

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

Progress Report No. 1  
(April 2008)

July 2008



# **Baywide Monitoring of Key Fishery Species in Seagrass Beds Sub-program**

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# Introduction

Regions of Port Phillip Bay (PPB) are important for fish as feeding, spawning and nursery grounds.

Fish populations are also influenced by environmental conditions such as water quality, currents and habitat availability, either through direct impacts on adults or indirectly through impacts on spawning and recruitment success. However the importance of deeper seagrass habitat to fish species is poorly understood when compared with the better documented shallow seagrass (Jenkins and McKinnon 2006)

The purpose of the Monitoring Key Fishery Species in Seagrass Beds sub-program of the Channel Deepening Baywide Monitoring Programs (CDBMP) for 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 0 (PoMC 2007).

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 (< 1m) and deeper (2–4 m) seagrass beds in three areas of PPB. These surveys are conducted in spring and autumn each year between 2008–2011.

## **This Report**

This report summarises results of the first, autumn survey (April 2008) for the sub-program.

# Materials and Methods

## Field Methods

Fish were sampled in shallow (< 1 m) and deeper (2 - 4 m) seagrass, *Heterozostera nigricaulis*, beds at three sites: Blairgowrie, Mud Islands and St Leonards (Figure 1). The St Leonards site was chosen as a replacement site for Pt Richards as it had better seagrass health and larger patches. Samples were collected between 7 and 17 April, 2008. The relocation site (St Leonards) and the sites at Blairgowrie and Mud Islands are specified in the Detailed Design (PoMC, 2007).

Sampling was conducted using a seine net of 15 m length with a 3 m drop; 15 m ropes were attached to each end of the net. The wings of the net consisted of 3 mm mesh with 1 mm mesh in the cod-end. The net was fitted with a chain-weighted lead-line so that it was negatively buoyant and to stop the net rising off the bottom until completely retrieved in order to sample effectively in the seagrass beds.

From the research vessel, the net was set from a small tender vessel (inflatable). Four, randomly placed, replicate hauls of the seine were

conducted at each of the shallow and deeper seagrass habitats. Large fish were identified, measured (standard length) and recorded before being returned to the water. Smaller fishes were anaesthetised in benzocaine and preserved in 95% ethanol for laboratory analysis.

