

# Baywide Egg and Larval Surveys Sub-Program

Progress Report No. 1  
(November 2007-January2008)

July 2008



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# Introduction

Several regions of Port Phillip Bay (PPB) are important to fish as feeding, spawning and nursery grounds.

Eggs and larvae are the stages of the fish life cycle that are most vulnerable to environmental perturbations (Jenkins and McKinnon 2006).

A recent study confirmed that juvenile snapper in PPB are derived predominantly from spawning within the bay rather than from coastal waters (Hamer and Jenkins 2007), and provides information on the abundance of snapper across PPB.

The Egg and Larval Surveys sub-program of the Channel Deepening Baywide Monitoring Programs (CDBMP) will track trends in fish egg and larval abundance, primarily of snapper and anchovy, in PPB.

This sub-program is described in the CDBMP Detailed Design for Egg and Larval Surveys - CDP\_ENV\_MD\_015 Rev 0 (PoMC 2007).

The objective of this sub-program is to detect interannual changes in the abundance of snapper and anchovy eggs and larvae outside of expected variability.

## This Report

This report summarises results collected during the first field sampling event (November 2007–January 2008) of the sub-program with respect to:

- Total number of fish larvae.
- Percentage of snapper and anchovy larvae collected.
- Total number of fish eggs and total number of anchovy eggs.
- Comparison of snapper larval abundance with historical data.

# Materials and Methods

## Field Methods

Sampling methods were based on the recently completed three year sampling program for snapper larvae in Port Phillip Bay (Hamer and Jenkins 2007). The plankton samples examined were collected from six areas within PPB:

Hobsons Bay, Carrum, Mordialloc, Frankston, Central Bay, Point Wilson and Port Phillip Heads (in the entrance of PPB) (Fig. 1). These areas correspond to areas where adult snapper are known to aggregate during the spawning season (Hamer and Jenkins 2007), and also overlap with important anchovy spawning areas (Jenkins 1986).

The plankton samples were collected from 23 November 2007 to 4 January 2008, using a 500  $\mu\text{m}$  mesh plankton net with a circular mouth of 0.8m diameter. The sampler was towed for 20 minutes at a speed of 1.5 knots using stepped oblique tows. Each tow consisted of a series of 1.5 minute pauses at each of five depths as the net was lowered, and again as it was retrieved. The five depths were: just below the surface,  $\frac{1}{4}$ ,  $\frac{1}{2}$ ,  $\frac{3}{4}$  of total depth below the surface, and approximately 1m above the bottom. A warp-depth measure was used to angle the tow rope for each depth. The contents of the cod-end were filtered through a 500  $\mu\text{m}$  sieve and immediately preserved in 95% ethanol. A calibrated flow-meter (attached to the opening of the net) was used to calculate the volume of water filtered on each deployment.

Sampling areas within PPB consist of six defined regions, each approximately 44km<sup>2</sup>. On each sampling occasion five randomly placed plankton tows were conducted within each area (Fig. 1). Sampling at Port Phillip Heads occurred at six sampling points evenly separated along a

transect between Queenscliff Pier and the Quarantine Station near Portsea (Fig. 1).

The sampling design is further described in the Detailed Design (PoMC, 2007) and variations from these specifications are reported in Exception Report ER2008#8.

