

Baywide Monitoring of Key
Fishery Species in Seagrass Beds
Sub-Program

Progress Report No. 3
(April 2009)

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Introduction

The purpose of the Monitoring Key Fishery Species in Seagrass Beds Sub-Program of the Channel Deepening Baywide Monitoring Programs (CDBMP) for Port Phillip Bay (PPB) is to improve the understanding of the fish species using seagrass beds in the Bay. This sub-program is described in the CDBMP Detailed Design: CDP_ENV_MD_018 Rev 2.1 (PoMC 2009).

The objective is to collect data on the types and abundance of fish in shallow and deeper seagrass beds that will fill existing knowledge gaps and assist in understanding the significance of any observed changes in seagrass habitat for these fish.

Surveys are undertaken to compare the distribution and abundance of fish in shallow

(< 1 m) and deeper (2–8 m) seagrass beds in three areas of PPB. These surveys are conducted in spring and autumn each year between 2008 and 2011. The autumn 2008 survey was reported in Smith *et al.* (2008) and the spring 2008 survey was reported in Hutchinson *et al.* (2009).

This Report

This report summarises results of the second autumn survey (April 2009) for the sub-program. Preliminary, qualitative results are presented in this report.

Length measurements recorded during April 2009 and quantitative, statistically analysed results will be reported in Milestone Report No. 3.

Materials and Methods

Field and laboratory methods

Field and laboratory methods utilised in the present study are described by Smith *et al.* (2008) and PoMC (2009).

During the autumn 2009 study period (this report), fish were sampled in shallow (< 1 m) and deeper (2–8 m) seagrass, *Heterozostera nigricaulis*, beds at three sites: Blairgowrie, Mud Islands and St Leonards (Figure 1). Samples were collected between 14 and 29 April 2009.

Exceptions

There were no exceptions for this study period according to the Detailed Design - CDP_ENV_MD_018_Rev 2.1 (PoMC 2009).

There were no significant field events observed or other QA/QC issues recorded during this reporting period.