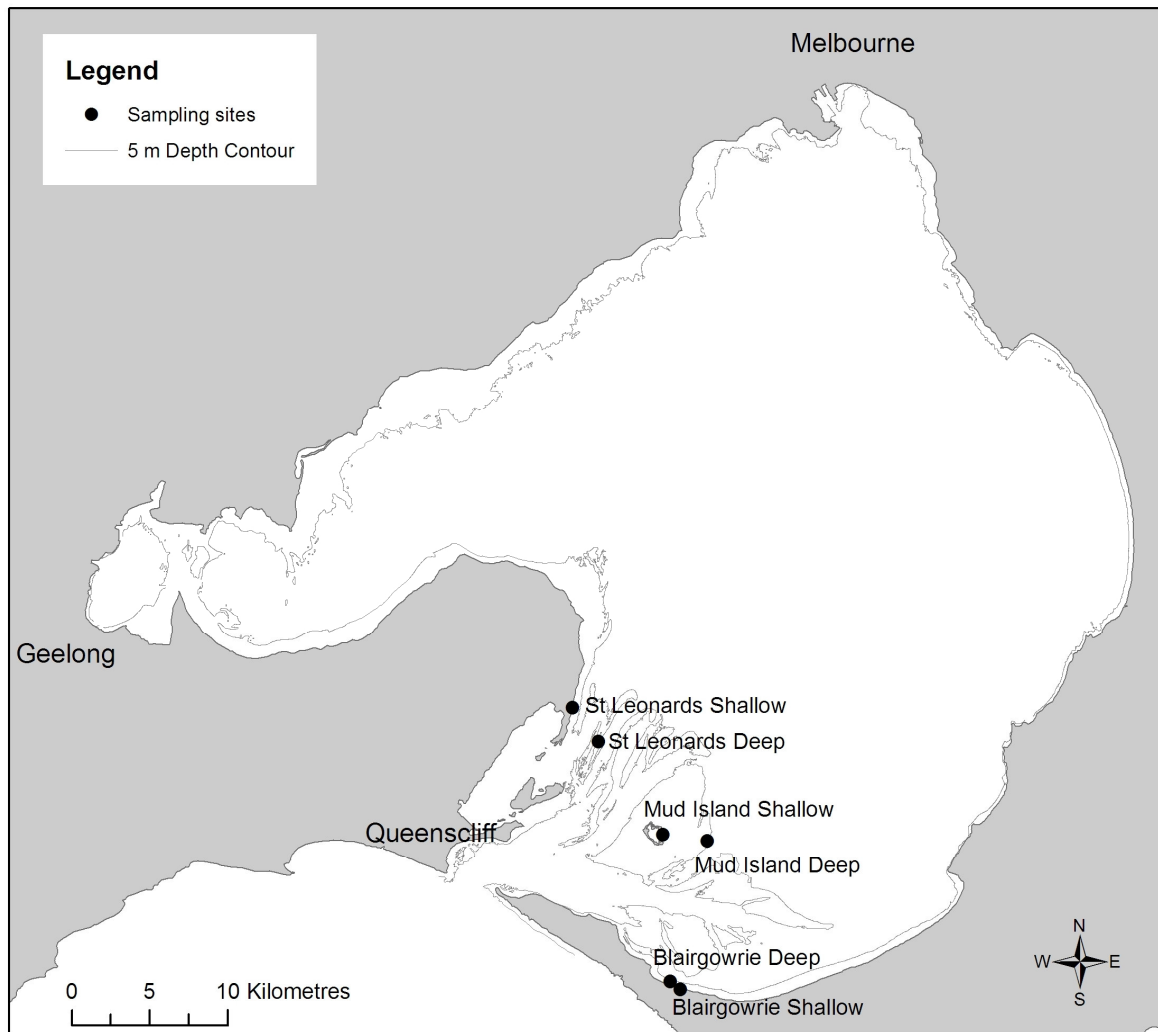
## Laboratory Methods

In the laboratory, fishes were identified to the lowest taxonomic level possible, and measured for standard length (SL, tip of snout to posterior of caudal peduncle). The length of a subsample of 20 specimens was measured for small species with high abundances.

## Definitions

Fish- as a broad term includes teleost fish, sharks, rays, cephalopods and crustaceans.

Fin-fish – refers to true teleost fish and distinguishes teleost fish from sharks, rays, cephalopods and crustaceans.



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

# Results

## Fish

A total of 36 fish species (34 finfish and two squid) from 19 families (17 families for finfish and two families for squid) were sampled for all sites (Table 1).

St Leonards had the greatest species diversity (24 species of finfish and one species of squid) followed by Blairgowrie (23 species finfish and one species of squid) and Mud Island (19 species of finfish and two species of squid).

A total of 26 species (for all sites) were sampled in shallow seagrass, of which 13 were sampled only in shallow seagrass. A total of 23 species (22 finfish and one squid) were sampled in deep seagrass, of which ten species (nine finfish and one squid) were found only in deep seagrass.

The greatest abundance of fish was sampled at Mud Island, where small-mouth hardyheads (*Atherinosoma microstoma*) and wide-bodied pipefish (*Stigmatopora nigra*) were dominant. Fish samples at Blairgowrie were dominated by wide-bodied pipefish and Tamar River gobies (*Afurcagobius tamarenisi*). The lowest fish abundance was found at St Leonards, which was dominated by wide-bodied pipefish and prickly toadfish (*Contusus brevicaudus*).

