

# Baywide Egg and Larval Surveys Sub-Program

Progress Report No. 2  
(November 2007-January 2008)

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# **Baywide Egg and Larval Surveys Sub-Program**

## **Progress Report No. 2 (November 2007–January 2008)**

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# Table of Contents

<b>Introduction</b> .....	<b>1</b>
This Report.....	1
<b>Materials and Methods</b> .....	<b>2</b>
Exceptions .....	2
<b>Results and Discussion</b> .....	<b>4</b>
Raw data .....	4
<b>References</b> .....	<b>5</b>
<b>Appendix 1</b> .....	<b>6</b>
<b>Appendix 2</b> .....	<b>7</b>

## List of Tables

Table 1. Total number and mean concentration ( $\pm$ standard error) of fish eggs and anchovy eggs collected during each Period.	4
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## List of Figures

Figure 1. Map showing locations of plankton sampling areas (shaded boxes) within PPB (Region 1) and the sampling transect immediately inside Port Phillip Heads (Region 2).....	3
Figure 2. Mean of the log-transformed concentration ( $\pm 1$ standard error) of anchovy ( <i>Engraulis australis</i> ) eggs and anchovy larvae collected during each period.....	4

# Introduction

The Egg and Larval Survey Sub-Program of the Channel Deepening Baywide Monitoring Programs (CDBMP) will track trends in egg and larval abundance 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 1.1 (PoMC 2008).

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

## This Report

This report summarises results for the sub-program with respect to:

- Sorting of anchovy eggs from historical samples
- Comparison of anchovy eggs and larval abundance from the 2007–08 CDBMP field sampling event with historical anchovy egg and larval data.

# Materials and Methods

Field, laboratory and data analysis methods for this sub-program are described by PoMC (2008) and Acevedo *et al.* (2009a, b), and for the historical sampling by Hamer and Jenkins (2007) (see also Appendix 2). Samples were collected from two regions within the Bay (Figure 1). Region 1 consisted of six sampling areas within the Bay, while Region 2 consisted of a transect immediately inside Port Phillip Heads (Figure 1).

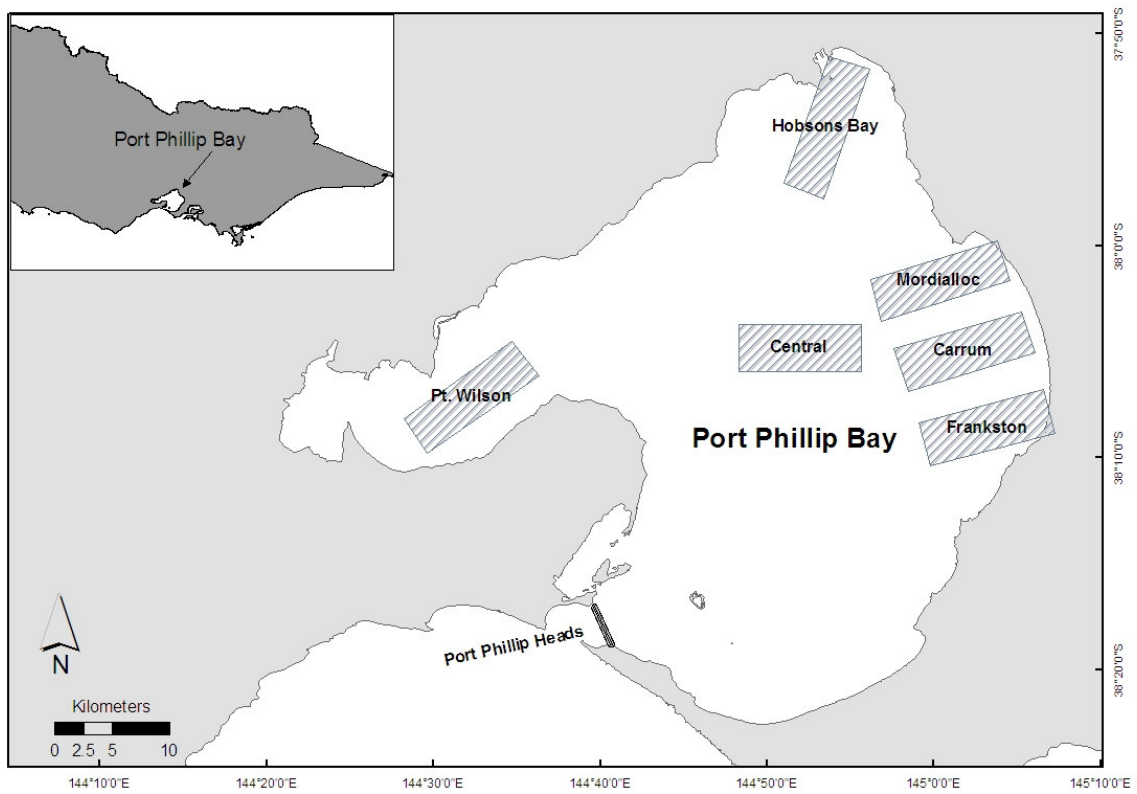
For this report, anchovy (*Engraulis australis*) eggs and larvae were sorted and counted from the historical samples (Hamer and Jenkins 2007). Anchovy larvae were identified based on the descriptions in Neira *et al.* (1998). Anchovy egg and larval concentrations (per 1000 m<sup>3</sup>) in each sample were calculated using the equation:  $D = ((N/S)/V) * 1000$ , where  $N$  is the total of eggs/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>), consistent with Acevedo *et al.* (2009a, b).