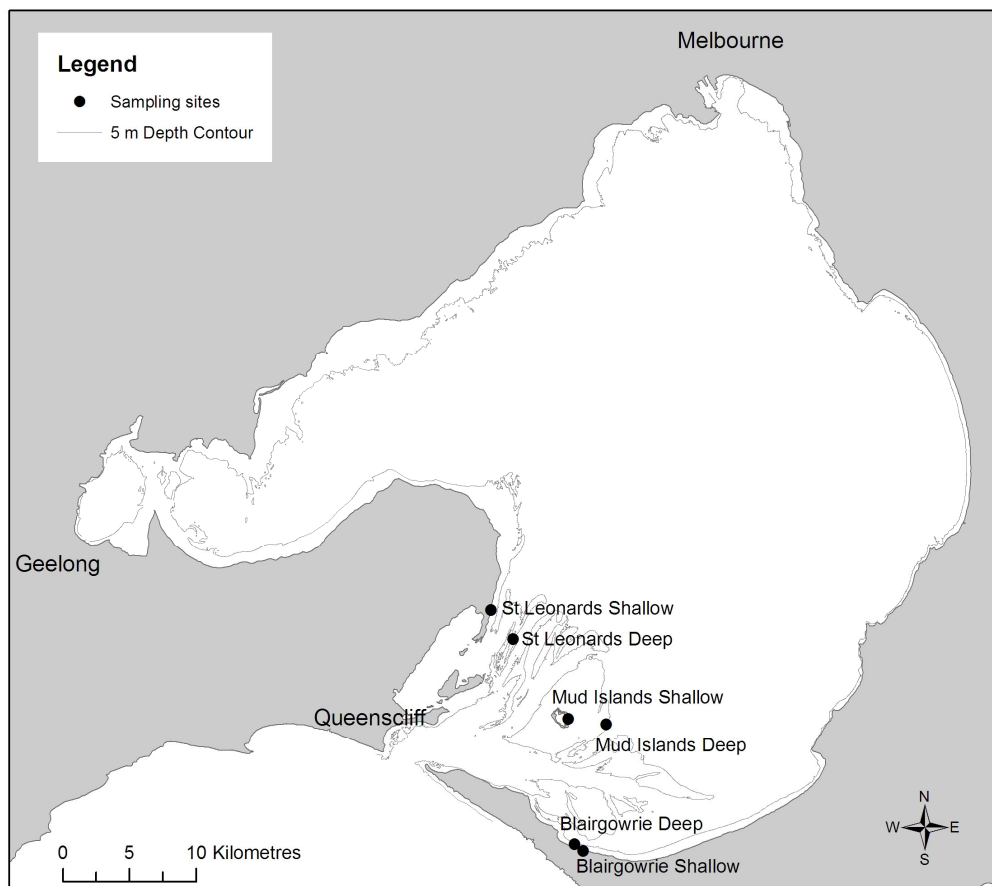


Figure 1. CDBMP sampling sites for monitoring key fishery species in seagrass beds sub-program.

Results and Discussion

A total of 38 fish species (37 finfish and one squid) from 16 families (15 families for finfish and one family for squid) were sampled from all sites (Table 1).

Fish species sampled in April 2009 were indicative of those collected in and around seagrass beds in previous surveys (Smith *et al.* 2008; Hutchinson *et al.* 2009) and in previous studies of PPB (Jenkins *et al.* 1997; Hindell *et al.* 2001). Hardyheads (atherinids), pipefish (syngnathids), weedfish (clinids), and leather jackets (monacanthids) were the dominant species.

Species Richness

Species richness was similar at all sites with:

- 27 species of finfish and one species of squid at Mud Islands
- 26 species of finfish and one species of squid at St Leonards
- 20 species of finfish and one species of squid at Blairgowrie.

A total of 32 species (for all sites, 31 finfish and one squid) were sampled in shallow seagrass, of which 18 finfish were sampled only in shallow seagrass. A total of 20 species (19 finfish and one squid) were sampled in deep seagrass, of which six species (all finfish) were found only in deep seagrass.

Abundance

When data were combined for both depths, it was apparent that the greatest abundance of fish was sampled at Mud Islands (2556 fish), where smallmouth hardyheads (*Atherinosoma microstoma*) and wide-body pipefish (*Stigmatopora nigra*) were dominant. At Blairgowrie (762 fish), these two species were also found to be dominant, while at St Leonards (622 fish), where abundances were lowest, wide-body pipefish and prickly toadfish (*Contusus brevicaudus*) occurred in the greatest numbers.

The abundance of fish (total for all sites) was higher in shallow seagrass (3691 fish) than deep seagrass (249 fish). Shallow seagrass was dominated by smallmouth hardyheads (2073 fish), wide-body pipefish (897 fish), southern pygmy squid (186 squid; *Idiosepius notoides*) and prickly toadfish (72 fish). Deep seagrass was

dominated by a range of species including wide-body pipefish (81 fish), threadfin goby (70 fish; *Nesogobius Sp. 2*), little rock whiting (17 fish; *Neodax balteatus*) and pygmy leatherjacket (10 fish; *Brachaluteres jacksonianus*).

Comparison with previous surveys

During this survey, six species of fish were sampled that were not found during the previous surveys in April or November 2008. All of these species occurred in relatively small abundances: Eastern Australian salmon (three fish; *Arripis trutta*), painted stinkfish (one fish; *Eocallionymus papilio*), Ogilby's weedfish (three fish; *Heteroclinus heptaeolus*), pikehead hardyhead (three fish; *Kestratherina esox*), silverfish (ten fish; *Leptatherina presbyteroides*) and Tasmanian blenny (three fish; *Parablennius tasmanianus*). In contrast, 22 species of fish found in either April or November 2008 were not found in this survey. The majority of these species were rare with few individuals collected at any time, except for two species, King George whiting (*Sillaginodes punctatus*) and Australian herring (*Arripis georgianus*), that were found in large numbers in November 2008.

