	20	9.5	790	590	95	17
Fishermans Is	2.5	1	225	2.9	20	11.5	35	4	590	505	95	52
Fishermans Is	2.5	1	225	2.9	20	11.5	35	5	550	440	75	53
Fishermans Is	2.5	1	225	2.9	20	11.5	35	6	590	590	95	53
Fishermans Is	2.5	1	225	2.9	20	11.5	35	7.5	570	560	75	47
Fishermans Is	2.5	1	225	2.9	20	11.5	35	8	625	520	90	54
Fishermans Is	2.5	1	225	2.9	20	11.5	35	8.5	630	520	75	35
Fishermans Is	2.5	2	270	2.7	305	11.8	315	0.5	608	530	90	58
Fishermans Is	2.5	2	270	2.7	305	11.8	315	1	590	520	90	57
Fishermans Is	2.5	2	270	2.7	305	11.8	315	3	735	490	85	36
Fishermans Is	2.5	2	270	2.7	305	11.8	315	4	620	490	95	65
Fishermans Is	2.5	2	270	2.7	305	11.8	315	4.5	625	530	75	32
Fishermans Is	2.5	2	270	2.7	305	11.8	315	5	580	500	65	51
Fishermans Is	2.5	3	190	3.5	255	11	270	1	600	560	75	46
Fishermans Is	2.5	3	190	3.5	255	11	270	4	620	500	80	47
Fishermans Is	2.5	3	190	3.5	255	11	270	4.5	560	500	65	36
Fishermans Is	2.5	3	190	3.5	255	11	270	6	620	520	70	22
Fishermans Is	2.5	3	190	3.5	255	11	270	8.5	620	560	45	44
Fishermans Is	2.5	3	190	3.5	255	11	270	9	640	540	50	37
Fishermans Is	2.5	4	70	2.1	110	11.5	130	1	640	520	85	38
Fishermans Is	2.5	4	70	2.1	110	11.5	130	1.5	690	560	80	46
Fishermans Is	2.5	4	70	2.1	110	11.5	130	2	690	560	70	38
Fishermans Is	2.5	4	70	2.1	110	11.5	130	3	640	520	70	44
Fishermans Is	2.5	4	70	2.1	110	11.5	130	4.5	610	500	85	40
Fishermans Is	2.5	4	70	2.1	110	11.5	130	6	475	400	65	40

Fishermans Is	3.5	1	210	7			310	1.5	410	350	75	39
Fishermans Is	3.5	1	210	7			310	2.5	630	420	60	21
Fishermans Is	3.5	1	210	7			310	3	390	320	40	22
Fishermans Is	3.5	1	210	7			310	4.5	470	400	75	41
Fishermans Is	3.5	1	210	7			310	7	310	260	50	24
Fishermans Is	3.5	1	210	7			310	8	270	220	10	6
Fishermans Is	3.5	2	6	8			58	1	600	130	60	44
Fishermans Is	3.5	2	6	8			58	1.5	330	0.0E+01	30	13
Fishermans Is	3.5	2	6	8			58	4	750	630	55	45
Fishermans Is	3.5	2	6	8			58	4.5	720	570	90	51
Fishermans Is	3.5	2	6	8			58	6	660	550	70	38
Fishermans Is	3.5	2	6	8			58	8.5	760	640	80	34
Fishermans Is	3.5	3	142	6			95	3.5	460	350	75	17
Fishermans Is	3.5	3	142	6			95	5.5	420	310	70	31
Fishermans Is	3.5	3	142	6			95	6	470	400	50	23
Fishermans Is	3.5	3	142	6			95	7	460	370	30	21
Fishermans Is	3.5	3	142	6			95	8	540	450	75	24
Fishermans Is	3.5	3	142	6			95	9	520	420	60	27
Fishermans Is	3.5	4	35	4			70	1	600	530	90	37
Fishermans Is	3.5	4	35	4			70	1.5	580	490	50	17
Fishermans Is	3.5	4	35	4			70	2	530	470	75	33
Fishermans Is	3.5	4	35	4			70	7	690	540	70	45
Fishermans Is	3.5	4	35	4			70	8	540	520	60	36
Fishermans Is	3.5	4	35	4			70	9.5	600	520	50	17
Fishermans Is	5.5	1	185	1.7	195	11.5	180	0.5	610	420	70	32
Fishermans Is	5.5	1	185	1.7	195	11.5	180	1.5	465	355	90	27
Fishermans Is	5.5	1	185	1.7	195	11.5	180	2	510	460	80	24
Fishermans Is	5.5	1	185	1.7	195	11.5	180	6.5	555	490	40	18
Fishermans Is	5.5	1	185	1.7	195	11.5	180	7.5	570	460	50	29
Fishermans Is	5.5	1	185	1.7	195	11.5	180	8	690	505	80	32
Fishermans Is	5.5	2	65	2.8	140	11.2	160	2.5	560	420	60	27
Fishermans Is	5.5	2	65	2.8	140	11.2	160	3.5	500	410	80	57
Fishermans Is	5.5	2	65	2.8	140	11.2	160	4	580	435	90	57
Fishermans Is	5.5	2	65	2.8	140	11.2	160	5.5	525	440	75	36

Fishermans Is	5.5	2	65	2.8	140	11.2	160	6.5	595	490	75	41
Fishermans Is	5.5	2	65	2.8	140	11.2	160	9	665	500	53	33
Fishermans Is	5.5	3	35	3.4	350	12.4	340	3.5	650	560	90	44
Fishermans Is	5.5	3	35	3.4	350	12.4	340	5	550	480	75	38
Fishermans Is	5.5	3	35	3.4	350	12.4	340	5.5	520	490	70	41
Fishermans Is	5.5	3	35	3.4	350	12.4	340	6	510	440	60	43
Fishermans Is	5.5	3	35	3.4	350	12.4	340	6.5	470	430	95	41
Fishermans Is	5.5	3	35	3.4	350	12.4	340	9	550	480	95	42
Fishermans Is	5.5	4	330	3.6	300	13.4	300	2	530	440	75	38
Fishermans Is	5.5	4	330	3.6	300	13.4	300	2.5	580	440	60	40
Fishermans Is	5.5	4	330	3.6	300	13.4	300	3	555	430	50	26
Fishermans Is	5.5	4	330	3.6	300	13.4	300	7.5	520	460	75	58
Fishermans Is	5.5	4	330	3.6	300	13.4	300	8	560	450	60	32
Fishermans Is	5.5	4	330	3.6	300	13.4	300	8.5	550	470	65	25