The abundance of fish (total for all sites) was higher in shallow seagrass (2028 fish) than deep seagrass (276 fish). Shallow seagrass (for all sites) was dominated by small-mouth hardyheads (844 fish), which were only present in shallow seagrass, and wide-bodied pipefish (772 fish) which were also the most abundant species (for all sites) in deep seagrass (53). Other abundant species found in deep seagrass were the bridled leatherjacket, *Acanthaluteres spilomelanurus*, (49 fish in deep seagrass) and the threadfin goby, *Nesogobius* Sp. 2 (44 fish).

## Raw data

- Missing data: None.
- Total fish abundances and lengths are provided with this report electronically as a MS Excel file (see Appendix).

## Exceptions

Exceptions for this study period according to the Detailed Design - CDP\_ENV\_MD\_018\_Rev 0. (PoMC 2007) have been documented separately (ER 2008#8) and specifically relate to:

- Substitution of St Leonards site for the Pt Richards site.

**Table 1. Average abundance of fish and squid sampled in deep and shallow seagrass beds at each site (Blairgowrie, Mud Island and St Leonards) in April 2008.**

Family	common name	Scientific Name	Blairgowrie		Mud Island		St Leonards		Average	Total
			Deep	Shallow	Deep	Shallow	Deep	Shallow		
Antherinidae	Small Mouth Hardy Head	<i>Atherinosoma microstoma</i>	0	10.5	0	200.5	0	0	211	844
Apogonidae	Woods Siphon Fish	<i>Siphaemia cephalotes</i>	0	0	0	0	0	0.25	0.25	1
Callionymidae	Common Stinkfish	<i>Foetorepus calauropomus</i>	0	0	1.25	0	1.25	0	2.5	10
Cheilodactylidae	Dusky Morwong	<i>Dactylophora nigricans</i>	0	0	0	0	0	0.25	0.25	1
Clinidae	Southern Crested Weedfish	<i>Cristiceps australis</i>	0.5	0.5	0.5	0.25	1.25	0.25	3.25	11
	Adelaide Weedfish	<i>Heteroclinus adeladae</i>	0	0.75	0	0	1.25	0.75	2.75	13
	Kuiter's Weedfish	<i>Heteroclinus kuiter</i>	0	0	1	0	3.5	0	4.5	18
	Common Weedfish	<i>Heteroclinus perspicillatus</i>	0	0	0	1.75	0	0.75	2.5	10
Diodontidae	Globefish	<i>Diodon nichthemerus</i>	0.25	0	0	0	0	0	0.25	1
Enoplosidae	Old Wife	<i>Enoplosus armatus</i>	0	0.25	0	0.25	0	1.5	2	8
Gobiesocidae	Tasmanian Clingfish	<i>Aspasmogaster tasmaniensis</i>	0	0	0.5	0	0	0	0.5	2
Gobiidae	Tamar River Goby	<i>Afurcagobius tamarensis</i>	0	39.25	0	0.25	0	0.5	40	160
	Half Bridled Goby	<i>Arenigobius frenatus</i>	0	0	0	1.5	0	0	1.5	6
	Longfinned Goby	<i>Favonigobius lateralis</i>	0	0	0	0	0	0.75	0.75	3
	Greens Goby	<i>Nesogobius greeni</i>	0.25	0	0	0	0	0	0.25	1
	Girdled Goby	<i>Nesogobius mccullochi</i>	0	0.75	0	0	0	0.5	1.25	5
	Sailfin Goby	<i>Nesogobius pulchellus</i>	1.5	0.5	0	0	0	0	2	8
	Threadfin Goby	<i>Nesogobius Sp 2</i>	10	0	1	0	0	0	11	43
	Idiosepiidae	Southern Pygmy Squid	<i>Idiosepius notoides</i>	0.5	0.25	0.75	8.5	1	0	11
Monacanthidae	Bridled Leatherjacket	<i>Acanthaluteres spilomelanurus</i>	0.25	1	7.25	0.75	4.75	0.25	14.25	57
	Toothbrush Leatherjacket	<i>Acanthaluteres vittiger</i>	0	0	0.25	0	0.25	0	0.5	2
	Pygmy Leatherjacket	<i>Brachaluteres jacksonianus</i>	2	1.75	0.5	0	1.5	0	5.75	23
	Six Spine Leather Jacket	<i>Meuschenia freycineti</i>	0	1.25	0	0.5	0	0	1.75	7
	Rough Leatherjacket	<i>Scobinichthys granulatus</i>	0.25	0.25	0	0	0.25	0	0.75	3
Mullidae	Red Mullet	<i>Upeneichthys vlamingii</i>	0	0	0	0	0.5	0	0.5	2
Odacidae	Little Rock Whiting	<i>Neodax balteatus</i>	1.5	2.75	3.75	0.25	2.25	1.25	11.75	47
Pleuronectidae	Greenback Flounder	<i>Rhombosolea tapirina</i>	0	0.25	0	0	0	0.25	0.5	2
Scorpaenidae	Cobbler	<i>Gymnapistes marmoratus</i>	0	3.25	0	0	0	0	3.25	13
Sepiolidae	Southern Dumpling Squid	<i>Euprymna tasmanica</i>	0	0	0.25	0	0	0	0.25	1
Syngnathidae	Spotted Pipefish	<i>Stigmatopora argus</i>	0.25	0.5	0.25	1	0.25	5.25	7.5	30
	Wide-bodied Pipe Fish	<i>Stigmatopora nigra</i>	6.25	55.75	4	119	3	18.25	206.25	825
	Port Phillip Pipefish	<i>Vanacampus phillipi</i>	0.25	0	0.75	0.75	0.5	0.75	3	12
Tetraodontidae	Prickly Toadfish	<i>Contusus brevicaudus</i>	0	0	0	0	0	17.5	17.5	70
	Smooth Toadfish	<i>Tetractenos glaber</i>	1	2.75	0	0	0.25	0.25	4.25	17
Urolophidae	Spotted Stingaree	<i>Urolophus gigas</i>	0	0	0	0.25	0.5	0	0.75	3
	Eastern Shovelnose Stingaree	<i>Trygonoptera Sp.</i>	0.25	0	0	0	0	0	0.25	1
	<b>Ave per shot</b>		25	122.25	22	335.5	22.25	49.25	576.25	2304