In shallow seagrass hauls, species richness (i.e. the number of species) at Blairgowrie was lower than previous sampling dates, but at Mud Islands and St Leonards, it was higher than previous sampling dates. In deep seagrass hauls, species richness at Blairgowrie was lower than previous sampling dates, but at Mud Islands and St Leonards it was within the range observed on previous sampling dates (Figure 2).

Average fish abundance in shallow seagrass hauls at Blairgowrie was within the range observed on previous sampling dates, but at Mud Islands and St Leonards it was higher than previous sampling dates. In deep seagrass hauls, average fish abundance at Blairgowrie was higher than previous sampling dates, while at Mud Islands it was lower than previous sampling dates and at St Leonards it was within the range observed on previous sampling dates (Figure 3).

At this stage it cannot be determined whether observed changes are from seasonal or other

factors. In general, variability in fish assemblages in deep and shallow seagrass beds was within what would be expected, based on previous studies (Jenkins *et al.* 1993; 1997).

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Appendix 1 Data Plots

Table 1. Average abundance (No. haul⁻¹; four hauls per site) and total number captured of fish and squid sampled in deep and shallow seagrass beds at each site (Blairgowrie, Mud Islands and St Leonards) in April 2009 (species names from Gomon *et al.* (2008) and Museum of Victoria). Species not found during previous sampling events are marked in bold.

	Family	Common name	Scientific Name	Blairgowrie		Mud Islands		St Leonards		Total Counts
				Deep	Shallow	Deep	Shallow	Deep	Shallow	
Deep	Callionymidae	Painted stinkfish	<i>Eocallionymus papilio</i>	0	0	0.25	0	0	0	1
		Common stinkfish	<i>Foetorepus calaupomus</i>	0	0	0	0	0.25	0	1
	Clinidae	Kuiter's weedfish	<i>Heteroclinus kuiteri</i>	0	0	0.75	0	1.00	0	7
	Gobiesocidae	Grass clingfish	<i>Genus C Sp. 1</i>	0	0	0.50	0	0.75	0	5
	Gobiidae	Threadfin goby	<i>Nesogobius sp2</i>	17.25	0	0.25	0	0	0	70
	Neosebastidae	Little gurnard perch	<i>Maxillicosta scabriceps</i>	0	0	0.25	0	0	0	1
Deep & Shallow	Clinidae	Southern crested weedfish	<i>Cristiceps australis</i>	0	0.25	0.50	0	0	0	3
		Adelaide weedfish	<i>Heteroclinus adelaide</i>	0	0.25	0.25	0.50	0.50	0.75	9
	Gobiidae	Greens goby	<i>Nesogobius greeni</i>	0	4.25	0	7.00	0.75	0.25	49
		Girdled goby	<i>Nesogobius maccullochi</i>	1.50	9.50	0	0.25	0	2.75	56
		Sailfin goby	<i>Nesogobius pulchellus</i>	2.00	0	0	0	0	3.50	22
	Monacanthidae	Bridled leatherjacket	<i>Acanthaluteres spilomelanurus</i>	0	5.50	0	0.25	2.00	2.50	41
		Toothbrush leatherjacket	<i>Acanthaluteres vittiger</i>	0	0	0	0.25	1.75	0.75	11
		Pygmy leatherjacket	<i>Brachaluteres jacksonianus</i>	0.50	0	1.75	0	0.25	0.50	12
		Rough leatherjacket	<i>Scobinichthys granulatus</i>	0	0	0.25	0	0.25	0.50	4
	Odacidae	Little rock whiting	<i>Neoodax balteatus</i>	0	1.00	1.75	0	2.50	3.25	34
	Syngnathidae	Spotted pipefish	<i>Stigmatopora argus</i>	0.50	1.50	0	0	1.00	0.75	15
		Wide-body pipefish	<i>Stigmatopora nigra</i>	4.75	53.00	5.75	92.50	9.75	78.75	978
		Port Phillip pipefish	<i>Vanacampus phillipi</i>	0.25	0	0	2.50	0.25	0	12
Idiosepiidae	Southern pygmy squid	<i>Idiosepius notoides</i>	0.50	2.00	0.75	44.50	1.00	0	195	

