Supplementary Materials.

The Differential Importance of Deep and Shallow Seagrass to Nekton Assemblages of The Great Barrier Reef

Matthew A. Hayes[1,*], Eva C. McClure[1], Paul H. York[2], Kristin I. Jinks[1], Michael A. Rasheed[2], Marcus Sheaves[3], Rod M Connolly[1]

Table S1. Seagrass metrics (species, mean canopy height (mm), mean aboveground biomass (g m^{-2}), LAI, and shoot density (m^{-2})) for each meadow sampled in this study.

Site	Dominant species	Mean canopy height (mm)	LAI (m^{-2})	Aboveground Biomass (g m^{-2})
Shallow One	*Zostera muelleri*	38	23.16	9.08
Shallow Two	*Halodule uninervis*	35.5	13.34	4.6
Shallow Three	*Halodule uninervis*	37	17.39	6.94
Deep One	*Halophila spinulosa*	42.75	27.96	14.46
Deep Two	*Halophila spinulosa*	46.5	21.42	14.24
Deep Three	*Halophila spinulosa*	45	30.97	19.36

Table S2. Comparison on seagrass metrics from Unsworth (2007a), Jinks et al (2019), Unsworth (2007b) and the present study (Hayes deep and Hayes shallow)

Study & complexity	Mean canopy height (mm)	LAI (m^{-2})	Aboveground biomass (g m^{-2})
Unsworth 2007a low	na	na	32
Unsworth 2007a mid	na	na	95
Unsworth 2007a high	na	na	438
Jinks 2019 low	32	41	2
Jinks 2019 mid	85	130	10.9
Jinks 2019 high	250	661	48.1
Hayes deep	45	27	16
Hayes shallow	37	18	7
Unsworth 2007b low	110	na	na
Unsworth 2007b mid	450	na	na
Unsworth 2007b high	800	na	na

Across all common seagrass metrics we found our deep and shallow seagrass meadows (Hayes Deep and Hayes Shallow) all fell within the low complexity categories of all three studies; best described as seagrass meadows with comparatively low aboveground biomass, short stature and lower leaf area indices. For example, in Unsworth et al (2007a) the low complexity sites had aboveground biomass of 31.5 (2.3 SE) g m^{-2}, while in our study, meadows had aboveground biomass of 6.87 and 16.02 g m^{-2} for shallow and deep seagrass meadows respectively. Canopy height in shallow and deep meadows (36.83 and 44.75 mm respectively) was much lower than those reported for low complex meadows in Unsworth et al (2007b; 110 mm), and comparable to those reported in Jinks et al (2019; 32 mm). Likewise, Jinks reported leaf area index values of 41 (m^{-2}) for low complexity sites, while in our study we found shallow and deep meadows had leaf area indices of 17.96 and 26.78 respectively. Given our seagrass metrics were all lower, or comparable to low complexity sites of similar seagrass studies, we determined all meadows within our study to be low complexity seagrass meadows.

Table S3. Showing size spectra slope exponent (b), CPUE, Shannon's H and E, total BPUE, and individual biomass across all nekton caught in the study, and by socioeconomically important species only. Numbers within parentheses are standard errors.

	All nekton species						Socioeconomic important nekton species		
Site	*CPUE (ind m-2)*	*Shannons H*	*Shannons E*	Total BPUE (g m^{-2})	Biomass per individual (g ind-1)	Slope exponent (*b*)	*CPUE (ind m^{-2})*	Total BPUE (g m^{-2})	Biomass per individual (g ind^{-1})
Shallow One	0.38 (0.01)	2.04 (0.12)	0.81 (0.08)	0.10 (0.01)	0.25 (0.03)	-1.36 (0.10)	0.28 (0.02)	0.09 (0.01)	0.32 (0.04)
Shallow Two	0.33 (0.08)	1.72 (0.21)	0.76 (0.09)	0.03 (0.01)	0.10 (0.02)	-1.59 (0.21)	0.13 (0.02)	0.03 (0.00)	0.20 (0.03)
Shallow Three	1.11 (0.18)	1.13 (0.21)	0.41 (0.12)	0.29 (0.02)	0.27 (0.02)	-2.07 (0.05)	0.26 (0.05)	0.18 (0.01)	0.74 (0.12)
Deep One	0.42 (0.18)	1.73 (0.03)	0.75 (0.04)	0.77 (0.34)	1.72 (0.26)	-0.91 (0.08)	0.35 (0.08)	0.63 (0.19)	1.73 (0.26)
Deep Two	0.22 (0.05)	1.94 (0.05)	0.77 (0.05)	0.24 (0.1)	0.96 (0.20)	-1.23 (0.09)	0.21 (0.05)	0.21 (0.09)	0.91 (0.22)
Deep Three	0.98 (0.27)	1.72 (0.07)	0.65 (0.06)	0.83 (0.19)	0.86 (0.05)	-1.16 (0.04)	0.95 (0.27)	0.81 (0.19)	0.87 (0.07)