Concentrations of anchovy eggs and anchovy larvae were tabulated and graphically compared between historical data (Period 1: 2004–05, Period 2: 2005–06 and Period 3: 2006–07) collected by Hamer and Jenkins (2007) and the most recent sampling (Period 4: 2007–08) for the present study (Acevedo *et al.* 2009a, b). Results are presented for both raw concentration data and log-transformed concentration data. Log-transformation was used to reduce the influence of individual samples with exceptionally high concentrations on the mean values.

## Exceptions

Exception Report ER2008#6 (Vers. 2), according to the Detailed Design (PoMC 2007), still applies in part for the study period November 2007–January 2008 (Acevedo *et al.* 2009a, b), and specifically relates to:

- Five instead of six plankton tows conducted within each sampling area.



**Figure 1. Map showing locations of plankton sampling areas (shaded boxes) within PPB (Region 1) and the sampling transect immediately inside Port Phillip Heads (Region 2).**

# Results and Discussion

Results for the 2007–08 field sampling event only have been previously reported by Acevedo *et al.* (2009a, b). A total of 13 267 anchovy eggs and 106 729 anchovy larvae were collected over all four periods (Table 1, Figure 2).

Total anchovy egg concentrations were lowest in 2004–05 (Period 1) and highest in 2007–08 (Period 4) (Table 1), and for the log-transformed data there was an increasing trend from 2004–05 (Period 1) to 2007–08 (Period 4) (Figure 2).

Total anchovy larvae concentrations were lowest in 2006–07 (Period 3) and highest in 2007–08 (Period 4) (Table 1), and for the log-transformed data the highest concentration was in 2004–05 (Period 1) (Figure 2).

(Period 1) (Figure 2). Anchovy larvae comprised 78.5 % of the total fish larvae recorded during all four periods.