Table 1 continued. Average abundance (No. haul⁻¹; four hauls per site) and total number captured of fish and squid sampled in deep and shallow seagrass beds at each site (Blairgowrie, Mud Islands and St Leonards) in April 2009 (species names from Gomon *et al.* (2008) and Museum of Victoria). Species not found during previous sampling events are marked in bold.

Family	Common name	Scientific Name	Blairgowrie		Mud Islands		St Leonards		Total Counts
			Deep	Shallow	Deep	Shallow	Deep	Shallow	
Shallow									
Arripidae	Eastern Australian	<i>Arripis trutta</i>	0	0	0	0	0	0.75	3
Atherinidae	Smallmouth hardyhead	<i>Atherinosoma microstoma</i>	0	56.00	0	458.50	0	3.75	2073
	Shortsnout hardyhead	<i>Kestratherina brevirostris</i>	0	3.75	0	0	0	0.25	16
	Pikehead hardyhead	<i>Kestratherina esox</i>	0	0	0	0.75	0	0	3
	Silverfish	<i>Leptatherina</i>	0	0	0	2.50	0	0	10
Blenniidae	Tasmanian blenny	<i>Parablennius tasmanianus</i>	0	0	0	0	0	0.75	3
Clinidae	Ogilby's weedfish	<i>Heteroclinus heptaeolus</i>	0	0	0	0	0	0.75	3
	Common weedfish	<i>Heteroclinus perspicillatus</i>	0	0	0	12.25	0	0.25	50
Clupeidae	Blue sprat	<i>Spratelloides robustus</i>	0	0	0	0.75	0	11.75	50
Enoplosidae	Old wife	<i>Enoplosus armatus</i>	0	5.25	0	0.25	0	2.75	33
Gobiidae	Tamar River goby	<i>Afurcagobius tamarensis</i>	0	12.25	0	0	0	0	49
	Bridled goby	<i>Arenigobius bifrenatus</i>	0	0	0	1.50	0	0.25	7
	Half bridled goby	<i>Arenigobius frenatus</i>	0	0.50	0	0.75	0	0	5
Monacanthidae	Six spine leatherjacket	<i>Meuschenia freycineti</i>	0	4.25	0	0	0	0.25	18
Syngnathidae	Hairy pipefish	<i>Urocampus carinirostris</i>	0	0	0	0.25	0	0	1
Tetradontidae	Prickly toadfish	<i>Contusus brevicaudus</i>	0	0	0	0.25	0	17.75	72
	Smooth toadfish	<i>Tetractenos glaber</i>	0	0.50	0	0	0	0	2
Tetrarogidae	Cobbler	<i>Gymnapistes marmoratus</i>	0	3.50	0	0.50	0	0	16
Total abundance			109	653	52	2504	88	534	3940