Table S4. Species and count of individuals caught at each of the three sample locations. Socioeconomically valuable species are indicated as follows: commercial (*), recreational (#) and aquarium (^). Species were also identified by their dietary grouping as follows: omnivore (Om), carnivore (Ca), and herbivore (He).

Species	**Sites**						
	Shallow One	**Shallow two**	**Shallow three**	**Deep One**	**Deep Three**	**Deep Two**	**Total**
Acetes spp. (Om)	45	102	11	1	15	5	179
Acreichthys tomentosus (^, Om)					4	3	7
Alpheus spp. (Om)			2				2
Aluterus scriptus (^, Om)			3	2	30	3	38
Apogonichthyoides atripes (^, Ca)			2	3	15		20
Apogonichthyoides brevicaudatus (^, Ca)			1				1
Brachaluteres taylori (Om)					1		1
Chaetodermis penicilligerus (*,#,^, Om))			3		6		9
Choerodon spp. (*,#, Ca)						1	1
Engyprosopon grandisquama (*,#, Ca)				1	1	5	7
Epinephelus sp. (*,#, Ca)		1					1
Gerres filamentosus (*,#, Ca)	1						1
Gnathanodon speciosus (*,#, Ca)			2				2
Helotes sexlineatus (*, Om)	20	3	9	20	11	1	64
Lagocephalus sceleratus (ca)	1						1
Lethrinus genivittatus (*,#, Ca)	20	1	62	17	68	28	196
Lutjanus russellii (*,#,^, Ca)	1						1
Metapenaeopsis novaeguineae (*, Om)			1		14	6	21
Metapenaeopsis palmensis (*, Om)	1	1	16		1	1	20
Metapenaeopsis wellsi (*, Om)				1			1
Metapenaeus ensis (*,#, Om)			1				1
Penaeus merguiensis (*,#, Om)			1	2			3
Monacanthus chinensis (*,#,^, Om)				2			2
Ostorhinchus hartzfeldii (^, Ca)					16	5	21
Paramonacanthus japonicus (^, Om)			6	43	130	46	225
Pelates quadrilineatus (*,^, Ca)	73	4	11				88
Penaeus indicus (*,#, Om)	1		3				4
Melicertus latisulcatus (*,#, Om)	6	22					28
Melicertus longistylus (*,#, Om)	1		8				9
Melicertus plebejus (*,#, Om)			3		1		4
Penaeus semisulcatus (*,#, Om)	21	29	31	7			88
Petroscirtes lupus (^, Om)				1	1	1	3
Portunus armatus (*,#,^, Om)	1	1	7	9			18
Pristotis obtusirostris (^, Om)						3	3
Secutor insidiator (Ca)	17	39	619				675
Sepioloidea lineolate (Ca)					1	4	5

Sepioteuthis lessoniana (*,#, Ca)		1	1		1		3
Sicyonia lancifer (Om)					2	2	4
Siganus fuscescens (*, He)	20	1	21	75	263	15	395
Siganus spinus (*,^, He)		1					1
Sillago spp. (*,#, Ca)	3						3
Siphamia tubifer (^, Om)						2	2
Species AB		2	1				3
Species AC (penaeid; Om)		8					8
Species AM (fish)	1						1
Species AP (fish)			1				1
Species AQ (fish)			1				1
Species AT (penaeid; Om)	2						2
Species U	1						1
Species Y (fish)		1					1
Suggrundus macracanthus (*,#, Ca)				1	2		3
Thenus australiensis (*, Ca)					1		1
Upeneus asymmetricus (*,#, Ca)				3			3
Yongeichthys nebulosus (^, Ca)	5	29	4			3	41
Grand Total	**241**	**246**	**831**	**188**	**584**	**134**	**2224**