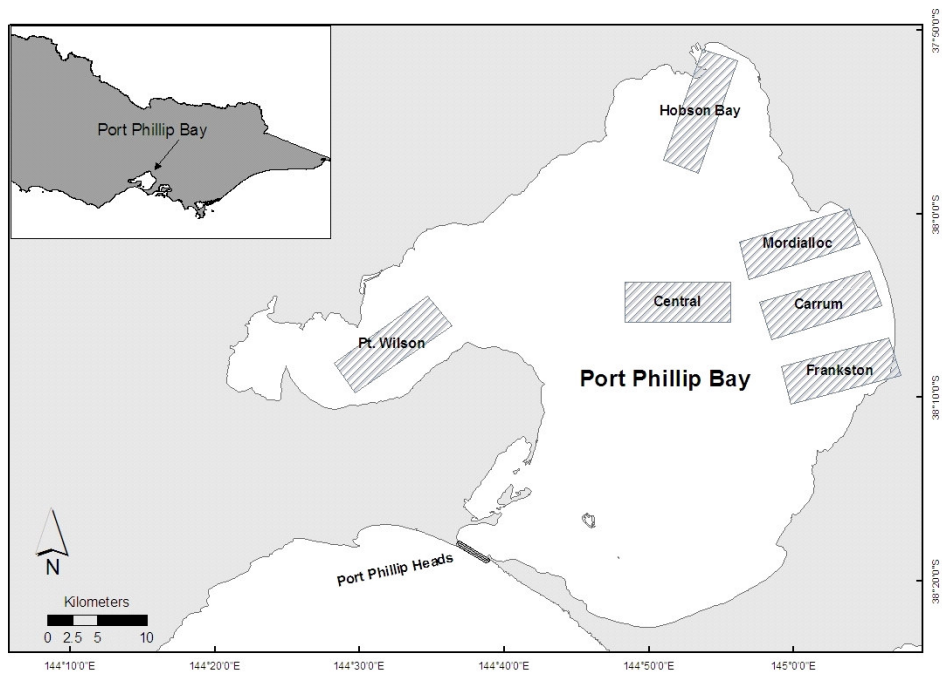
## Laboratory Methods

In the laboratory, all fish eggs and fish larvae were removed from the samples. The total number of fish eggs was counted. Anchovy (*Engraulis australis*) eggs are easily identifiable and were counted. Snapper (*Pagrus auratus*) eggs cannot be distinguished reliably from eggs of other fish species and were not counted.

Anchovy and snapper larvae were identified (based on the descriptions in Neira *et al.* (1998) and counted. Some samples contained a large number of fish eggs and/or anchovy larvae. For these samples, the anchovy eggs and other fish larvae were extracted and then a plankton splitter was used to divide the sample into  $\frac{1}{2}$ ,  $\frac{1}{4}$ ,  $\frac{1}{8}$  or  $\frac{1}{16}$  sub-samples, depending on the amount of material. Egg and fish larval densities (per 1000m<sup>3</sup>) in each sample were calculated using the equation:  $D = ((N/S)/V)*1000$ , where  $N$  is the total of eggs or larvae in each sample,  $S$  is the fraction of the sample that was split and  $V$  is the volume of water sampled (m<sup>3</sup>).

## Data Analysis

The total abundance of fish larvae and snapper larvae were graphically compared with historical data (2004–05, 2005–06 and 2006–07) from Hamer and Jenkins (2007). Abundance for anchovy eggs, anchovy larvae and total fish eggs for 2007–08 were also graphed.



**Figure 1. Map showing locations of CDBMP egg and larval survey sampling areas (shaded boxes) in PPB.**

# Results and Discussion

A total of 76,552 fish eggs (total fish species) were collected during the field sampling event. Anchovy eggs comprised 9.1% of the total fish eggs recorded across all samples (average of  $262 \pm 54$  eggs per  $1000\text{m}^3$ ) (Table 1, Figure 2).

A total of 48,203 fish larvae (total fish species) were collected during the field sampling event. Anchovy larvae comprised 74.5% of the total fish larvae recorded ( $1,338 \pm 303$  larvae per  $1000\text{m}^3$ ) in 2007–08. Snapper larvae comprised 0.7% of the total fish larvae recorded (Table 1; Figure 2).

Snapper larval density was highest in 2004–05 ( $22.4 \pm 6.4$  larvae per  $1000\text{m}^3$ ). A second peak was also recorded in 2007–08 ( $9.6 \pm 2.4$  larvae per  $1000\text{m}^3$ ) (Table 2; Figure 3).