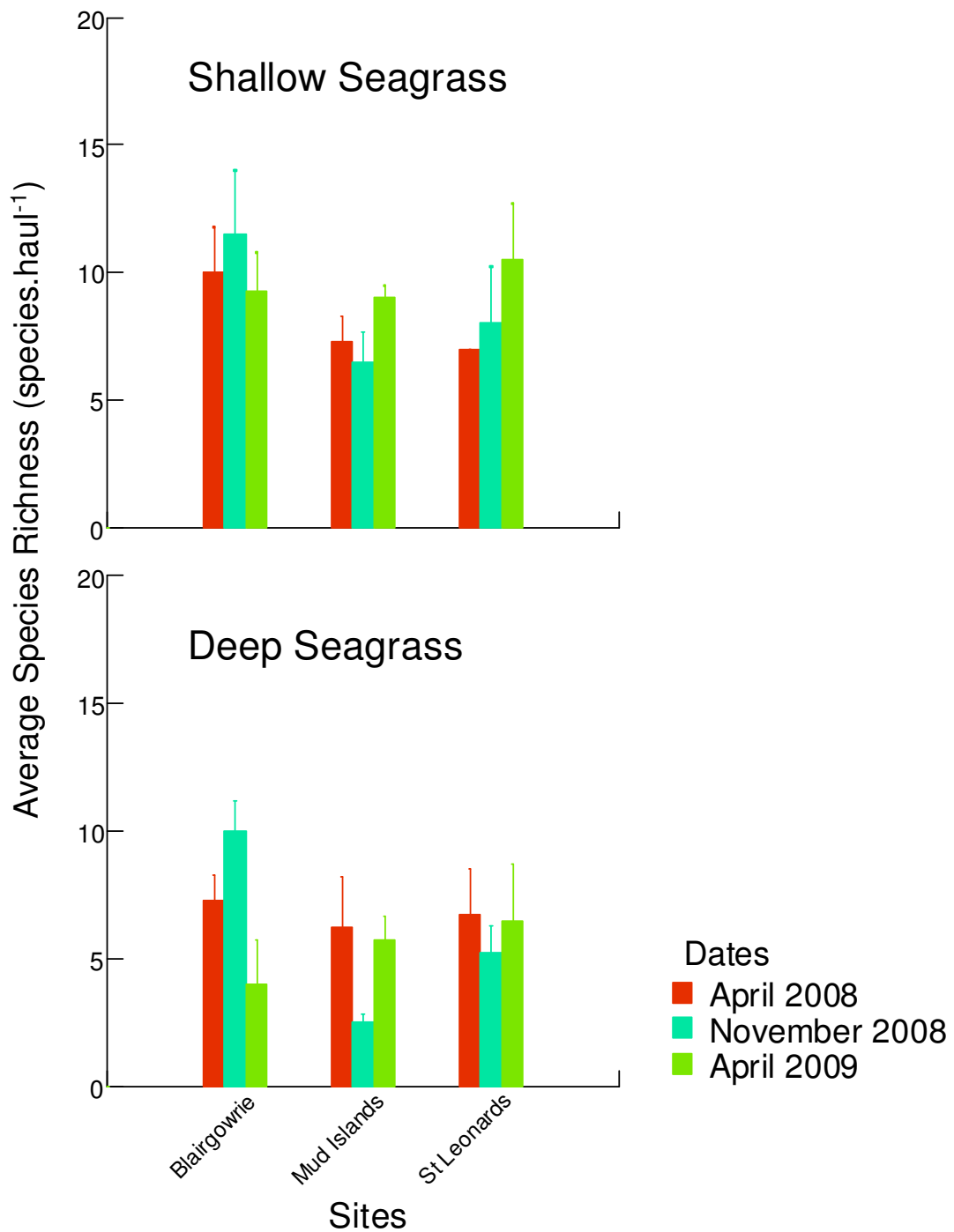


Figure 2. Average (+SE) species richness recorded in seagrass beds at each site in PPB from April 2008 to April 2009.