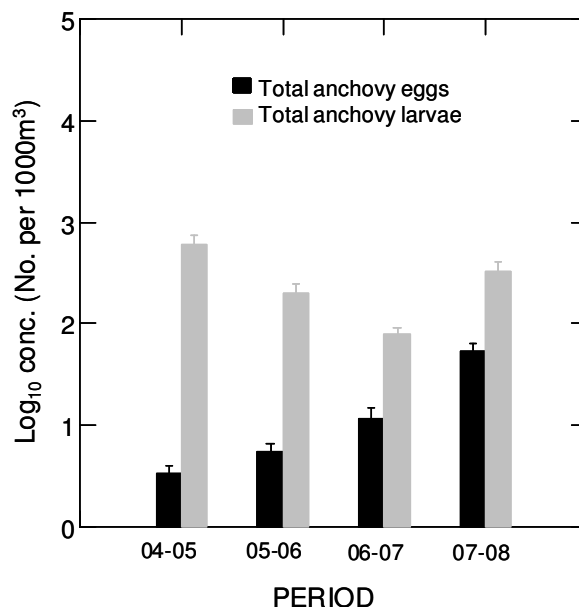
Inter-annual variation in anchovy eggs and larvae is high, and the concentrations recorded in 2007–08 (Period 4) were within, or exceeded, the range of natural variability recorded over the previous three years (Periods 1-3).

## Raw data

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

**Table 1. Total number and mean concentration ( $\pm$  standard error) of fish eggs and anchovy eggs collected during each Period.**

Period	Total anchovy eggs	Mean concentration anchovy eggs (larvae per 1000m <sup>3</sup> )	Total anchovy larvae	Mean concentration anchovy larvae (larvae per 1000m <sup>3</sup> )
1 (2004–05)	889	43.7 $\pm$ 23.1	25 298	1637.5 $\pm$ 290.1
2 (2005–06)	1108	49.6 $\pm$ 18.9	27 268	1187.8 $\pm$ 309.0
3 (2006–07)	4279	225.7 $\pm$ 128.2	6487	287.7 $\pm$ 73.2
4 (2007–08)	6991	261.6 $\pm$ 54.2	47 676	1783.4 $\pm$ 447.6
<b>All four periods</b>	<b>13 267</b>	<b>160.1 <math>\pm</math> 37.7</b>	<b>106 729</b>	<b>1237.6 <math>\pm</math> 173.1</b>



**Figure 2. Mean of the log-transformed concentration ( $\pm$ 1 standard error) of anchovy (*Engraulis australis*) eggs and anchovy larvae collected during each period.**

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# Appendix 1

Electronic data files are as follows:

- PPB\_Anchovy eggs larvae\_snapper larvae\_Period 4.xls

# Appendix 2

## Field Methods

Ichthyoplankton sampling methods were based on the recently completed three-year sampling program for snapper larvae in PPB (Hamer and Jenkins 2007) and are described by PoMC (2008) and Acevedo *et al.* (2009a,b). Samples were collected from two regions within the Bay:

- Region 1: consisted of six defined geographical areas of approximately 44 km<sup>2</sup> (Hobsons Bay, Carrum, Mordialloc, Frankston, Central Bay and Point Wilson)
- Region 2: consisted of six sampling points between Queenscliff Pier and the Quarantine Station near Portsea at Port Phillip Heads (at the entrance of PPB).

The areas within the Bay correspond to areas where adult snapper (*Pagrus auratus*) are known to aggregate during the spawning season (Hamer and Jenkins 2007) and overlap with known anchovy spawning areas (Jenkins 1986).

Samples were collected during daylight from 23 November 2007 to 4 January 2008, using a 500 µm mesh plankton net with a circular mouth of 0.8 m 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 included: just below the surface, ¼, ½, ¾ of total depth below the surface, and approximately 1m above the bottom. The net depth was set on the basis of warp length and angle, verified periodically using a submersible pressure gauge. The plankton net was washed with seawater after completion of each tow. The contents of the cod-end were filtered through a 500 µm sieve and immediately preserved in 95% ethanol. A calibrated General Oceanics flow-meter (attached to the opening of the net) was used to calculate the distance towed on each deployment. The volume of water sampled was calculated by multiplying the distance towed by the opening area of the net. Volume filtered for each tow averaged approximately 400 m<sup>3</sup>.

Each region was sampled on two occasions (Round 1, late November/early December and Round 2, mid December/early January) during the spawning season. Five randomly placed plankton tows were conducted in each Round,

within each area of Region 1. In Region 2 the same six sampling points were sampled in each Round. Significant tidal currents in the Port Phillip Heads area meant sampling was restricted to flood tide for consistency.