The number of snapper larvae recorded during the field sampling event (November 2007–January 2008) was within the range of abundances observed since 2004–05 and are within expected natural variability. Larval density for total fish species within the current sampling event (2007–08) was the highest recorded since the beginning of monitoring in

2004–05, indicating the variability in spawning from year to year.

## Raw data

- Missing data: None.
- Raw data are provided with this report electronically as a Microsoft Excel file (see Appendix 1).

## Exceptions

Exceptions for this study period according to the detailed design - CDP\_ENV\_MD\_015 Rev 0. (PoMC) have been documented separately (ER2008#6) and specifically relate to:

- Sampling areas within Port Phillip Bay consisted of defined regions of approximately  $44 \text{ km}^2$ .
- Five instead of six plankton tows conducted within each area.
- Late submission of this progress report

**Table 1. Total number and density of fish eggs and larvae collected between November 2007–January 2008 (SE, standard error).**

	Total eggs	Eggs %	Density Mean ( $\pm$ SE) eggs per $1000\text{m}^3$	Total larvae	Larvae %	Density Mean ( $\pm$ SE) larvae per $1000\text{m}^3$
All fish species	76,552	-	$7,138 \pm 1,107$	48,203	-	$1,787 \pm 360$
Snapper	na	na	na	312	0.7	$9.6 \pm 2.4$
Anchovy	6,991	9.1	$262 \pm 54$	35,915	74.5	$1,338 \pm 303$

Legend: na- snapper eggs cannot be identified reliability, no data available

**Table 2. Total number and density of fish larvae collected during 2004–05, 2005–06, 2006–07 and 2007–08 (SE, standard error).**

Period	Number of total fish larvae	Number of Snapper larvae	Density of total fish larvae Mean ( $\pm$ SE) larvae per $1000\text{m}^3$	Density of snapper larvae Mean ( $\pm$ SE) larvae per $1000\text{m}^3$
04/05	18,107	494	$782 \pm 208$	$22.4 \pm 6.4$
05/06	8,775	19	$268 \pm 34$	$0.7 \pm 0.5$
06/07	7,578	84	$277 \pm 61$	$3.2 \pm 0.8$
07/08	48,203	312	$1,787 \pm 360$	$9.6 \pm 2.4$