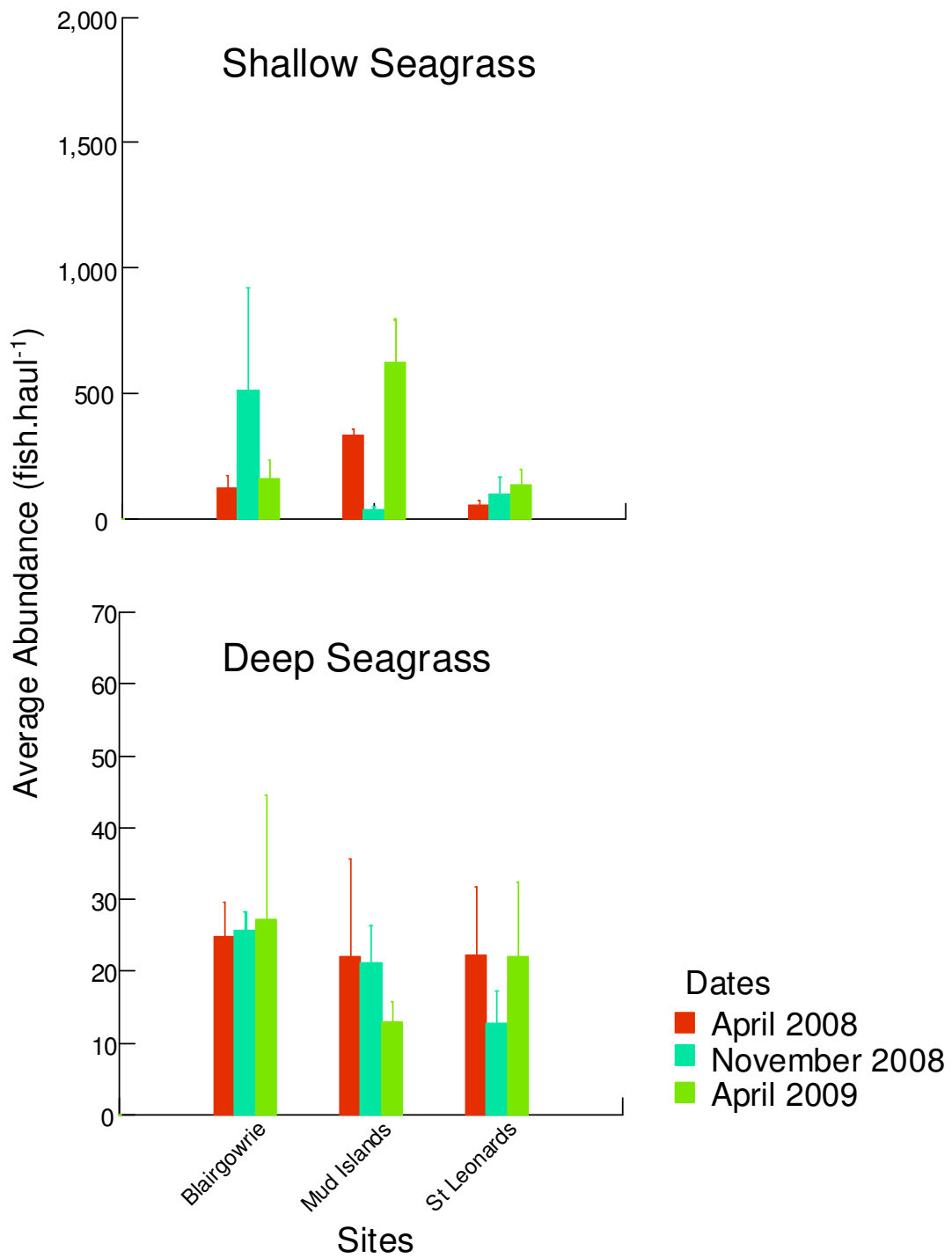


Figure 3. Average (+SE) fish abundance (totalled for all species) recorded in seagrass beds at each site in PPB from April 2008 to April 2009 (n.b. scale change between graphs).

Appendix 2

Raw data

Data are provided with this report electronically, in an MS Excel format requested by PoMC.

Missing data - None

Data Files

Electronic data files are as follows:

- Seagrass fish April 09.xls
- CDP Fish in Seagrass Metadata.doc