# Discussion

Sampling was completed successfully at all three sites in both deep and shallow seagrass. Fish species sampled were indicative of those collected in and around seagrass beds in previous studies of PPB (Jenkins *et al.* 1997, Hindell *et al.* 2001), where hardyheads (Atherinids), pipefish (Syngnathids), weedfish (Clinids), gobies (Gobiids) and leather jackets (Monacanthids) dominated.

Depth of seagrass beds may be important in determining the fish species that inhabit the bed. Total abundance (2028 fish compared with 276 fish) and species richness (26 fish species compared with 23 species) were greater in shallow seagrass than deep seagrass, even when the two most dominant species (wide-bodied pipefish and small-mouth hardyhead) were removed from the data (412 fish in shallow seagrass compared with 223 fish in deep seagrass).

Fourteen finfish species (no squid) were found exclusively in shallow habitats. Ten fish species

(nine finfish and one squid species) were found exclusively in deep habitats, indicating that for some species deep seagrass is more important than shallow seagrass.

Seagrass habitats are often referred to as nurseries for fish species (Jackson *et al.* 2001). Four juvenile fish species were sampled (dusky morwong, *Dactylophora nigricans*; old wife, *Enoplosus armatus*; six spine leather jacket, *Meuschenia freycineti* and prickly toadfish) in shallow seagrass, but none from deep seagrass. Therefore, deep seagrass may not be an important nursery ground for fish species. Recruitment of many fish species, including some of commercial importance such as King George whiting, occurs in spring. The importance of deep seagrass as a nursery ground for fish species will need to be assessed after the next sampling event during late spring-early summer, and once additional data on seagrass biomass and structure are available.

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# Appendix

Electronic data files are as follows:

- Seagrass fish April 08.xls
- CDP Fish in Seagrass Metadata.doc