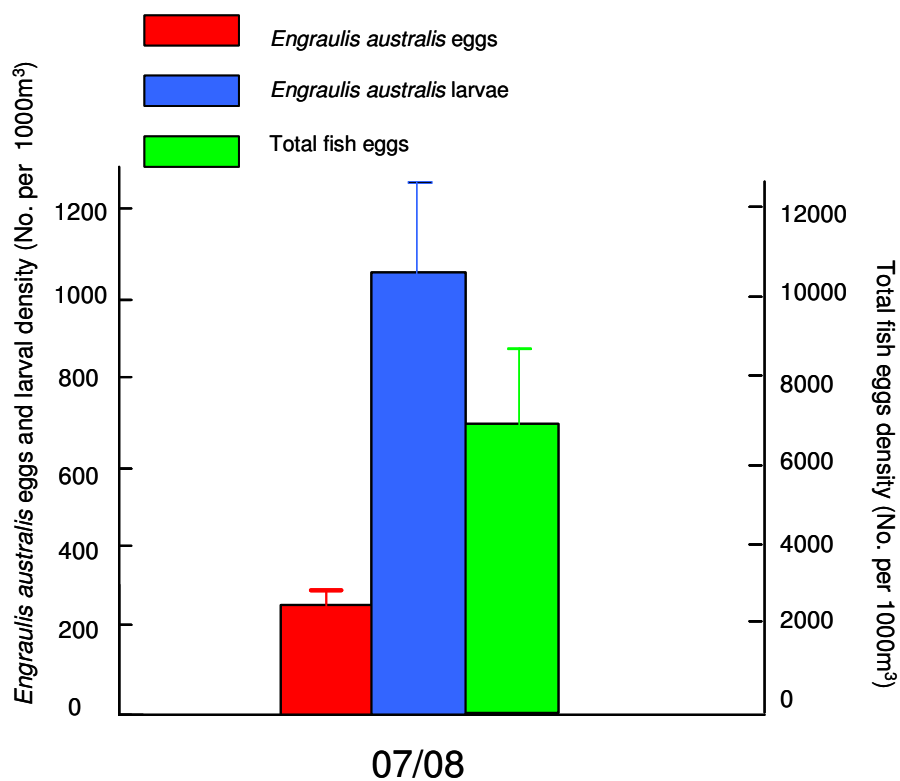


Figure 2. Mean density ( $\pm$ SE) of anchovy (*Engraulis australis*) eggs/larvae and total fish eggs sampled between November 2007–January 2008.

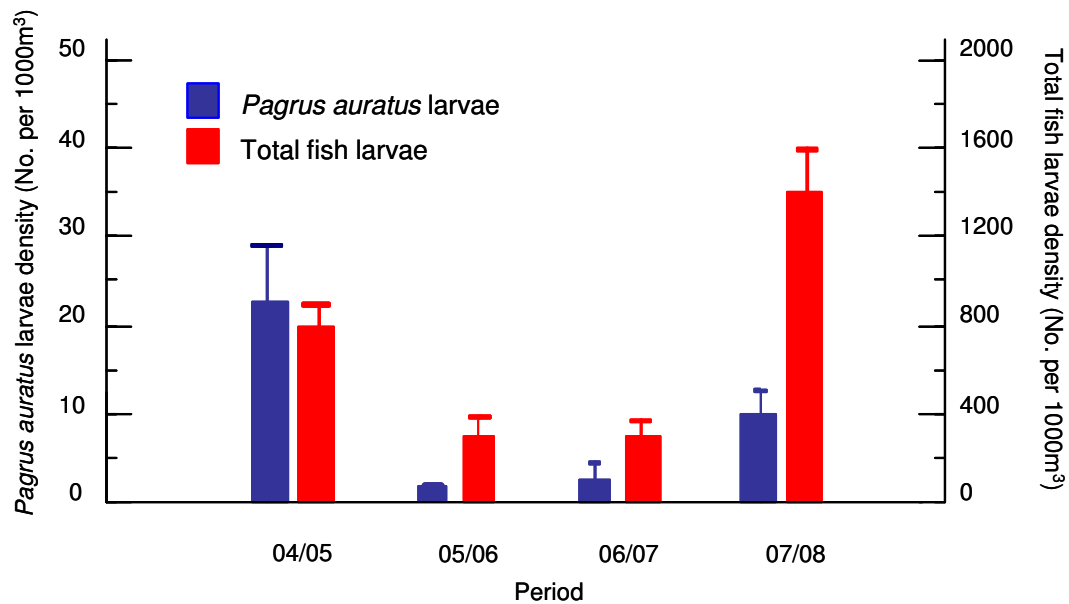


Figure 3. Mean density ( $\pm$ SE) of total fish (all species) and snapper (*Pagrus auratus*) larvae sampled in 2004–05, 2005–06, 2006–07 and 2007–08.

# References

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PoMC (2007). Fish stock and recruitment. Sub-program 2a— Egg and Larval Surveys. Detailed Design CDP\_ENV\_MD\_017 Rev 0, ([www.channelproject.com](http://www.channelproject.com)). Port of Melbourne Corporation

Neira, F.J., Miskiewicz, A.G. and Trnski, T. (1998) Larvae of temperate Australian fishes - laboratory guide for larval fish identification. University of Western Australia Press: Nedlands, Western Australia.

# Appendix 1

Electronic data files are as follows:

- PPB\_All\_Period\_snapper.xls
- PPB\_0708\_anchovy.xls
- PPB eggs and larvae\_0708metadata.doc