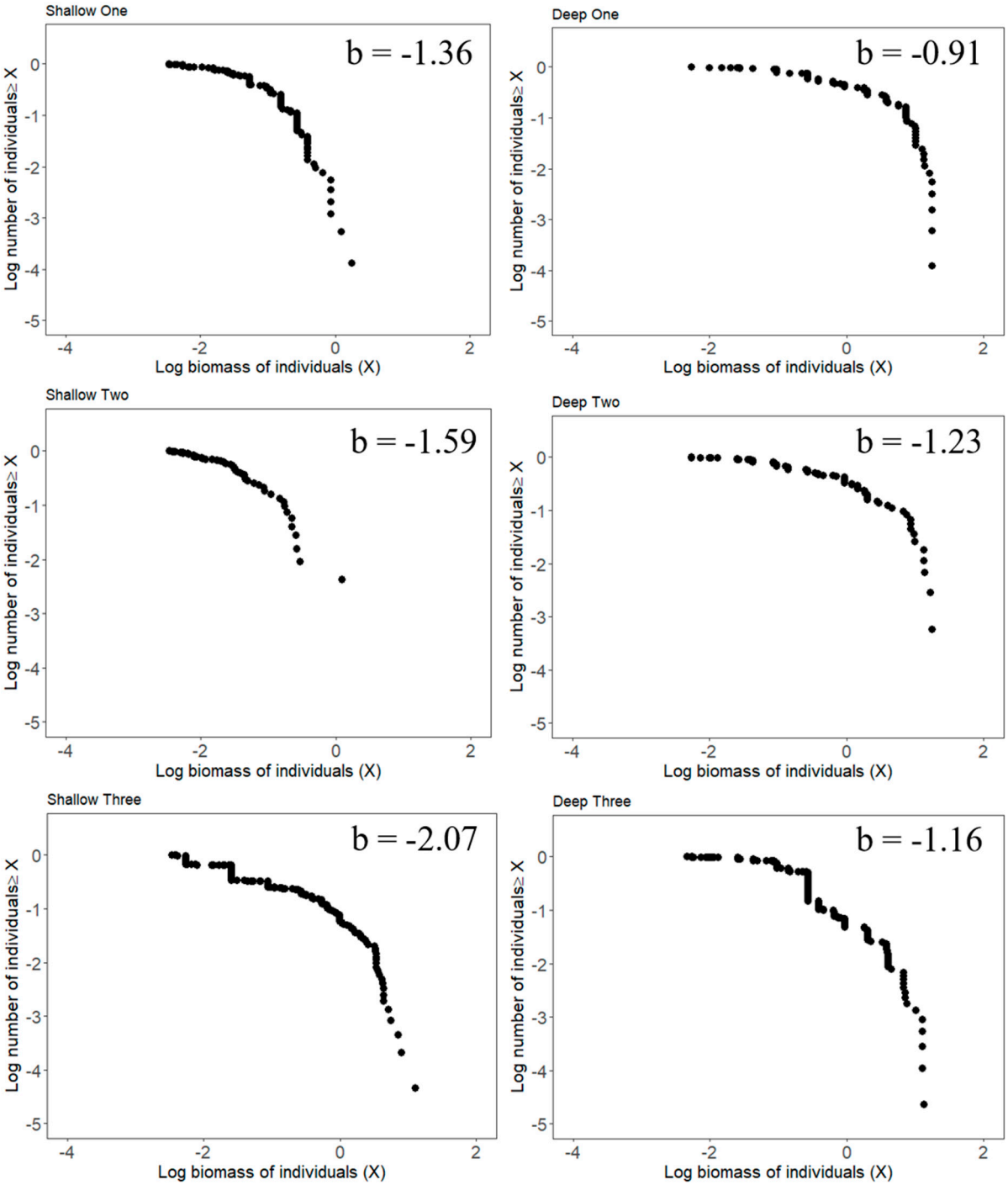

Figure S1. Slope of the nekton size spectra (b) for six seagrass meadows calculated using maximum likelihood estimation (MLE; Edwards et al. 2017). The x-axis represents body mass of individuals (X) plotted against the proportion of individuals greater than or equal to X. The left column are shallow seagrass meadows (< 2m) and the right column are deep (> 9m) meadows.